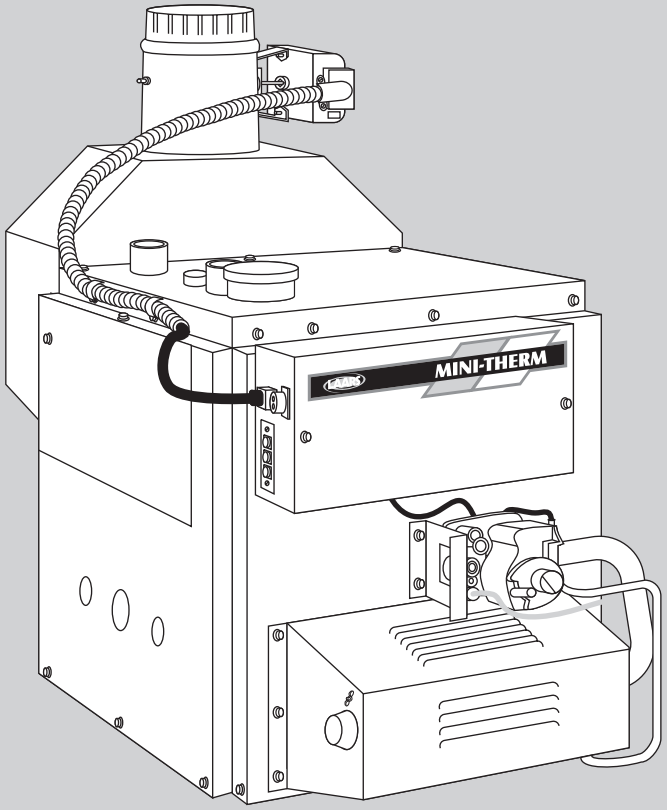

Installation
and Operation
Instructions for

Mini-Therm II

Residential
Gas-Fired
Hydronic Boilers

Model JV
Sizes 50-225

Vent damper is optional in some provinces of Canada.
These instructions are to be stored in the packet provided on the boiler.

FOR YOUR SAFETY: This product must be installed and serviced by a professional service technician, qualified in hot water boiler installation and maintenance. Improper installation and/or operation could create carbon monoxide gas in flue gases which could cause serious injury, property damage, or death. Improper installation and/or operation will void the warranty.

⚠WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids 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 nearby 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 gas supplier.

H0071400W

LAARS HEATING SYSTEMS

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SECTION 1.
General Information

⚠WARNING

The JV hydronic boiler **must** be installed in accordance with the procedures detailed in this manual, or the Laars warranty will be voided. The installation must conform to the requirements of the local jurisdiction having authority, and, in the United States, to the latest edition of the National Fuel Gas Code, ANSI Z223.1. In Canada, the installation must conform with the latest edition of CAN/CGA-B149.1 OR .2 installation codes for gas burning appliances, and/or local codes. Any modifications to the boiler, its gas controls, gas orifices, wiring or draft diverter may void the warranty. If field conditions require modifications, consult the factory representative before initiating such modifications.

1A. Introduction

This manual provides information necessary for the installation, operation, and maintenance of Laars Model JV copper tube hydronic boilers. These boilers are available in two configurations; the JVT has a thermocouple/continuous burning pilot, and the JVS has an electronic intermittent ignition device (I.I.D.). Look for the model designation on the rating plate, which can be found on top of the boiler in the right rear corner. If the unit is part of a Mini-Combo II (model MC) Residential Gas-Fired Space/Water Heater, refer also to Document 8001, Mini-Combo II Installation and Operation Instructions.

The Laars automatic vent dampers are standard on all U.S. models. The Laars side wall power venters can be used on both JVS and JVT models. Special instructions for their installation are included in the vent damper and power venter package. Read them carefully before installation.

All application and installation procedures should be reviewed completely before proceeding with the installation. Consult the Laars factory, or local factory representative, with any problems or questions regarding this equipment. Experience has shown that most operating problems are caused by improper installation.

1B. Warranty

The Laars Model JV boilers are covered by a limited warranty. The owner should fill out the warranty registration card and return it to Laars.

All warranty claims must be made to an authorized Laars representative or directly to the factory. Claims must include the boiler serial number and model (this information can be found on the rating plate), installation date, and name of the installer. Shipping costs are not included in the warranty coverage.

Some accessory items are shipped in separate packages. Verify receipt of all packages listed on the packing slip. Inspect everything for damage immediately upon delivery, and advise the carrier of any shortages or damage. Any such claims should be filed with the carrier. The carrier, not the shipper, is responsible for shortages and damage to the shipment whether visible or concealed.

1C. Field Assembly

1. Mini-Therm II boilers have built-in draft diverter for natural draft operation.
2. Find the vent damper box which is located in the boiler package (vent damper is optional in Canada).
3. Install the vent damper directly to the top of the draft diverter outlet with the damper operator facing to the front of the boiler, and with the flow direction arrow pointing upward. Use the vent damper wire harness provided with the boiler to connect the vent damper to the boiler. The bracket end of the harness should be connected to the vent damper actuator.
4. For Model JVS only: Install the metal plug provided with the vent damper onto the damper plate hole. Disregard the metal plug in case of standing (continuous) pilot boilers. **The damper plate hole should never be blocked on all JVT models.**

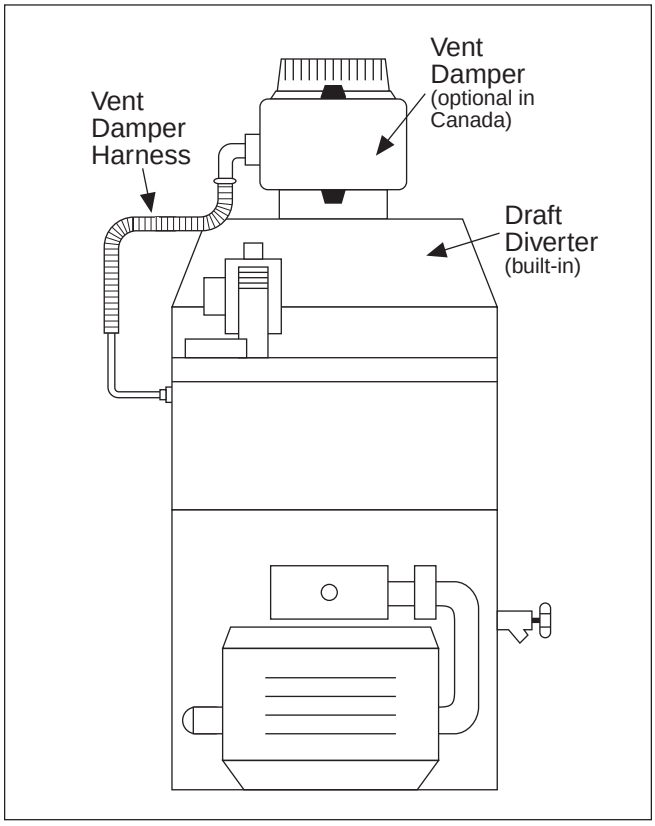


Figure 1. Vent Damper Installation.

5. The field assembly is now complete. The boiler is ready for water, gas and electrical connections and venting installation.
6. Do not modify the automatic vent damper device. It is very important that no other vents are closed. Provide at least six inches clearance between the automatic vent damper and combustible construction, and be sure to allow access for servicing the damper.

⚠Caution
Do not force motor operation when operator is fastened to the damper by moving the damper blade, turning the shaft or by turning the position indicator.

Note: In Canada, the vent damper is optional.

1D. Flow Requirements

All high recovery, low volume water boilers must have adequate flow for efficient operation. Pump selection is critical to this goal, and pumps should be selected to provide for system design water temperature rise. Table 1 details temperature rise and water flow (GPM) for the Mini-Therm boilers.

Damage from improper flow is not warranted.

Failure to insure proper water flow through the heat exchanger of the boiler will void the Laars warranty. Flow can be verified by measuring the difference in water temperatures between the boiler inlet and outlet. For example: For a JV-100 installation, the inlet water temperature is 160°F (71°C), and the outlet temperature is 180°F (82°C). That means there is a 20° (-7°C) temperature rise through the boiler. According to Table 1, that would indicate a flow rate of 8 GPM (0.5L/S). Temperature rise must be measured with the longest (highest head) zone calling for heat alone.

Other factors to be considered before selecting a pump are pipe size, the number of fittings throughout the system, smoothness of the interior surface of the pipe, the quantity of water flowing through the pipe, whether a glycol solution is being used, and the total length of piping in the system. Table 2 can help in making that determination.

1E. Boiler Placement

The boiler must be placed to provide clearances on all sides for maintenance and inspection. There must also be minimum distances maintained from combustible surfaces.

At least 15" (381mm) access must be available in front of the boiler for burner removal. Consult local codes for clearances to hot water pipes and accessories.

If the boiler is to be installed in a garage, all burners and burner ignition devices must have a minimum 18" (457mm) clearance above the floor.

The Model JV-50 through JV-100 boilers can be installed in a closet, as long as the minimum clearances shown in Table 3 are observed. Special attention should be paid to clearances between the front of the boiler and the closet door when it is closed.

Consult the American National Standard Z21.13 for more information concerning closet installations. In Canada, refer to the latest edition of CAN/CGA-B149.1 and 2.

IMPORTANT: The boiler shall be installed on a floor of non-combustible construction with non-combustible flooring and surface finish and with no combustible materials against the underside, or on fire-resistant slabs or arches having no combustible materials against the underside unless listed for installation on a combustible floor.

All boilers must be installed on a non-combustible surface. That means a surface not capable of being ignited and burning, such as surfaces

Size	15°F *8°C*				20°F *11°C*				25°F *14°C*			
	Flow Rate		Headloss		Flow Rate		Headloss		Flow Rate		Headloss	
	gpm	*l/s*	ft	*m*	gpm	*l/s*	ft	*m*	gpm	*l/s*	ft	*m*
50	5.3	*0.3*	0.3	*0.1*	4.0	*0.3*	0.2	*0.1*	3.2	*0.2*	0.1	*0.0*
75	8.0	*0.5*	0.6	*0.2*	6.0	*0.4*	0.3	*0.1*	4.8	*0.3*	0.2	*0.1*
100	10.7	*0.7*	1.3	*0.4*	8.0	*0.5*	0.7	*0.2*	6.4	*0.4*	0.5	*0.2*
125	13.3	*0.8*	2.2	*0.7*	10.0	*0.6*	1.3	*0.4*	8.0	*0.5*	0.8	*0.2*
160	17.0	*1.1*	2.5	*0.8*	12.8	*0.8*	1.8	*0.5*	10.2	*0.6*	1.2	*0.4*
225	24.0	*1.5*	5.0	*1.5*	18.0	*1.1*	3.1	*0.9*	14.4	*0.9*	1.9	*0.6*

gpm = Water Flow in gallons per minute. *l/s = Water flow in liters per second.*
ft = Pressure drop (headloss) through the boilerin feet of water. *m = Pressure drop (headloss) through the boiler in meters of water.*
Note: Shaded area is the recommended flow and temperature rise.

Table 1. Temperature Rise °F *°C.*

consisting entirely of a combination of steel, iron, brick, tile, concrete, slate, glass or plaster.

All boilers can be installed on a combustible floor if a non-combustible base assembly, available from Laars, is used. See the boiler rating plate for the appropriate base part number. **Boilers must never be installed on carpeting.**

Size	1/2" Pipe		3/4" Pipe			1" Pipe			1-1/4" Pipe		
	Pump H.P.		Pump H.P.			Pump H.P.			Pump H.P.		
	1/25	1/12	1/25	1/12	1/6	1/25	1/12	1/6	1/25	1/12	1/6
50	50	99	390	680	*	*	*	*	*	*	*
75	*	35	160	300	460	640	*	*	*	*	*
100	*	*	77	150	260	330	620	*	*	*	*
125	*	*	27	80	140	170	360	600	*	*	*
160	*	*	*	25	72	57	160	330	190	480	*
225	*	*	*	*	*	*	*	110	*	69	330

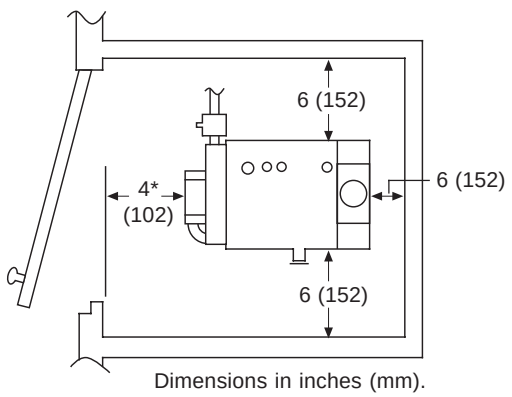
*A circular and/or primary/secondary piping are required. Consult factory.

1. Chart is based on 30°F (-1°C) maximum temperature rise.
2. Calculations are based on Type L copper tubing with one zone valve and eight elbows.
3. Typical circulating pumps: 1/25 HP=Taco 007, B&G LR-20 or SLC-25, Grundfos UP15-42F, or equivalent. 1/12 HP=B&G LR-12, Grundfos UP26-42F, or equivalent. 1/6 HP=B&G series HV, Grundfos UP43-75, or equivalent.

Table 2. Maximum Suggested Circuit Length in Feet.

Boiler Sizes	50-125		160-225	
Clearances	in	*mm*	in	*mm*
Left side	6	*152*	6	*152*
Right side	6	*152*	6	*152*
Rear	6	*152*	6	*152*
Front	4	*102*	6	*152*
Flue	6	*152*	6	*152*
Top	23	*484*	36	*914*

Table 3. Minimum Boiler Clearances From Combustible Surfaces.



Dimensions in inches (mm).

*6" for models JV160 to JV225.

Figure 2. Closet and Alcove Installation (see Table 3).

As an alternative to the Laars non-combustible base plate, the National Fuel Code allows a boiler to be placed on other than a non-combustible surface when such an installation complies with the American Insurance Code. This code specifies the surface under the boiler be protected with hollow masonry no less than 4" (102mm) thick, covered with sheet metal at least 24 ga. in thickness. Such masonry must be laid with ends unsealed, and joints matched in such a way as to provide a free circulation of air from side to side through the masonry (see Figure 3).

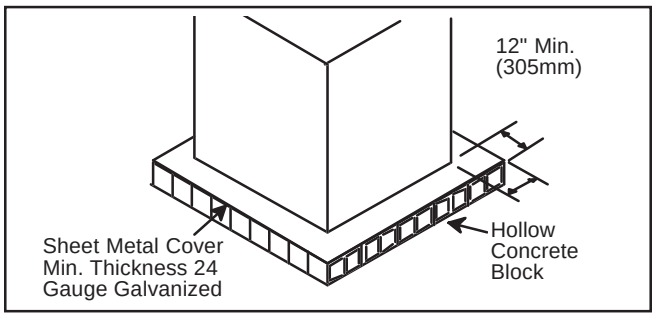


Figure 3. Typical Combustible Floor Installation.

1F. Gas Supply and Piping

Review the following instructions before proceeding with the installation.

1. Verify that the boiler is fitted for the proper type of gas by checking the rating plate. Laars boilers are normally equipped to operate below a 2000 foot altitude. Boilers equipped to operate at higher altitudes have appropriate stickers or tags attached (next to the rating plate).
2. Use the figures in Table 4 to provide adequate gas piping from the gas meter to the boiler.
3. A trap (drip leg) must be provided ahead of the gas controls (see Figure 4). A manual gas shutoff valve must also be provided for service convenience and safety. Check the local codes.

Distance From Gas Meter	Boiler Size					
	50	75	100	125	160	225
	Pipe Size					
0-50' *0-15m*	1/2	3/4	3/4	3/4	1	1
50-100' *15-30m*	3/4	3/4	3/4	1	1	1-1/4
100-200' *30-60m*	3/4	1	1	1	1-1/4	1-1/4

Note: These figures are for Natural Gas (.65 Sp. Gr.), and are based on 1/2" water column pressure drop. Check supply pressure with a manometer, and local code requirements for variations. For LPG, reduce pipe diameter one size, but maintain a 1/2" minimum diameter. A 'normal' number of Tees and elbows have been taken into allowance.

Table 4. Gas Piping Sizes.

4. Disconnect the boiler from the gas supply pipe before pressure testing the pipe for gas leaks. Provide gas supply pressure to the boiler as follows:

Inches Water Column	Natural Gas	Propane (LP)
Minimum	5.5	10
Maximum	9	14

NOTE: The boiler and all other gas appliances sharing the boiler gas supply line must be firing at maximum capacity to properly measure the inlet supply pressure. Low gas pressure could be an indication of an undersize gas meter and/or obstructed gas supply line.

5. The correct burner manifold gas pressure is stamped on the rating plate. The regulator is pre-set at the factory, and normally requires no further adjustment.
6. Before operating the boiler, the complete gas supply system and all connections must be tested for leaks using a soap solution.

1G. Combustion Air Supply

The boiler location must provide sufficient air supply for proper combustion, and ventilation of the surrounding area as outlined in the latest edition of ANSI standard Z223.1 or in Canada, CAN/CGA-B149.1 or .2, and any local codes that may be applicable.

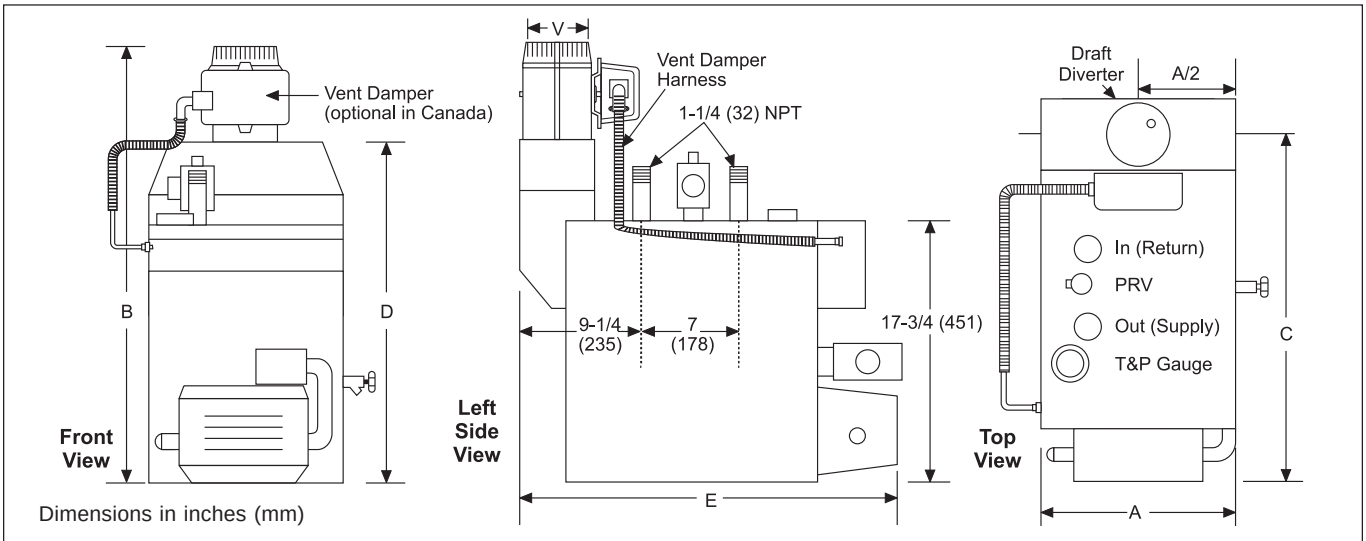
In general, these requirements specify that boiler rooms which represent confined spaces should be provided with two permanent air supply openings; one within 12 inches (305mm) of the ceiling, the other within 12 inches (305mm) of the floor.

Boiler Size	Outside Air Area* Sq. In.	*sq cm*	Inside Air Area* Sq. In.	*sq cm*
50	15	*97*	100	645
75	20	*129*	100	645
100	25	*161*	100	645
125	32	*206*	125	807
160	40	*258*	160	1032
225	60	*387*	225	1452

*Area indicated is for one of two openings; one at floor level and one at the ceiling, so the total net free area would be double the figures indicated. For special conditions, refer to NFPA54 ANSI Z223.1. **In Canada refer to the National Standard CAN1-B149.1 or .2 which differs from this table.**
NOTE: Check with louver manufacturers for Net Free Area of louvers. Correct for screen resistance to the Net Free Area if a screen is installed. Check all local codes applicable to combustion air.

Table 5. Minimum Recommended Air Supply to Boiler Room.

⚠ Important
See gas line selection chart, Table 4 previous page, for gas line sizing. In all cases, pipe size is larger than inlet connection on heater. Run pipe size shown in chart and reduce at heater inlet.



Size	Dimensions inches (*mm*) A	B	C	D	E	V	Water Conn. in.	Gas Conn. in.
50	13-3/8 *340*	27-3/4 *705*	23-5/8 *600*	21-3/4 *552*	26-1/2 *673*	4 *102*	1-1/4	1/2
75	13-3/8 *340*	27-*3/4* *705*	24-1/8 *613*	21-3/4 *552*	27-1/2 *699*	5 *127*	1-1/4	1/2
100	16-7/8 *429*	28-3/4 *730*	24-1/8 *613*	22-3/4 *578*	27-1/2 *699*	5 *127*	1-1/4	1/2
125	16-7/8 *429*	28-3/4 *730*	23-5/8 *600*	22-3/4 *578*	27-1/2 *699*	6 *152*	1-1/4	1/2
160	20-3/8 *518*	28-3/4 *730*	23-5/8 *600*	22-3/4 *578*	27-1/2 *699*	6 *152*	1-1/4	1/2
225	25-5/8 *651*	31-1/2 *800*	23-1/4 *591*	23-3/4 *629*	27-1/2 *699*	7 *178*	1-1/4	3/4*

*1/2 for propane

Figure 4. Dimensional Information.

Outside Air Supply: When combustion air is supplied directly through an outside wall, each opening should have a minimum free area of one square inch per 4,000 BTU/h (1.2kW) input of the total input rating of all appliances in the enclosed area.

Inside Air Supply: When combustion is supplied from inside the building, each opening should have a minimum free area of one square inch per 1,000 BTU/h (0.3kW) input of the total input rating of all appliances in the enclosed area. These openings should never be less than 100 square inches (645 sq. cm).

Note: In Canada, follow Canadian Standard, CAN/CGA-B149.1, .2 or local codes.

Exhaust Fans or Vents: Any equipment which exhausts air from the boiler room can deplete the combustion air supply or reverse the natural draft action of the venting system. This could cause flue products to accumulate in the boiler room. Additional air must be supplied to compensate for such exhaust.

The information in Table 5 is not applicable in installations where exhaust fans or blowers of any type are used. Such installations must be designed by qualified engineers.

If a blower or fan is used to supply air to the boiler room, the installer should make sure it does not create drafts which could cause nuisance shutdowns of the pilot. If a blower is necessary to provide adequate combustion air to the boiler, a suitable switch or equivalent must be wired into the boiler control circuit to prevent the boiler from firing unless the blower is operating.

The boiler must be completely isolated and protected from any source of corrosive chemical fumes such as those emitted by trichlorethylene, perchlorethylene, chlorine, etc.

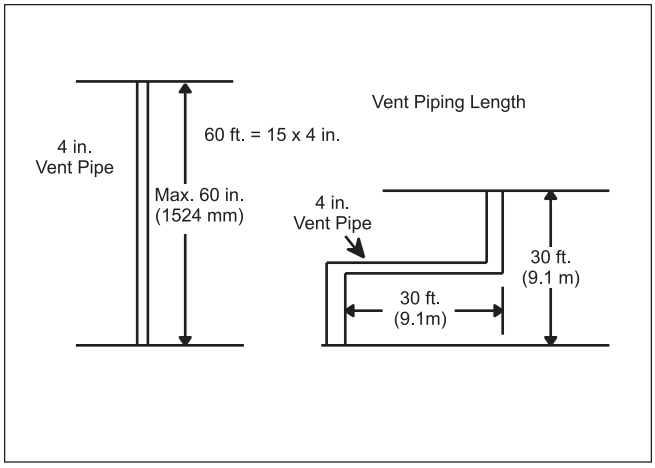


Figure 5. Vent Pipe Sizing.

1H. Venting

The draft diverter outlet is to be connected to an unobstructed vent pipe of the same or larger diameter, terminating outside the building. The vent pipe must have a listed vent cap, and extend at least two feet above any object within a ten foot radius. All connections should be made with rustproof sheet metal screws.

IMPORTANT NOTE: Do not use sheet metal screws at the snap lock joints of Type B gas vents.

Do not weld or fasten the vent pipe to the boiler draft diverter. The weight of the stack must not rest on the boiler. The draft diverter and boiler top must be easily removable for normal boiler service and inspection.

Avoid horizontal runs of the vent pipe, and 90° elbows, reductions and restrictions. Horizontal runs should have at least a 1/4" rise per foot (20mm per meter) in the direction of flow. A vent connector shall be supported for the design and weight of the material employed to maintain clearances and prevent physical damage and separation of joints.

Avoid terminating boiler vents near air conditioning or air supply fans. The fans can pick up exhaust flue products from the boiler and return them inside the building, creating a possible health hazard.

Always use double-wall or insulated vent pipe when used as a chimney (Type B or equivalent). In cold weather, uninsulated outside vents can chill the rising flue products, blocking the natural draft action of the venting system. This can create a health hazard by spilling flue products into the boiler room. Use engineered venting tables acceptable to the authority having jurisdiction to size the venting pipe or liner.

Avoid oversize vent piping or extremely long runs of the pipe which may cause excessive cooling and condensation.

Rule of Thumb: The total length of the vent, including the connector and any offset, should not exceed 15 feet (4.6m) for every inch (25mm) of vent diameter (see Figure 5). Longer total lengths shown in venting tables are based on maximum capacity, not condensation factors.

Before connecting a vent connector to a chimney, the chimney passageway shall be examined to ascertain that it is clear and free of obstructions. When inspection reveals that an existing chimney is not safe for the intended application, it shall be rebuilt to conform to nationally recognized standards (see National Building Code or ANSI/NFPA 211), lined or relined with a suitable liner, or replaced with a vent or chimney suitable for the equipment to be attached.

1H-1. Common Venting System

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it.

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as it is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous conditions of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z223.1.

1I. Water Piping of Boiler System

Figure 5 shows 'typical' plumbing installations. Be sure to provide **unions** and **gate valves** at the boiler inlet and outlet so it can be isolated for service. Check local codes for specific plumbing requirements before beginning the installation.

An ASME pressure relief valve is supplied on all JV boilers, and is pre-set at 30 PSI. The valve outlet piping must discharge to a drain. Under no circumstances should the relief valve piping be a closed circuit.

A pressure reducing valve (automatic feed) must be used to maintain system at constant proper pressure (see Figure 6). Supply properly installed purge valves to eliminate air from each circuit.

A drain valve is supplied with the boiler, and can be found in the plastic bag shipped with each boiler. This valve is to be installed on the lower right side of the boiler, see Figure 4, and is used for draining the unit. **To drain the boiler completely, open the drain valve and remove the two drain plugs located on the lower left side of the boiler.**

Be sure to include air vent devices located at the highest point in the system to eliminate trapped air, and an air elimination device near the outlet side of the JV boiler. Manual vent valves are recommended.

Hot water piping should be supported by suitable hangers or floor stands, NOT by the boiler. Due to expansion and contraction of copper pipe, consideration should be given to the type of hangers used. Rigid hangers could transmit noise through the system caused by the piping sliding in the hangers. It is recommended that padding be used when rigid hangers are installed.

Gas piping should also be supported by suitable hangers or floor stands, not the boiler.

A properly sized expansion tank must be included in the system. Laars offers an aircharged diaphragm-type expansion tank, with an automatic feed valve, which includes a pressure regulator set at 12 psig. **The part numbers are:**

Less Than 20 Gallons in System	A0066800
20 to 45 Gallons in System	A0066900

1I-1. By-pass Piping

The following information and suggestions are made on by-pass piping as it affects the temperature rise at the boiler. A boiler temperature rise must be taken on all JV boiler installations. If the temperature rise exceeds 30°F (-1°C), it is an indication that the boiler is not receiving adequate water flow. Check the pump for any obstruction, replace the pump with a larger size where necessary, or install a system by-pass as indicated in Figures 6 and 7.

On JV sizes 125, 160 and 225 with a multiple zone system, a by-pass is required to ensure proper flow in addition to properly sized circulator and piping system.

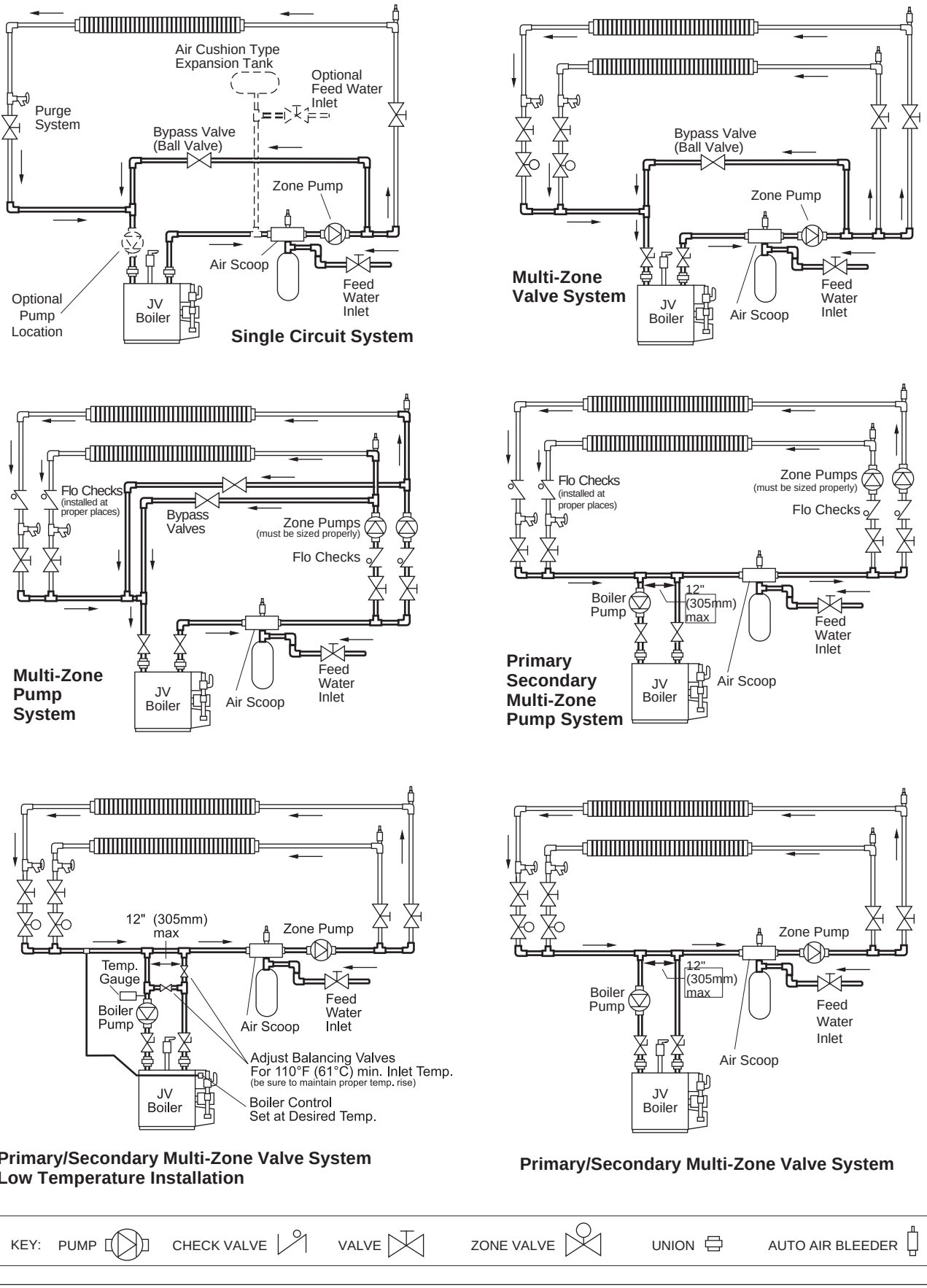


Figure 6. Typical Plumbing Installations.

Note: On JV sizes 160 and 225 a primary/secondary piping system is recommended. In this system, a circulator is dedicated to pumping the boiler only. This circulator should be sized for the boiler head loss and flow rate.

The two above piping configurations can also apply to JV sizes 50, 75 and 100, especially in multi-zone installations, but flow rates may be obtained without a by-pass.

All precautions must be taken by the installer to insure that a maximum temperature rise through the boiler does not exceed 30°F (-1°C). The temperature rise on boilers installed in multi-zone systems using zone valves must be taken when the zone of the longest length and/or the zone of the highest head loss is open.

Please note that a 1¼" diameter by-pass with balancing ball valve must be installed if a return water temperature of below 110°F (43°C) is expected under operating conditions (see Figure 7).

1J. Chilled Water Systems

If the boiler is installed in conjunction with refrigeration systems, it shall be installed so that the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler.

When boiler piping is connected to heating coils, which are in close proximity to refrigerated air circulation, there must be flow control valves or other automatic methods to prevent gravity circulation of the boiler water during the cooling cycle.

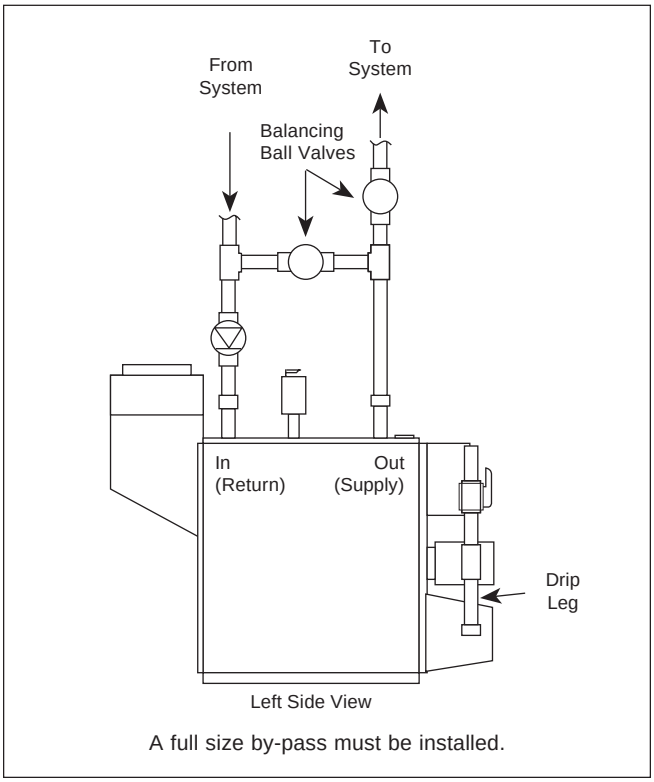


Figure 7. By-pass Piping.

1K. Electrical Wiring

Follow these instructions to make the necessary initial electrical connections.

1. Remove the two screws attaching the front cover of the control box.
2. There are four wires coiled in the area on the right side of the control box, supplied with wire nuts: 2 black wires twisted together, a white wire and a brown wire (see Figure 8).
3. Follow the schematics in Figure 9. Remove the wire nut from the two black wires, and connect the hot lead from a 115V power supply to both wires. Secure the three wires with the wire nut. The white, neutral wire should be joined to the other neutral lead coming from the 115V power supply, and the neutral lead coming from the pump. The brown wire attaches to the hot side of the pump.
4. Attach the leads from the wall thermostat to the R and W terminals on the terminal strip, located on the left side of the control box.
5. When using a Laars or field supplied power venter, the proving switch must be connected in series with the hi-limit. See wiring diagrams, Document 1077. See Figure 1 for vent damper connections.
6. Check the boiler wiring and pump for correct voltage, frequency and phase. If the pump circuit is other than 115V, be sure there is an appropriate transformer or relay installed. The pump relay is suitable for pumps of ¾ HP or less.
7. For systems with multiple zone pumps or valves, see Figure 10.

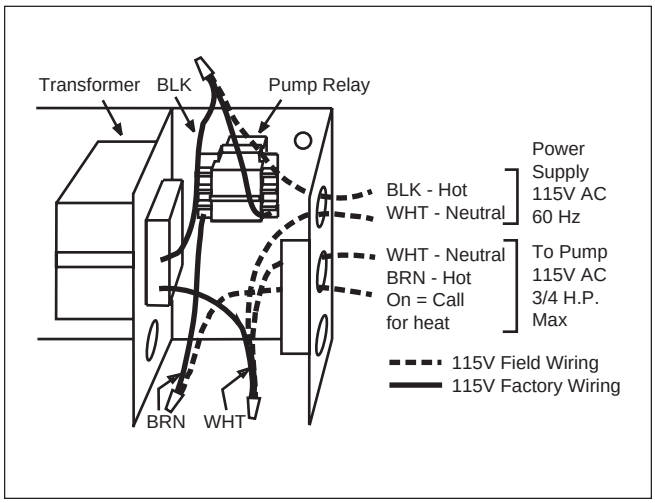


Figure 8. Field Wiring Connections.

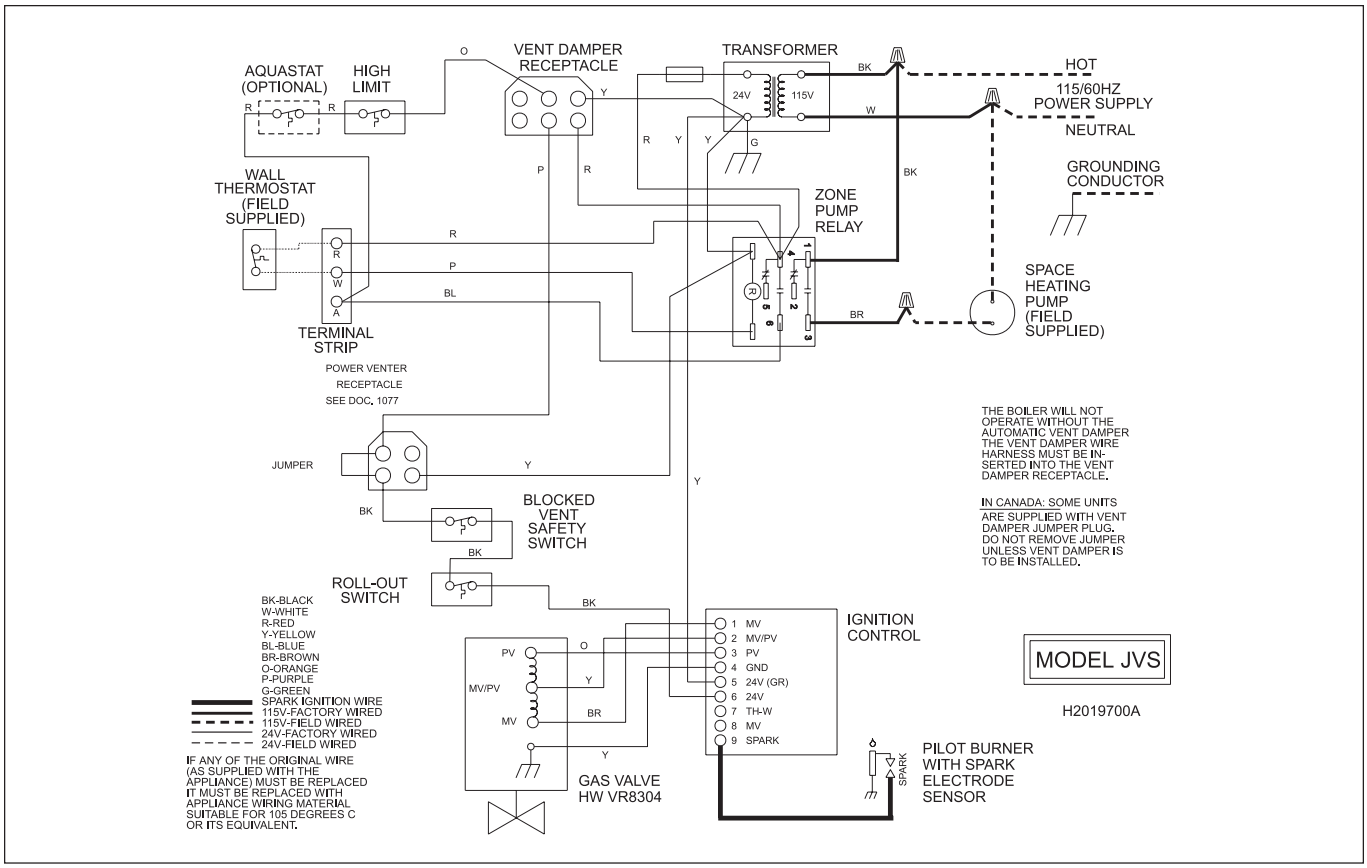


Figure 9a. Wiring Diagram, Spark Ignition System (JVS).

A means of disconnecting the electrical supply must be provided within sight of the boiler. The pump and boiler must be wired as shown to insure that the pump is running whenever the boiler is firing.

⚠WARNING

The boiler must be electrically grounded in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the latest edition of the National Electrical Code, ANSI/NFPA 70, in the U.S. and with latest edition of CSA C22.1 Canadian Electrical Code, Part 1, in Canada. Do not rely on the gas or water piping to ground the metal parts of the boiler. Plastic pipe or dielectric unions may isolate the boiler electrically. Service and maintenance personnel who work on or around the boiler may be standing on wet floors and could be electrocuted by an ungrounded boiler.

Hi-Limit Switch: Factory setting is 190°F (88°C). This setting is correct for normal operations, and should only be changed by an authorized service technician. Under no circumstances should the setting exceed 220°F (104°C).

Flow Switch: If the system includes a flow switch, it should be wired in series with the high-limit

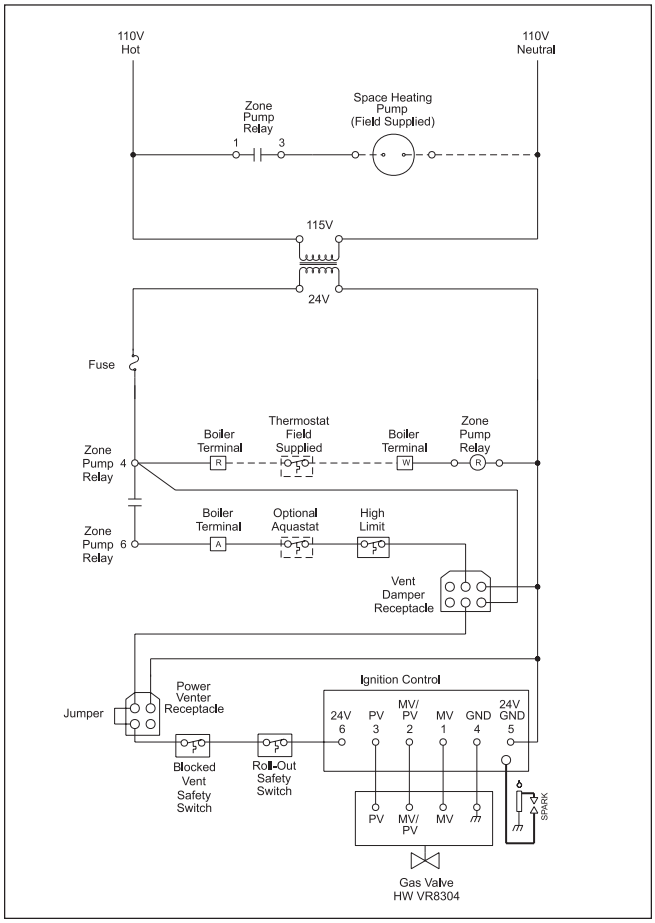


Figure 9b. Schematic, Spark Ignition System (JVS).

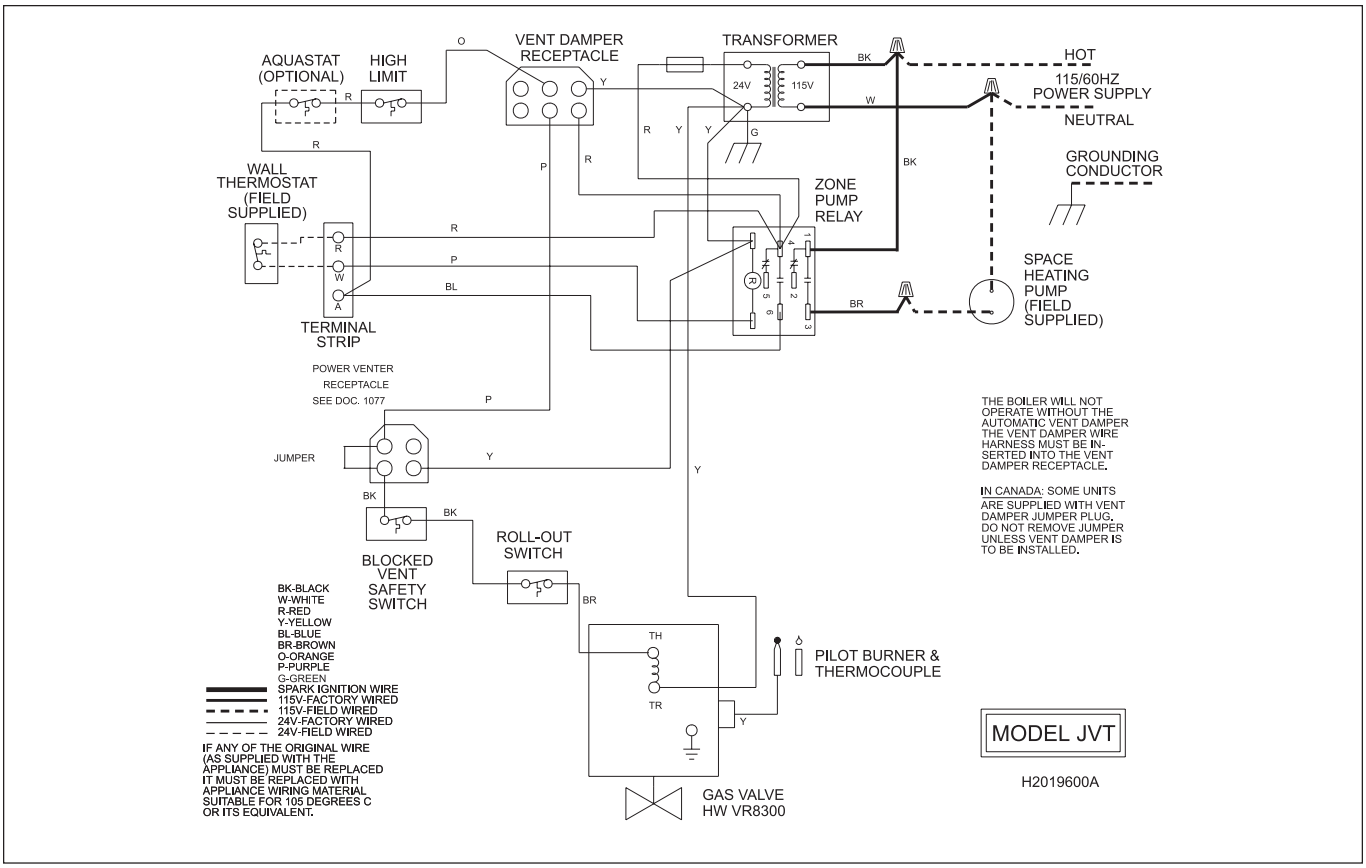


Figure 9c. Wiring Diagram, Standing Pilot System (JVT).

switch. The boiler will not fire unless the pump is running and the flow switch is closed.

Field installed safety devices and operating controllers, such as a valve end switch, draft switches, relays, timers, and outdoor temperature reset devices, can be connected to the boiler through the wall thermostat circuit. Do not exceed a draw of 30VA on the transformer secondary.

Heat Anticipator: For single zone installations, the wall thermostat heat anticipator should be set at 1.0 amperes. For multi-zone installations, have a qualified electrical technician make the necessary measurements to properly set the thermostats.

1L. Filling the System

It is **crucial** to the efficient operation of the system that all air be removed from the circuit. For this reason, an air scoop and vent should be located close to the boiler outlet, and there should be a minimum distance between cold water feed and system purge valve.

1. When the system has been completely installed, close all air vents and open the makeup water valve. Allow the circuit to fill slowly.
2. If a make-up water pump is employed, adjust the pressure to provide a minimum of 12 psi (82.7kPa) at the highest point in the circuit. If a

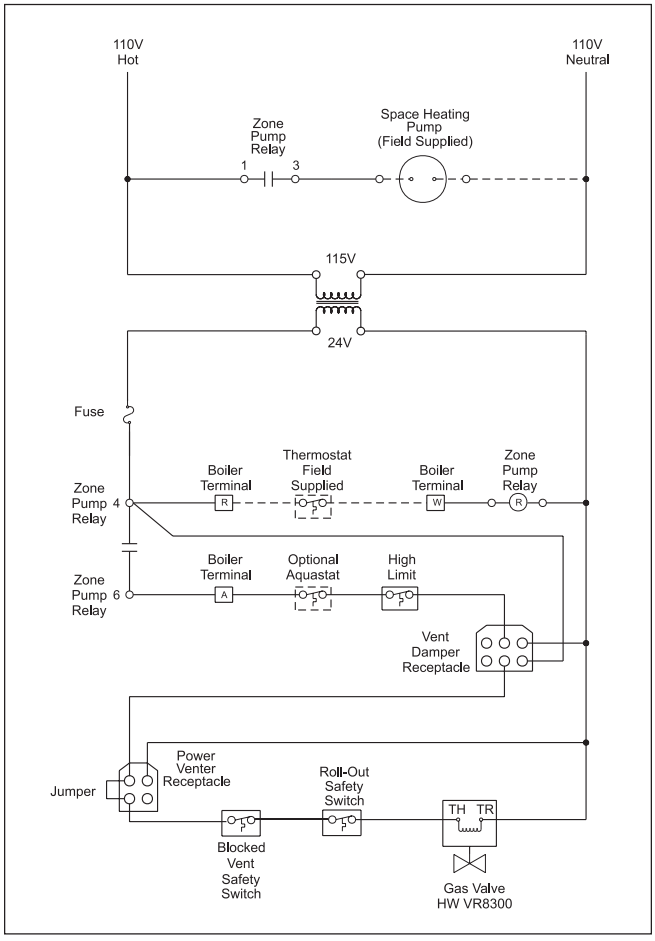


Figure 9d. Schematic, Standing Pilot System (JVT).

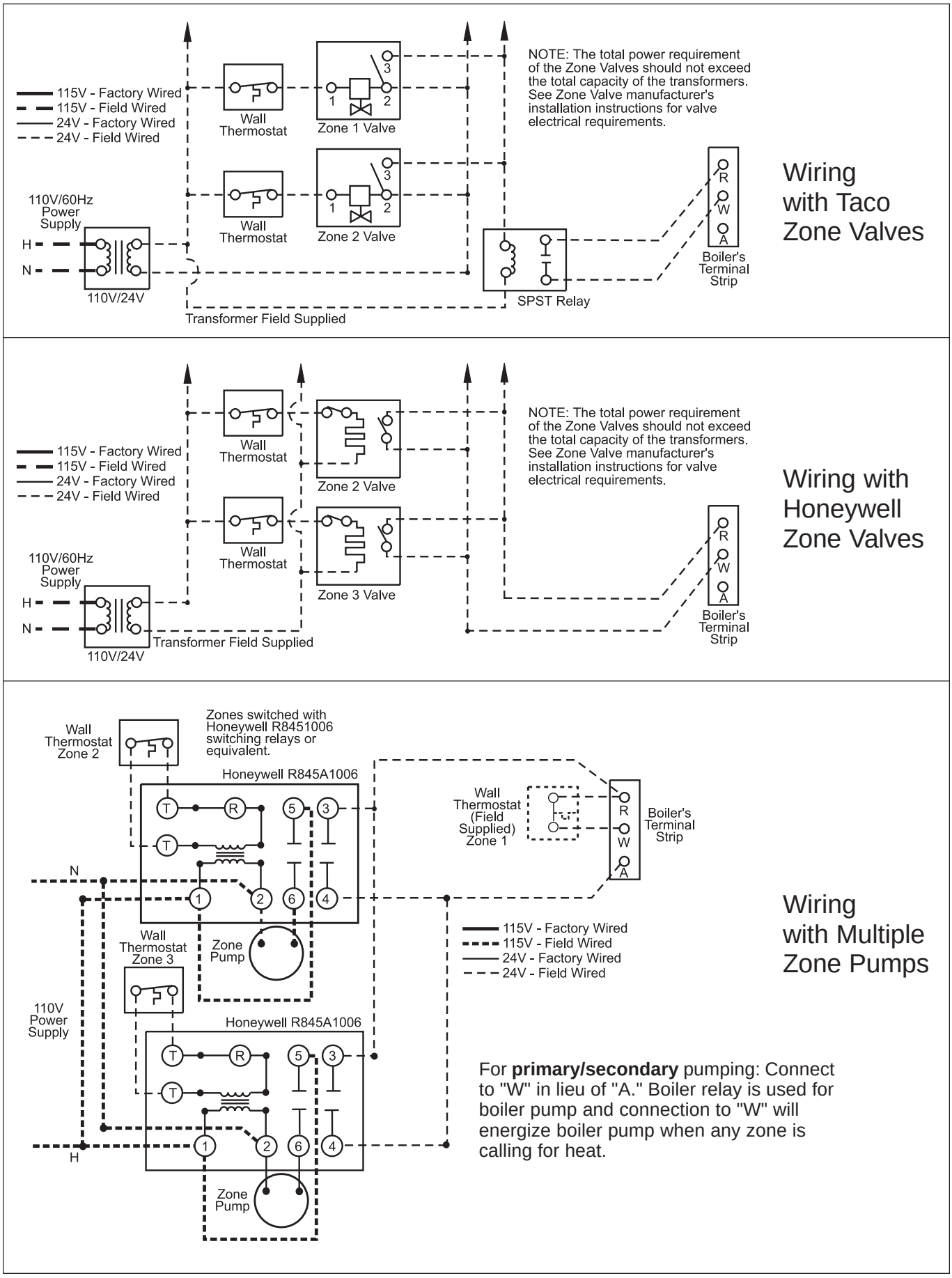


Figure 10. Multiple Zone Wiring.

pressure regulator is also installed in the line, adjust it to the same pressure.

3. Close all gate valves. Purge one circuit at a time as follows:
   a. Open one circuit drain valve and let water drain out for at least 5 minutes. Be certain there are no air bubbles visible in the water stream before closing the drain valve.
   b. Repeat this procedure for each circuit.
4. Open all gate valves after all circuits have been purged.
5. Run the system circulating pump for a minimum of 30 minutes with the boiler shut off.
6. Open all strainers in the system, and check for debris.
7. Recheck all air vents as described in Step 3 above.
8. Some expansion tanks require visual inspection of liquid level. If necessary, inspect the liquid level in the expansion tank. With the system full of water, and under normal operating pressure, to ensure proper water level in the expansion tank.
9. Start up boiler according to the procedures described in Section 2 and operate the system, including the pump, boiler, and radiation units, for one hour.
10. Recheck the water level in the expansion tank, if necessary. If it exceeds ½ of the volume of the tank, open the tank drain and reduce the water level.
11. Shut down the entire system, and vent all radiation units and high points in the system.
12. Close the water makeup valve and check the strainer in the pressure reducing valve for sediment or debris. Reopen the water makeup valve.
13. Verify system pressure with the boiler pressure gauge before beginning regular operation.

Sizes	Firing System	Type of Gas	Valve Number	Manufacturer
JVS				
50-225	Spark Ignition	Natural or Propane	VR8304H	Honeywell
JVT				
50-225	Standing Pilot	Natural or Propane	VR8300H	Honeywell

Table 6. Gas Valve Selection.

14. Within 3 days of start-up, recheck and bleed all air vents and the expansion tank using these instructions.

SECTION 2
Operation and Maintenance
2A-1. System Start-Up

⚠WARNING
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.

1. Verify that the pump system is operating properly:
   a. Shut off the manual gas valve located outside the boiler.
   b. Raise the wall thermostat high enough to call for heat.
   c. The pump should come on immediately. If it doesn't, test the electrical circuits.
2. Pilot 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.

   a. The JVS boilers do not require manual lighting. The pilot is controlled by the automatic ignition system.
   b. The JVT boilers do require manual pilot lighting. For access to the pilot burner, remove the louvered airbox cover by loosening the two thumb screws.
   c. Different models of the JV boiler utilize various gas valves. Although the gas valves may have different control knobs, they are all similar in operation. The JVS gas valve has a two-position knob, ON and OFF. The JVT valve has a three-position knob, ON, OFF and PILOT, some models come with extra push-button (see Figure 11).

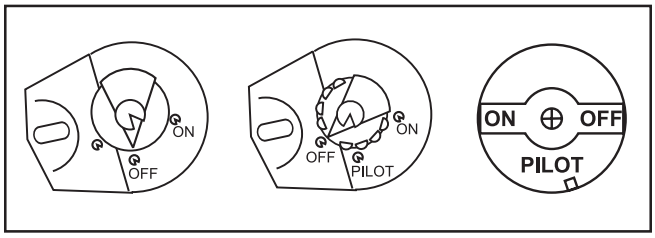


Figure 11. Gas Valves.

3. BEFORE LIGHTING 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 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.

All Models:

1. Shut off electrical power to the boiler.
2. Turn the gas valve knob clockwise to OFF. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
3. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow 2A-1.3 in "What to do if you smell gas". If you don't smell gas, go to the next step.

JVS Models:

4. Turn gas valve knob counterclockwise to ON.
5. Restore power to the boiler, and set the thermostat to the desired temperature. The pilot will automatically ignite when there is a call for heat.

JVT Models: (Continuous Pilot)

4. Remove louvered burner cover by loosening the two thumb screws to access the pilot burner.
5. Remove the control box cover to fully access the gas valve.
6. Find pilot - follow metal tube from gas control. The pilot is on the right hand side of the first burner.
7. Turn knob on gas control counterclockwise to PILOT.
8. Push in control knob or push-button all the way and hold in. Immediately light the pilot with a match using the match holder. Continue to hold the control knob in for about one (1) minute after the pilot is lit. Release knob and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 2 through 8.
   a. If the knob does not pop up when released, stop and immediately call your service technician or gas supplier.
   b. If the pilot will not stay lit after several tries, turn the gas control knob to OFF and call your service technician or gas supplier.
9. Replace the louvered airbox cover and tighten the two thumb screws securely.
10. Turn gas control knob counterclockwise to ON.
11. Replace control box cover.
12. Restore power to the boiler and adjust the thermostat high enough to call for heat to verify the boiler is operating properly.
13. Set the thermostat to the desired temperature.

2A-2. High Altitude Burner Air Shutter Replacement

⚠DANGER
This procedure must be followed exactly and must be performed by a qualified installer or warranty may be voided.

⚠DANGER
Read and understand this entire procedure prior to proceeding. Improper adjustment of high altitude shutters may result in a fire, explosion, and/or high levels of toxic gases which may cause property damage, personal injury, or loss of life.

1. STOP! Read the safety information above.
2. Perform System Start-Up in accordance with Section 2A of this manual.
3. Remove burner cover by loosening two (2) thumbscrews.
4. Observe flame pattern on all burners. If the flame on any burner is pulsing, unstable or lifting continue with this procedure. Otherwise skip to step 10.
5. On all burners exhibiting an abnormal flame, loosen but do not remove the air shutter locking screw using a 5/16 inch wrench (see Figure 12).

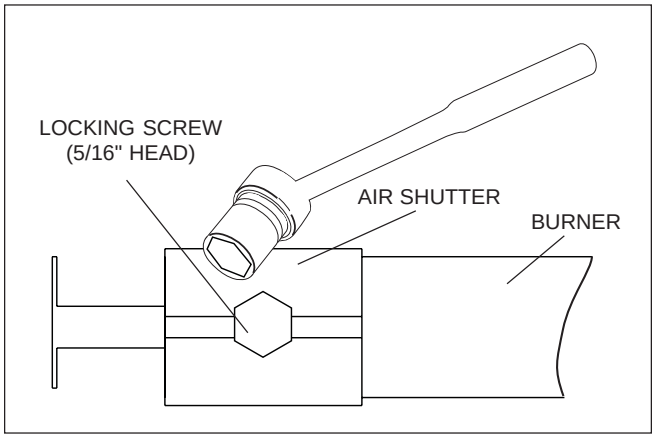


Figure 12. Air Shutter Adjustment.

6. On each affected burner, slowly close the air shutter until a normal flame is observed then re-tighten its associated locking screw.
7. Turn the boiler off.
8. Perform System Start-Up in accordance with Section 2A of this manual.
9. Observe flame pattern on all burners. If the flame on any burner is pulsing, unstable or lifting then repeat steps 5 and 6 until all burners are exhibiting a normal flame.
10. Re-install the burner cover and tighten it in place.

2A-3. Sequence of Operation

1. Wall thermostat calls for heat.
2. The damper activator rotates damper blade to open position. Indicator light comes on.
3. Pump relay will turn on the circulating pump.
4. If water temperature is below the limit setting on the spark ignition models will light the pilot and check the flame existence.
5. After pilot is proven to be lit, the main gas valve will open, the main burners will ignite and continue until either the hi-limit or wall thermostat opens.
6. When the wall thermostat is satisfied, the burners will shut off. The pump relay will turn off the pump, and the damper will close. When the room temperature falls below the wall thermostat setting, the cycle will repeat.

Note: When equipped with pump delay option, the pump will run for short time after the burners turn off and the damper closes.

2B. Water Temperature Setting

In Canada, for models equipped with modulating gas valves, in addition to the main gas valve. These controls are factory set at "5" which is satisfactory for most installations. Lower settings may be appropriate for radiant floor systems, or when heating requirements are low. To change the factory setting simply adjust the red knob on the valve to the desired water temperature according to Table 7 (temperatures are approximate).

Dial Number	1	2	3	4	5	6	7	8	9
Temp. °F	120	135	150	165	180	195	210	225	240
Temp. °C	*49*	*57*	*66*	*74*	*82*	*91*	*99*	*107*	*116*

Table 7. Water Temperature Settings.

2C. Maintenance

1. Lubricate the water circulating pump per the instructions on the pump.
2. If a strainer is employed in a pressure reducing valve or the piping, clean it every six months.
3. At start-up, and periodically thereafter, the burner flame should be observed. If the flame has the appearance of 'sooting' tips, check for debris near the orifices and call the service technician.
4. Inspect the venting system for obstruction, leakage or corrosion at least once a year.
5. Keep the boiler area clear and free from combustible materials, gasoline, and other flammable vapors and liquids.
6. Be sure that all combustion air and ventilation openings are unobstructed.
7. Upon completion of the installation, inspect the external surfaces of the heat exchanger for fouling based on the following schedule:

   24 hours 7 days 30 days 90 days

   Once every six months thereafter.
8. If the boiler is not going to be used for long periods of time in locations where freezing occurs, it should be completely drained of all water. To accomplish this, there is a drain valve on the right side of the boiler which can be opened. This will drain the right side of the boiler. There are two plugs located on the left side of the heater which must be removed to drain that side. Both sides must be drained.
9. The gas and electric controls on the boiler are engineered for long life and dependable operation, but the safety of the equipment depends on their proper functioning. It is strongly recommended that the basic items listed below be inspected by a qualified service technician every year.
   a. Water temperature controls
   b. Pilot safety system.
   c. Automatic gas valves.
   d. Flow sensing safety devices.
   e. Vent dampers and power venters.

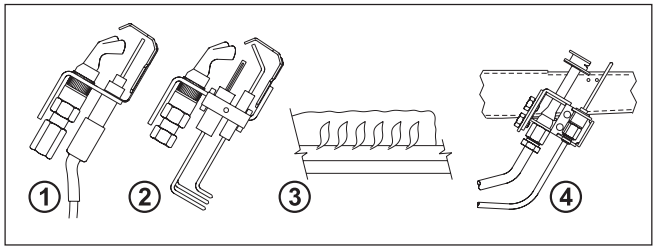


Figure 13. 1) JVS Pilot; 2) JVH Pilot; 3) Main Burner Flame Pattern; 4) JVT Pilot.

10. Low water cutoffs should be inspected and flushed periodically.

Note: The Warranty does not cover damage caused by lack of required maintenance, lack of water flow, or improper operating practices.

Fouling on the external surfaces of the heat exchanger is caused by incomplete combustion, and is a sign of venting and/or combustion air problems. The heat exchanger can be inspected by using a flashlight and placing a mirror under the burners. An alternate method is to remove the venting and top panel to inspect the exchanger from above. The vent system should be inspected at the same time. If cleaning is required:

a. Shut off all power to the boiler.
b. Remove the draft hood, venting top, flue collector, and heat exchanger baffles.
c. Remove the burners by lifting them off the orifices and pulling them out of the boiler.
d. Use a hand-operated spray bottle filled with water, and a wire brush to clean soot and loose scale from the underside of the heat exchanger. DO NOT USE COMPRESSED AIR, HIGH PRESSURE WATER OR A GARDEN HOSE.
e. Clean any fallen debris from the bottom of the unit.
f. Check to make sure the burner ports and pilot assembly are free of debris before returning the burners to their original position.
g. Reassemble the boiler in reverse order, making sure to replace the heat exchanger baffles.

2D. Electrical Troubleshooting

1. Remove the control box cover on the front of the boiler.
2. Verify that 115V is reaching the boiler by testing across the black wire on the pump relay and the white wire on the transformer.
3. Verify 24V transformer output by placing the meter leads on the yellow and red wires. If 24V is not evident, replace the transformer. Perform the following series of tests with one meter lead attached to the yellow wire on the transformer.
4. Place the second lead on the "W" connection on the terminal board. Turn the wall thermostat high enough to call for heat. If the meter fails to register 24V, the thermostat or its circuit may be defective.
5. Make sure thermostat is set high enough to call for heat. Place second lead on the "A" connection on the terminal board. If voltage is evident, skip to step 6. If no voltage, test the circuit between the red wire on the transformer and terminal 4 on the pump relay; from terminal 6 on the pump relay and the "A" connection on the terminal board; and from the purple wire terminal on the pump relay to the "W" connection on the terminal board. If no output is found, the connections or the pump relay could be defective.
6. Place the second lead on the orange wire terminal on the hi-limit switch. If no voltage across the switch, check for defective hi-limit, open circuit due to excessive water temperature, or a low temperature setting.
7. Place the second lead on the orange wire terminal on the blocked vent safety switch. If voltage is present, the vent damper is open. If voltage isn't present, connections or the vent damper could be defective.
8. Verify the voltage across the blocked vent and roll-out safety switches.
9. On JVT boilers, test for voltage at the "TH" terminal on the gas valve. If none is found, follow steps 1 through 8.
10. If it is determined that there is voltage to the gas valve, the pilot is lit and the thermocouple is properly positioned, and the thermostat is set high enough to call for heat, the gas valve or the pilot thermocouple may be defective
11. There are two tests necessary to make sure the problem is not in the pilot thermocouple. The first test can be performed by unscrewing the compression fitting on the gas valve, and placing one millivoltmeter lead on the center post of the tube and the other lead on the copper tubing. If the meter shows a reading of approximately 30 millivolts, proceed to the second test. If it doesn't, replace the pilot thermocouple. The second test requires the use of a Millivolt Reading Adapter to test the thermocouple under load. Once again, remove the pilot thermocouple compression fitting from the gas valve. Replace it with a Millivolt Reading Adapter, and screw the thermocouple fitting into the end of the adapter. Attach one lead from the millivoltmeter to either side of the adapter and the other lead to ground. Light the pilot and set the wall thermostat high enough to call for heat. With the boiler firing, take a millivolt reading. It should be in the 15 millivolt range. If it isn't, replace the pilot thermocouple.

⚠Caution

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

#	Symptom	Cause	Remedy
1.	Pump not operating	A. No power B. Pump defective C. Incorrectly wired	A. Check circuit breakers and power source. B. Replace. C. Recheck wiring diagrams.
2.	Pilot outage	A. Inlet gas pressure too low B. Inlet gas pressure too high causing an unstable blowing pilot C. Weak or defective thermocouple D. Damaged pilot or thermocouple E. Dirty pilot F. Plugged or undersized pilot orifice	A. Consult gas utility company. Inlet gas pressure to boiler should be 5.5" to 10.0" water column on natural gas. 11.0" to 14.0" on propane gas. B. Pressure should be regulated within limits shown above. C. Replace thermocouple. D. Replace. E. Blow dust or lint out of pilot. F. Clean or replace pilot orifice.
3.	Flame roll-out on start-up	A. Blocked flue B. Pilot out of position (delayed ignition) C. Blocked heat exchanger or flue D. Refractory tile out of place E. Altered draft diverter	A. Remove blockage. B. Correct pilot position. C. Clean and correct as necessary. D. Correct or replace tile as necessary. E. Install factory-provided draft diverter.
4.	Spillage at draft hood	A. Cold chimney B. Vent pipe pitches down to chimney C. Blocked chimney D. Draft hood altered E. Pre-fabricated chimney with incorrect cap	A. Allow boiler to operate 5 minutes to create draft action. B. Reinstall vent pipe to pitch up from boiler to chimney. C. Remove blockage. D. Install factory-provided draft diverter. E. Install U.L. listed vent cap.
5.	Flame has lazy yellow tip	A. Low primary air	A. Correct manifold pressure according to rating plate. Correct orifice size if necessary (see parts list). Clean burner ports if dirty.
6.	Not enough heat	A. Inadequate gas supply B. Low manifold gas pressure C. Boiler size inadequate	A. Gas meter too small. Gas line from meter to boiler too small. B. Gas pressure on boiler manifold, with Modusnap valve wide open. Should be adjusted to 4.0"W.C. natural gas, 9.0"W.C. propane. C. Replace with boiler of higher input.
7.	Pump noisy	A. Air in volute B. Worn coupling or bearings	A. Bleed air from volute. Check pump alignment. B. Replace worn parts.
8.	Boiler pounding or knocking	A. Too low water flow through boiler	A. Check temperature rise between inlet and outlet boiler piping. 15°F to 25°F temperature rise is recommended. If temperature rise is over 25°F, increase pipe size or pump capacity or locate obstruction. Check for stuck closed zone valves. Check for zone pumps not operating. Check for closed valve in system.
9.	Boiler condensing	A. Low water temperature	A. Flue product moisture will condense at the start-up until the boiler water temperature reaches the normal operating conditions.
10.	Pump cavitates or low water pressure at boiler gauge or bubbles in system at high temperature	A. Defective fill valves or pressure regulator B. Oversized expansion tank C. Expansion tank piped incorrectly	A. Replace. B. Replace. C. Repipe expansion tank to suction size of pump.
11.	Pressure relief valve opens	A. Water-logged expansion tank	A. Drain $^{2}/_{3}$ of the water from the expansion tank.
12.	Pilot is lit but main burners will not come on	A. Gas valve not at "on" position B. Boiler off on hi-limit control C. Boiler incorrectly wired D. Boiler off on blocked vent switch E. Boiler off on flame roll-out switch F. Broken wire in thermostat circuit or defective thermostat	A. Turn knob to "on" position. B. Check for low water flow or hi-limit setting. C. On single or multiple zone systems with zone valves, room thermostat should be wired to R & W terminals. For multiple zone systems with zone pumps, thermostats for extra zones should be wired to R & A terminals. D. Remedy as in symptom #4. Reset the manual reset switch. E. Remedy as in symptom #3. Reset the manual reset switch. F. Check continuity through thermostat circuit with wires disconnected from R & W.
13.	Boiler short cycles	A. Heat anticipator in room thermostat set too low B. Low water flow through boiler C. Hi-limit switch may be set too low	A. Increase setting (1.0 is usually satisfactory). B. Increase size of pump or increase piping size. C. Increase setting to at least 20°F over outlet water temperature.

Table 8. Troubleshooting Analysis.

Troubleshooting Honeywell S8600 Intermittent Pilot System

Some heaters may be equipped with an ignition module that shuts off pilot gas if pilot fails to light. To reset, interrupt power to heater

Start

Note: Before troubleshooting, familiarize yourself with the start-up and checkout procedure.

Turn off gas supply. Turn thermostat (controller) to call for heat.

Power to module (24V nominal).

NO → Check line voltage power, low voltage transformer, hi- limit switch, thermostat (controller) and wiring.

YES

Spark across igniter/ sensor gap.

NO → Pull ignition lead and check spark at module. Spark okay?

YES → • Check ignition cable ground wiring, ceramic insulator and gap, and correct.
• Check boot of the ignition cable for signs of melting or buckling. Take protective action to shield cable and boot from excessive temperatures.

YES

Turn gas supply on. Pilot burner lights?

NO → • Check that all manual gas valves are open, supply tubing and pressures are good, and pilot burner orifice is not blocked.
• Check electrical connections between module and pilot operator on gas control.
• Check for 24 Vac across PV-MV/PV terminals on module. If voltage is okay, replace gas valve; if not, replace module.

YES

Spark stops when pilot is lit?

NO → **Note:** If S8600H goes into lockout, reset system. Lockout is used on L.P.G. models.
• Check continuity of ignition cable and ground wire.
• Clean flame rod.
• Check electrical connections between flame rod and module.
• Check for cracked ceramic flame rod insulator.
• Check that pilot flame covers flame rod and is steady and blue.
• Adjust pilot flame.
• If problem persists, replace module.

YES

Main burner lights?

NO → • Check for 24 Vac across MV-MV/PV terminals. If no voltage, replace module.
• Check electrical connections between module and gas valve. If okay, replace gas valve.

YES

System runs until call for heat ends?

NO → **Note:** If S8600H goes into lockout, reset system.
• Check continuity of ignition cable and ground wire.
Note: If ground is poor or erratic, shutdowns may occur occasionally even though operation is normal at the time of checkout.
• Check that pilot flame covers flame rod and is steady and blue.
• If checks are okay, replace module.

YES

Call for heat ends. System shuts off?

NO → • Check for proper thermostat (controller) operation.
• Remove MV lead at module; if valve closes, recheck temperature controller and wiring; if not, replace gas valve.

YES

Troubleshooting ends

Repeat procedure until trouble-free operation is obtained.

Glossary of Terms

Air Vent
Another device used to purge air from the Circuit. Should be located at the highest point in the Circuit.

Branch
The section(s) of supply and return piping, including the heat distribution units (see below), connected directly to the trunk. Also referred to as a "zone."

By-pass
A section of pipe (including an adjustable valve) that diverts part of the water flow from undersized piping to the boiler. Adjusted to maintain minimum flow requirement (GPM) through the boiler.

Circuit
Entire water circulation piping, beginning and ending at the boiler (Series Loop System).

Expansion Tank (Compression Tank)
Installed in the circuit to accommodate excess water produced by heat expansion.

Heat Distribution Units
Transfers heat from the water supplied by the boiler to the area to be heated through the use of baseboard, convector, radiator, finned tube. Also known as "radiation."

Isolation Valve
Used to isolate the boiler from the circuit. It minimizes the amount of water drained from the system.

Primary-Secondary Piping
Two or more interconnecting circulating loops, each with its own pump. Primary=System Circuit; Secondary=Boiler Circuit.

Reverse-return Piping
Balanced, equal flow (first in, last out) piping. Utilized with multiple boilers and/or radiation. Applied with single system pumps, or primary-secondary pumps.

Side Wall Power Venter
This Laars accessory allows the boiler exhaust to be routed horizontally through an adjoining outside wall, rather than gravity venting with a chimney or stack when local codes allow.

System Purge Valve
A device used to purge air from the circuit. Should be located as close as possible to the cold water feed, but not immediately after the cold water feed.

Trunk
The section of piping which connects the boiler return and supply with the branch(es). Also known as a "main" or "header." Should be same size as boiler inlet/outlet connections.

Vent Damper (optional in Canada)
Standard on JV boilers. This energy-saving device prevents heated air from exiting the open vent when the boiler is not operating.

Zone Pump
Circulators installed in branch piping that divert hot water coming from the boiler into various areas (zones) of a building.

Zone Valve
Diverts hot water from the boiler into various areas (zones) of a building.

SECTION 3.
Parts List and Ordering Information

Description Model, Size	Part Number JVS-50	JVT-50	JVS-75	JVT-75	JVS-100	JVT-100	JVS-125	JVT-125
Pilot Gas System								
Pilot Assembly (Nat.)	W0030600	W0040900	W0030600	W0040900	W0030600	W0040900	W0030600	W0040900
Pilot Assembly (LP)	W0039600	W0040901	W0039600	W0040901	W0039600	W0040901	W0039600	W0040901
Thermocouple	-	W0036500	-	W0036500	-	W0036500	-	W0036500
Main Gas System								
Burner W/Pilot Bracket	L0056500	L0056500	L0056500	L0056500	L0056500	L0056500	L0056500	L0056500
Burner, Main	L0052500	L0052500	L0052500	L0052500	L0052500	L0052500	L0052500	L0052500
Burner/Air Shutter (LP)	L0055900	L0055900	L0055900	L0055900	L0055900	L0055900	L0055900	L0055900
Gas Valve, HW., VR8304 (Nat.)	V2002200	-	V2002200	-	V2002200	-	V2002200	-
Gas Valve, RS (Nat.)	-	R0017500	-	R0017500	-	R0017500	-	R0017500
Gas Valve, HW., VR8300 (LP)	-	V2002100	-	V2002100	-	V2002100	-	V2002100
Gas Valve, HW., VR8304 (LP)	V0073600	-	V0073600	-	V0073600	-	V0073600	-
Gas Orifice (Nat.)	L0032200	L0032200	L0032200	L0032200	L0032200	L0032200	L0032200	L0032200
Gas Orifice (LP)	L0032900	L0032900	L0032900	L0032900	L0032900	L0032900	L0032900	L0032900
Gas Manifold	L0052601	L0052601	L0052602	L0052602	L0052603	L0052603	L0052604	L0052604
Electrical System								
Relay, DPNO	E0088400	E0088400	E0088400	E0088400	E0088400	E0088400	E0088400	E0088400
Transformer 115/24V (40VA)	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100
Ignition Control (S8600F) Nat.	E0094001	-	E0094001	-	E0094001	-	E0094001	-
Limit Switch	E0098700	E0098700	E0098700	E0098700	E0098700	E0098700	E0098700	E0098700
Control Panel Wiring Harness	20406501	20406501	20406501	20406501	20406501	20406501	20406501	20406501
Power Venter Jumper	20036700	20036700	20036700	20036700	20036700	20036700	20036700	20036700
Terminal Strip	E0098500	E0098500	E0098500	E0098500	E0098500	E0098500	E0098500	E0098500
Hi-Tension Lead	10449514	-	10449514	-	10449514	-	10449514	-
Blocked Vent SafetySwitch*	E0121000	E0121000	E0121000	E0121000	E0121000	E0121000	E0121000	E0121000
Roll-out Safety Switch	E2103200	E2103200	E2103200	E2103200	E2103200	E2103200	E2103200	E2103200
Fuse, 2 amp	E2043600	E2043600	E2043600	E2043600	E2043600	E2043600	E2043600	E2043600
Water System								
Heat Exchanger	20036601	20036601	20036602	20036602	20036603	20036603	20036604	20036604
Temperature/Pressure Gauge	A0000100	A0000100	A0000100	A0000100	A0000100	A0000100	A0000100	A0000100
Pressure Relief Valve, 30PSI	A0069000	A0069000	A0069000	A0069000	A0069000	A0069000	A0069000	A0069000
Well, Immersion	E2058300	E2058300	E2058300	E2058300	E2058300	E2058300	E2058300	E2058300
Drain Valve 1/2" NPT	P0066600	P0066600	P0066600	P0066600	P0066600	P0066600	P0066600	P0066600
Jacket and Fire Box Components								
Draft Diverter	20034801	20034801	20034802	20034802	20034803	20034803	20034804	20034804
Rear Panel	20099801	20099801	20099802	20099802	20099803	20099803	20099804	20099804
Side Panel (L&R)	10467900	10467900	10467900	10467900	10467900	10467900	10467900	10467900
Front Panel	10484701	10484701	10484702	10484702	10484703	10484703	104884704	10484704
Top	20099401	20099401	20099402	20099402	20099403	20099403	20099404	20099404
Gap Closure	20099501	20099501	20099502	20099502	20099503	20099503	20099504	20099504
Flue Collector	20034901	20034901	20034902	20034902	20034903	20034903	20034904	20034904
Access Panel HX, (L&R)	10535900	10535900	10535901	10535901	10535900	10535900	10535901	10535901
Base, Control Box	10469200	10469200	10469200	10469200	10469200	10469200	10469200	10469200
Cover, Control Box	10469400	10469400	10469400	10469400	10469400	10469400	10469400	10469400
Burner Cover	10500601	10500601	10500601	10500601	10500602	10500602	10500602	10500602
Heat Exchanger Baffle	10485301	10485301	10485302	10485302	10485303	10485303	10485304	10485304
Tile Cover	10469501	10469501	10469502	10469502	10469503	10469503	10469503	10469504
Refractory, Front	T0022001	T0022001	T0022002	T0022002	T0022003	T0021803	T0022004	T0022004
Refractory, Rear	T0021701	T0021701	T0021702	T0021702	T0021703	T0021703	T0021704	T0021704
Insulation, Fiberglass	T0027300	T0027300	T0027300	T0027300	T0002000	T0027300	T0027300	T0027300
Base Assembly	10467101	10467101	10467012	10467102	10467103	10467103	10467104	10467104
Combustible Base (optional)	10466701	10466701	10466701	10466701	10466702	10466702	10466702	10466702
Vent Damper Components								
Automatic Vent Damper Assy., Penn Q35*	E2071501	E2071501	E2071502	E2071502	E2071502	E2071502	E2071503	E2071503
Damper Connection Harness*	E0099100	E0099100	E0099100	E0099100	E0099100	E0099100	E0099100	E0099100

* Optional in Canada.

Description / Model, Size	Part Number			
	JVS-160	**JVT-160**	**JVS-225**	**JVT-225**
Pilot Gas System				
Pilot Assembly (Nat.)	W0030600	W0040900	W0030600	W0040900
Pilot Assembly (LP)	W0039600	W0040901	W0039600	W0040901
Thermocouple	-	W0036500	-	W0036500
Main Gas System				
Burner W/Pilot Bracket	L0056500	L0056500	L0056500	L0056500
Burner, Main	L0052500	L0052500	L0052500	L0052500
Burner/Air Shutter (LP)	L0055900	L0055900	L0055900	L0055900
Gas Valve, HW., VR8304H (Nat.)	V2002200	-	V2002200	-
Gas Valve, RS (Nat.)	-	R0017500	-	R0017500
Gas Valve, HW., VR8300H (LP)	-	V2002100	-	V2002100
Gas Valve, HW., VR8304H (LP)	V0073600	-	V0073600	-
Modulating Valve, HWV 5155A 1/2" x 1/2" (Canada)	V0051100	V0051100	V0051100	V0051100
Modulating Valve, HWV 5155A 1" x 1" (Canada)	-	-	V0045100†	V0045100†
Gas Orifice (Nat.)	L0050700	L0050700	L0050700	L0050700
Gas Orifice (LP)	L0032900	L0032900	L0032900	L0032900
Gas Manifold	L0052606	L0052606	L0052607	L0052607
Electrical System				
Relay, DPNO	E0088400	E0088400	E0088400	E0088400
Transformer 115/24V (40VA)	E0086100	E0086100	E0086100	E0086100
Ignition Control (HW S8600F) NAT.	E0094001	-	E0094001	-
Ignition Control (S8610M) LP.	E2102800	-	E2102800	-
Limit Switch	E0098700	E0098700	E0098700	E0098700
Control Panel Wiring Harness	20406501	20406501	20406501	20406501
Power Venter Jumper	20036700	20036700	20036700	20036700
Terminal Strip	E0098500	E0098500	E0098500	E0098500
Hi-Tension Lead	10449515	-	10449516	-
Blocked Vent Switch*	E0121000	E0121000	E0121000	E0121000
Roll-out Safety Switch	E2103200	E2103200	E2103200	E2103200
Fuse, 2 amp.	E2043600	E2043600	E2043600	E2043600
Water System				
Heat Exchanger	20036605	20036605	20036606	20036606
Temperature/Pressure Gauge	A0000100	A0000100	A0000001	A0000100
Pressure Relief Valve, 30PSI	A0069000	A0069000	A0069000	A0069000
Well, Immersion	E2058300	E2058300	E2058300	E2058300
Drain Valve 1/2" NPT	P0066600	P0066600	P0066600	P0066600
Jacket and Fire Box Components				
Draft Diverter	20034805	20034805	20034806	20034806
Rear Panel	20099805	20099805	20099806	20099806
Side Panel (L&R)	10467900	10467900	10467900	10467900
Front Panel	10501605	10501605	10501606	10501606
Top	20099405	20099405	20099406	20099406
Gap Closure	20099504	20099504	20099506	20099506
Flue Collector	20034905	20034905	20034906	20034906
Access Panel HX (L&R)	10535901	10535901	10535901	10535901
Base, Control Box	10469200	10469200	10469200	10469200
Cover, Control Box	10469400	10469400	10469400	10469400
Burner Cover	10494105	10494105	10494106	10494106
Heat Exchanger Baffle	10485305	10485305	10485306	10485306
Tile Cover	10469505	10469505	10469506	10469506
Refractory, Front	T0022605	T0022605	T0022606	T0022606
Refractory, Rear	T0021705	T0021705	T0021706	T0021706
Insulation, Fiberglass	T0027300	T0027300	T0027300	T0027300
Base Assembly	10467105	10467105	10467106	10467106
Combustible Base (Optional)	10466703	10466703	10466704	10466704
Vent Damper Components				
Automatic Vent Damper Assy. (Penn Q35)*	E2071503	E2071503	E2071504	E2071504
Damper Connection Harness*	E0099101	E0099101	E0099101	E0099101
*Optional in Canada				

TO OBTAIN OR ORDER PARTS: Check with your nearest Laars dealer or distributor. They have many of the commonly needed parts in stock. If your dealer cannot supply you, contact the Service Department at Laars. See address and telephone information on back page of this document.

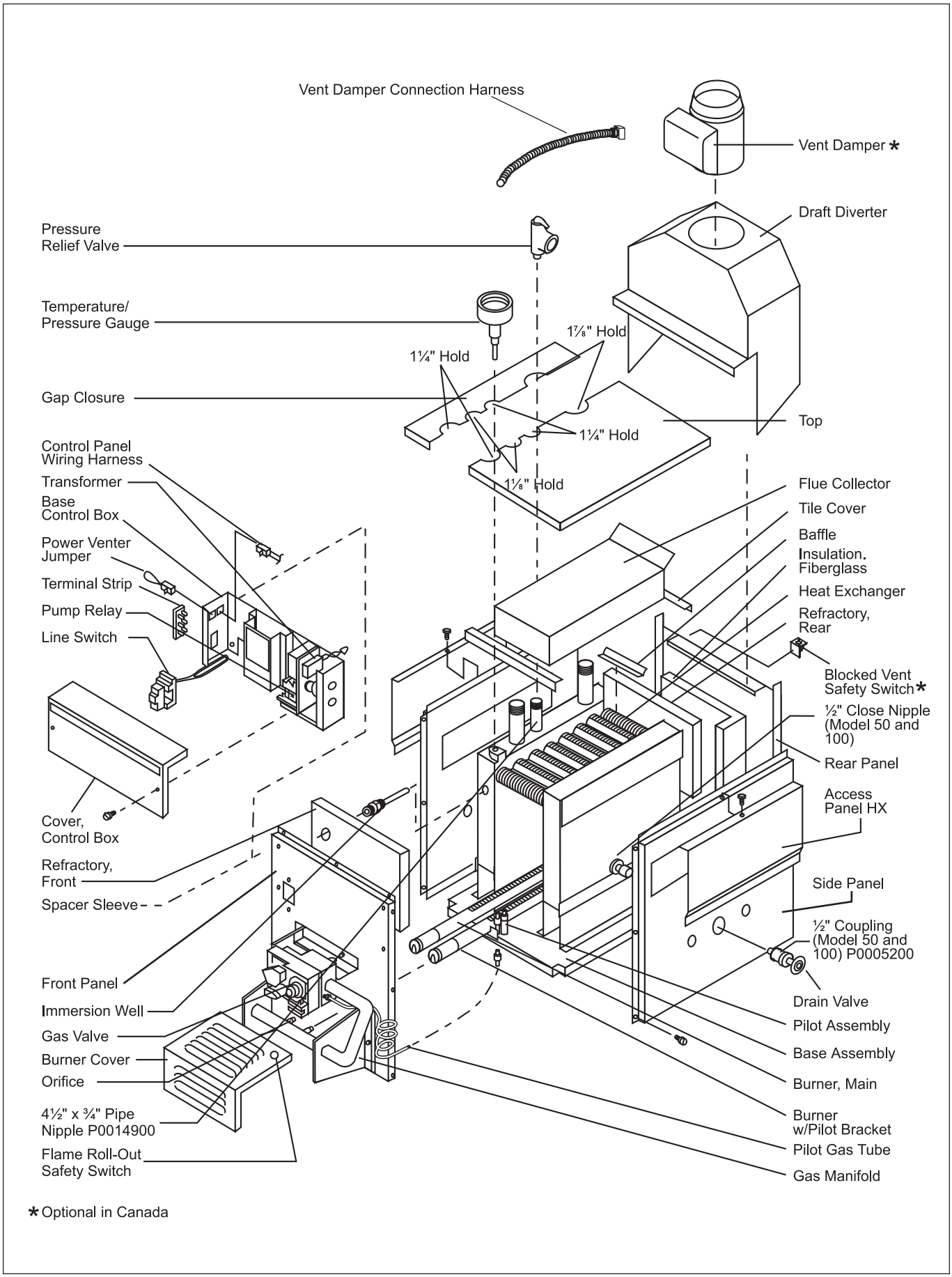


Figure 13. Parts Identification.

H0071400W

LAARS HEATING SYSTEMS

Waterpik Technologies, Inc.
6000 Condor Drive, Moorpark, CA 93021 • 805.529.2000 • FAX 805.529.5934
20 Industrial Way, Rochester, NH 03867 • 603.335.6300 • FAX 603.335.3355
480 S. Service Road West, Oakville, Ontario, Canada L6K 2H4 • 905.844.8233 • FAX 905.844.2635
www.laars.com