

INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS SERIES 2 (model B) GAS BOILERS



For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number 2 ____ - ____	Boiler Serial Number 6 _ _ _ _ _	Installation Date
Heating Contractor		Phone Number
Address		



AMERICA'S BOILER COMPANY
Burnham Corporation
Lancaster, PA 17604-3079

NOTE: The equipment shall be installed in accordance with those installation regulations in force in the area where the installation is to be made. These shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before installations are made.

All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or local regulations.

All wiring on boilers installed in Canada shall be made in accordance with the Canadian Electrical Code and/or local regulations.

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The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

DANGER

Indicates presence of a hazard which will cause severe personal injury, death or substantial property damage if ignored.

CAUTION

Indicates presence of a hazard which will or can cause minor personal injury or property damage if ignored.

WARNING

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

NOTICE

Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

WARNING

FAILURE TO FOLLOW ALL INSTRUCTIONS IN PROPER ORDER CAN CAUSE PERSONAL INJURY OR DEATH. READ ALL INSTRUCTIONS BEFORE INSTALLING.

WARNING

SERVICE ON THIS BOILER SHOULD BE UNDERTAKEN ONLY BY TRAINED AND SKILLED PERSONNEL.

KEEP BOILER AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS.

DO NOT PLACE ANY OBSTRUCTION IN THE BOILER ROOM THAT WILL HINDER THE FLOW OF COMBUSTION AND VENTILATING AIR.

WARNING

READ THESE INSTRUCTIONS CAREFULLY BEFORE PROCEEDING WITH THE INSTALLATION OF BOILER. POST INSTRUCTIONS NEAR BOILER FOR REFERENCE BY OWNER AND SERVICE TECHNICIAN. MAINTAIN INSTRUCTIONS IN LEGIBLE CONDITION.

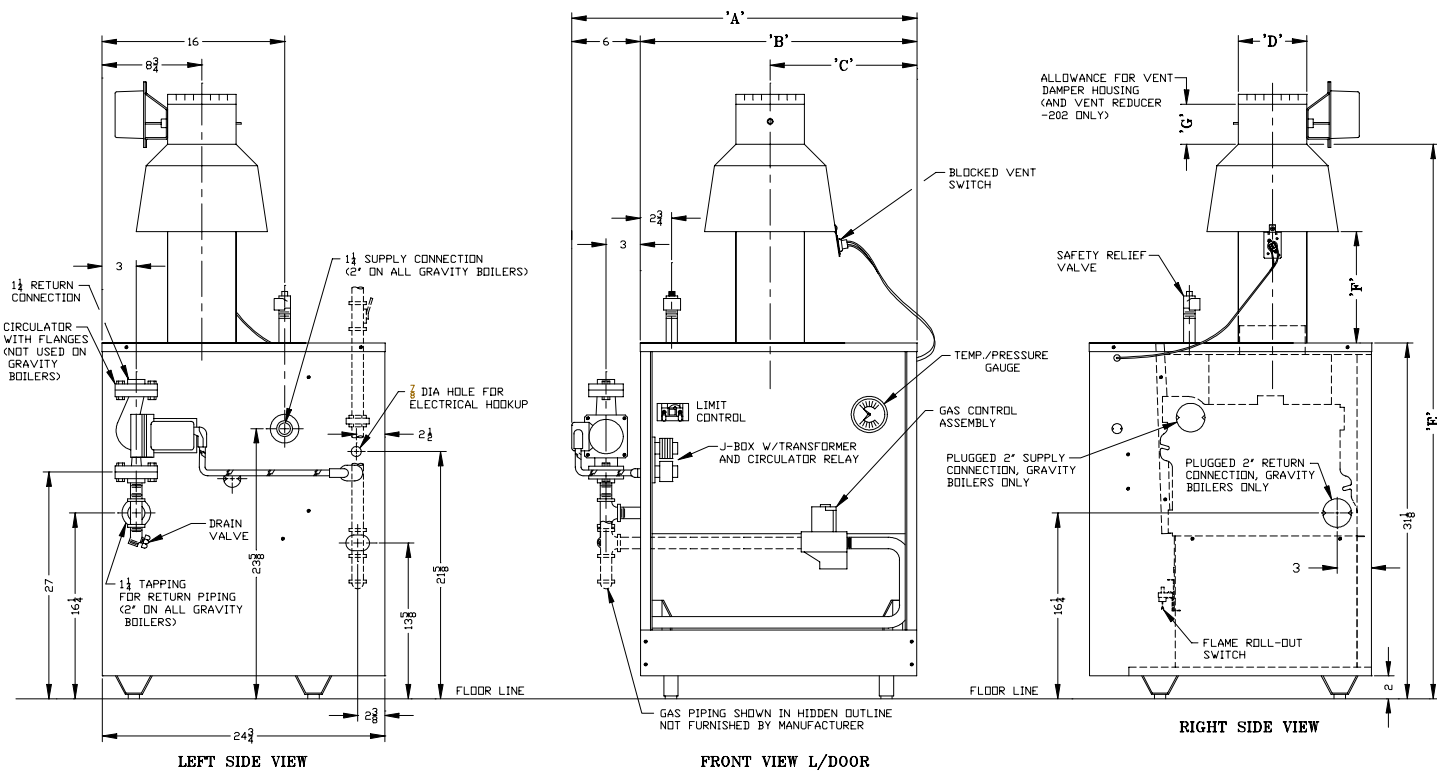


Figure 1

Boiler Model Number	Dimensions [inches]							Gas Connection For Automatic Gas Valve	Water Content [gallons]	Recommended Vent Size [1] [2]	Approx. Shipping Weight (lb.)
	A	B	C	D	E	F	G				
202	18-3/4	10-3/4	6-3/8	4	45-5/8	8-1/2	10 [3]	1/2	2.5	3" dia. x 15 ft.	212
202X	20	12	6	4	45-5/8	8-1/2	4-3/4	1/2	3.2	4" dia. x 15 ft.	262
203	20	12	6	4	45-5/8	8-1/2	4-3/4	1/2	3.2	4" dia. x 15 ft.	262
204	23-1/4	15-1/4	7-5/8	5	47-1/8	9-1/8	4-3/4	1/2	4	5" dia. x 15 ft.	306
205	26-1/2	18-1/2	9-1/4	6	48-1/2	9-3/4	5-1/4	1/2	4.7	6" dia. x 15 ft.	354
206	29-3/4	21-3/4	10-7/8	6	48-1/2	9-3/4	5-1/4	1/2	5.5	6" dia. x 15 ft.	414
207	33	25	12-1/2	7	50-1/8	10-3/8	6-5/8	3/4	6.2	7" dia. x 15 ft.	458
208	36-1/4	28-1/4	14-1/8	7	50-1/8	10-3/8	6-5/8	3/4	7	7" dia. x 15 ft.	514
209	39-1/2	31-1/2	15-3/4	8	52	11	7-1/4	3/4	7.7	8" dia. x 15 ft.	550
210	42-3/4	34-3/4	17-3/8	8	52	11	7-1/4	3/4	8.5	8" dia. x 15 ft.	608

[1] 15' chimney height is from bottom of draft hood opening to top of chimney.

[2] Refer to the National Fuel Gas Code, Appendix G for equivalent areas of circular and rectangular flue linings. Maximum Allowable Working Pressure - 30 PSI (Water Only)

[3] 202 only. Dimension 'G' includes allowance for 4" x 3" reducer furnished with boiler. See Figure 8.

SECTION I - INSTALLATION INSTRUCTIONS

1. INSPECT SHIPMENT carefully for any signs of damage. All equipment is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of Boiler to the carrier in good condition. Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be allowed by Boiler Manufacturer unless presented within sixty (60) days after receipt of equipment.

2. BOILER INSTALLATION must conform to the requirements of the authority having jurisdiction, or in the absence of such requirements, to:

U.S.A. - *National Fuel Gas Code, ANSI Z223.1*, obtainable from the American Gas Association, 1515 Wilson Blvd., Arlington (Rosslyn), VA 22209.

When required by the authority having jurisdiction, the installation must conform to ANSI/ASME No. CSD-1.

CANADA - "Installation Codes for Natural and LP Gas Burning Appliances and Equipment, CAN/CGA-B149.1 or .2-latest edition obtainable from the Canadian Gas Association, 55 Scarsdale Road, Don Mills, Ontario, Canada M3B 2R3.

3. These Gas Boilers are DESIGN CERTIFIED FOR INSTALLATION ON COMBUSTIBLE FLOORING. DO NOT INSTALL THESE BOILERS ON CARPETING.

4. LOCATE BOILER in front of or behind installation position before removing Crate. Locate on a level floor as close to chimney as possible. For basement installations, provide a solid base such as concrete, if floor is not level or if water may be encountered on floor around Boiler.

The boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during boiler operation and service (circulator replacement, control replacement, etc.).

5. REMOVE CRATE-

- A. Remove all crate fasteners. Lift off outside container.
- B. Remove all screws and brackets securing boiler to skid.
- C. Save two of the wooden slats from the container sleeve for use in Steps D & E.
- D. Tilt the boiler to one side and slide a wooden slat under the two raised feet.
- E. Tilt the boiler to the other side and slide another wooden slat under the two raised feet.

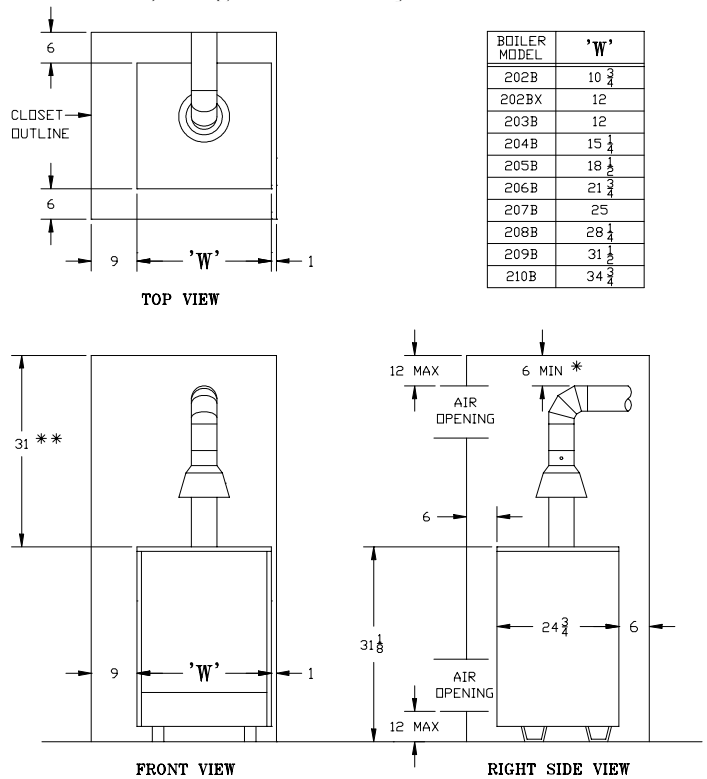
F. Slide the boiler forward or backward off the skid using the two wooden slats as runners.

6. Move boiler to permanent position.

7. PROVIDE CLEARANCE and AIR for COMBUSTION and VENTILATION.

A. CLEARANCES

- 1. ALL INSTALLATIONS - Practical service clearances must be considered (see Figure 1). A minimum of 24" from the left side and front jacket panels is recommended for servicing but may be reduced to minimum shown in Figure 2. Subject to boiler and system piping, left side clearance may be reduced to 1" if right side clearance is increased to 9".
- 2. ALCOVE INSTALLATIONS - An alcove is considered a closet as shown in Figure 2 less front. Height clearance may be reduced to 27".
- 3. UNCONFINED SPACE (see definition, Paragraph (B) below) - Height clearance may be reduced to 27".



* MINIMUM RADIAL CLEARANCE AROUND DRAFT HOOD AND BREECHING.
 ** ADD HEIGHT REQUIRED TO MAINTAIN 6" CLEARANCE FROM ALL BREECHING COMPONENTS. VENT DAMPER MAY BE INSTALLED IN VERTICAL OR HORIZONTAL SECTION OF BREECHING WITHIN REACH OF CONTROL HARNESS.

Figure 2: Minimum Clearances

B. PROVIDE COMBUSTION AND VENTILATION AIR in accordance with applicable provisions of local building codes, or: U.S.A. - *National Fuel Gas Code*, NFPA 54/ANSI Z223.1, Section 5.3, Air for Combustion and Ventilation; Canada - *Natural Gas Installation Code*, CAN/CGA-B149.1, or *Propane Installation Code*, CAN/CGA-B149.2, Part 5, Venting Systems and Air Supply for Appliances.

1. CLOSET INSTALLATIONS (confined space) in a building of *other than unusually tight construction* (see definition below), provide combustion and ventilation air as shown in Figure 2.
2. Installations other than Paragraph (1) above:
 - a. Determine volume of space (boiler room). Rooms communicating directly with space (through openings not furnished with doors) are considered part of space.
Volume [ft³] = Length [ft] x Width [ft] x Height [ft]
 - b. Determine Total Input of all appliances in space.
Round result to nearest 1,000 Btu per hour (Btuh).
 - c. Determine type of space. Divide Volume by Total Input.
 - i. If result is greater than or equal to 50 ft³ per 1,000 Btuh, space is considered an *unconfined space*.
 - ii. If result is less than 50 ft³ per 1,000 Btuh, space is considered a *confined space*.
 - d. Determine building type. A building of *unusually tight construction* has the following characteristics:
 - i. Walls and ceiling exposed to outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings gasketed and sealed, and
 - ii. Weather-stripping has been added on openable windows and doors, and
 - iii. Caulking or sealants applied in joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at plumbing and electrical penetrations, and at other openings.
 - e. For boiler located *in a building of other than unusually tight construction*, adequate combustion and ventilation air is normally provided by fresh air infiltration through cracks around windows and doors.
 - f. For boiler located *in building of unusually tight construction*, provide outdoor air through two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space. Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:
 - i. Direct communication with outdoors. Minimum free area of 1 square inch per 4,000 Btu per hour input of all equipment in space.
 - ii. Vertical ducts. Minimum free area of 1 square inch

per 4,000 Btu per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.

iii. Horizontal ducts. Minimum free area of 1 square inch per 2,000 Btu per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.

g. Ventilation Duct Louvers and Grilles. Equip outside openings with louvers to prevent entrance of rain and snow, and screens to prevent entrance of insects and rodents. Louvers and grilles must be fixed in open position or interlocked with equipment to open automatically before burner operation. Screens must not be smaller than ¼ inch mesh.

Consider the blocking effect of louvers, grilles and screens when calculating the opening size to provide the required free area. If free area of louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.

8. CONNECT GAS SERVICE from Meter to gas control assembly in accordance with Local Piping Codes and requirements of Gas Company, see Figure 1. They may require piping of larger size than Control Assembly Connection, especially if run from meter is long or includes several elbows. (See Figure 1 for size of Gas Connection to gas control assembly).

This piping is to be supplied by the installer and must include a trap, a ground joint union and a manual shutoff valve upstream of the gas control assembly outside of the jacket when codes require, see Figure 1. A pipe thread compound resistant to the action of liquefied petroleum gases should be applied to all threaded joints in the gas piping. Pressure testing of the Gas Supply Piping Boiler and its connections is required before placing the boiler in operation.

The boiler and shutoff valve must be disconnected from the gas supply piping system during any pressure testing at pressures greater than ½ psig.

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at pressures equal to or less than ½ psig.

RECOMMENDED SIZING OF GAS SUPPLY PIPING TO BOILER FOR NATURAL GAS - shall be such as to provide the required supply of gas without undue loss of pressure between meter and the boiler. Gas supply piping should be sized in accordance with the Tables 1, 2 and 3. The following shall be taken into account:

- A. Allowable loss of pressure to assure a burner manifold pressure of 3½" water.
- B. Supply of gas to be provided in cubic feet.
- C. Length of piping and number of fittings.
- D. Specific gravity of gas.
- E. Correction factor for specific gravity.

9. BOILERPIPING

CAUTION

Failure to properly pipe boiler may result in improper operation and damage to boiler or building.

- A. CLEARANCES - Hot water pipes do not require clearance from combustible construction.
- B. Install drain cock and safety relief valve as shown in Figure 4. Note - Safety relief valve must be in vertical position.
- C. Pipe safety relief valve discharge to floor.

WARNING

Safety relief valve discharge piping must be piped near floor to eliminate potential of severe burns. Do not pipe in any area where freezing could occur. Do not install any shut-off valves.

- D. Install circulator with flanges, gaskets and bolts provided. Five foot long circulator harness allows circulator to be mounted on supply or return. Connect harness to circulator and secure any excess conduit.
- E. For heating only system piping, see Figure 3. Consult also I=B=R Installation Guides.
- F. Space heating and domestic water heating with Alliance water heater (intermittent circulation only). Install Alliance water heater as a separate heating zone. Refer to Alliance Installation, Operating and Service Instructions for additional information.
- G. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from

entering the boiler, see Figure 4. Also consult I=B=R Installation and Piping Guides.

If this Boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air, the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.

- H. Use a boiler bypass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperatures may be encountered (i.e. converted gravity circulation system, etc.).

Remove the circulator and install a pipe tee between the circulator and boiler return along with a second tee in the supply piping as shown in Figure 5. The bypass should be the same size as the supply and return lines with valves located in the bypass and supply outlet as illustrated in Figure 5 in order to regulate water flow to maintain higher boiler water temperatures.

Set the by-pass and boiler supply valves to a half throttle position to start. Operate boiler until the system water temperature is at a normal operating range.

Adjust the valves to provide 180° to 200°F supply water temperature. Opening the boiler supply valve will raise the system temperature, while opening the by-pass valve will lower the system supply temperature.

- I. A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.
- J. OXYGEN CORROSION:

Oxygen contamination of the boiler water will cause corrosion of the iron and steel boiler components, which can lead to failure. As such, any system must be designed to prevent oxygen absorption in the first place or prevent it from reaching the boiler. Problems caused by oxygen contamination of boiler water are not

Length [Feet]	0.3 inch w.c. Pressure Drop				0.5 inch w.c. Pressure Drop			
	½	¾	1	1¼	½	¾	1	1¼
10	132	278	520	1,050	175	360	680	1,400
20	92	190	350	730	120	250	465	950
30	73	152	285	590	97	200	375	770
40	63	130	245	500	82	170	320	660
50	56	115	215	440	73	151	285	580
60	50	105	195	400	66	138	260	530
70	46	96	180	370	61	125	240	490
80	43	90	170	350	57	118	220	460
90	40	84	160	320	53	110	205	430
100	38	79	150	305	50	103	195	400

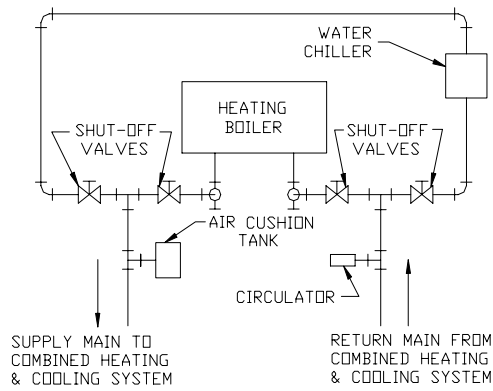


Figure 4: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems

the jacket side panel to secure the power cord to the jacket.

H. Be sure the power cord, mounting bracket, and switch are secure and located as shown in Figure 6.

WARNING

Failure to properly install and use this Blocked Vent Switch may result in property damage, personal injury or loss of life.

12. TO MEET FEDERALLY MANDATED EFFICIENCIES, THIS BOILER MUST BE EQUIPPED WITH A VENT DAMPER.

OPEN THE VENT DAMPER CARTON and remove the Installation Instructions. READ THE INSTALLATION INSTRUCTIONS THOROUGHLY before proceeding.

The automatic gas control valve supplied on each Series 2 boiler provides the redundancy referenced in the vent damper Installation Instructions.

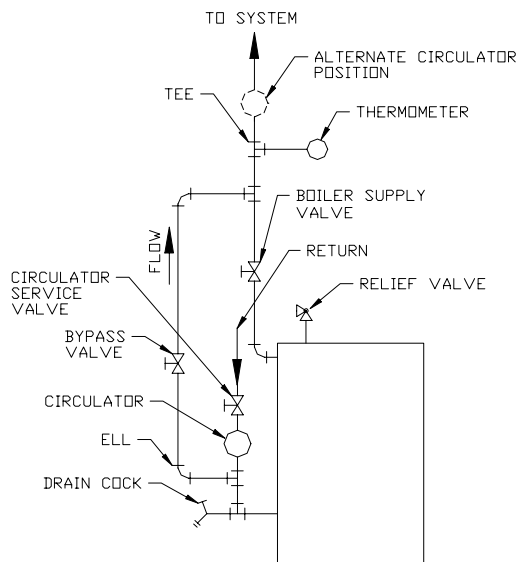


Figure 5

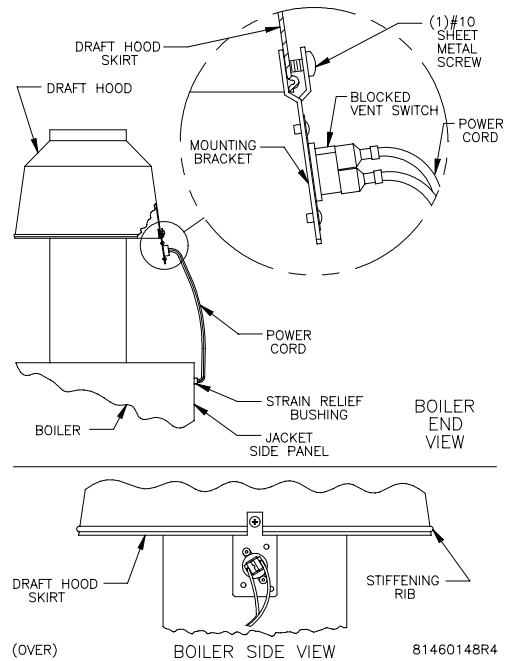


Figure 6

- A. The vent damper should be the same size as the outlet of the Draft Hood. (See Figure 1) Unpack the damper carefully - DO NOT FORCE IT CLOSED! Forcing the damper may damage the gear train and void the warranty. The damper assembly includes a prewired connection harness for use on all 24V Standing Pilot or intermittent ignition control systems.
- B. Refer to Figure 7 in this manual.
- C. Mount the vent damper assembly on the draft hood without modification to either. (Refer to instructions packed with the vent damper for specific instructions). This is a must for the wiring harness to fit and the damper position indicator to be visible to the users.

NOTICE

Please refer to the specifications, installation instructions and troubleshooting guide packed in the vent damper carton for complete detailed installation instructions. Also refer to Figure 7 in this manual.

- D. Install the 90° BX connector attached to the flexible conduit in the 7/8" knockout on the left side of the jacket. Plug the factory wired Vent Damper Harness into the polarized receptacle. Install a cable clamp around the flexible conduit and attach to the Jacket top panel. (See Figure 7).

- E. Continuous Ignition (Standing Pilot) Only. Remove knockout from vent damper blade.
- F. Size 202 Only. Install 4" x 3" reducing fitting on vent damper outlet (or draft hood outlet for Canadian boiler not equipped with vent damper).

13. INSTALL VENT CONNECTOR from reducing fitting (202 Only), draft hood or damper to chimney, see Fig. 8.

- A. Vent installation shall be in accordance with local building codes; or the local authority having jurisdiction; or the National Fuel Gas Code, ANSI Z223.1/NFPA 54; or the Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances, ANSI/NFPA 211. Both of the aforementioned standards, ANSI Z223.1 and ANSI/NFPA 211, specify Type B and Type L double wall metal vents and fire clay tile lined masonry chimneys as suitable chimney constructions for Category I, draft hood equipped appliances, such as this Series 2 boiler. Both standards prohibit the use of unlined masonry construction as a chimney, with the exception in ANSI Z223.1/NFPA 54 that "Where permitted by the authority having jurisdiction, existing chimneys shall be permitted to have their use continued when an appliance is replaced by an appliance of similar type, input rating, and efficiency." ANSI/NFPA 211 prohibits the use of single wall metal vent as a chimney, while ANSI Z223.1 allows it under very restrictive conditions. In Canada refer to the Natural Gas Installation Code, CAN/CGA-B149.1 or the LP Gas Installation Code, CAN/CGA-B149.2 - latest edition.
- B. Do not connect into same leg of chimney serving an open fireplace.
- C. Inspect chimney for obstructions or restrictions and remove. Clean chimney if necessary.
- D. Vent pipe to chimney must not be smaller than outlet on draft hood or damper. Although single wall vent pipe may be used, Type B is recommended. The venting system must be arranged so that only the boiler is served by the damper device. Installation per paragraph 12 complies with this provision.
- E. Where two or more appliances vent into a common vent, the area of the common vent should at least equal the area of the largest vent plus 50% of the area in the additional vents. Do not connect the vent of this appliance into any portion of mechanical draft system operating under positive pressure.
- F. Vent pipe should have the greatest possible initial rise above the draft hood consistent with the head room available and the required clearance from adjacent combustible building structure. Vent Pipe should be

installed above the bottom of chimney to prevent blockage.

- G. Vent pipe should slope upward from draft hood to chimney not less than one inch in four feet. No portion of vent pipe should run downward or have dips or sags. Vent pipe must be securely supported.
- H. Vent pipe must be inserted into but not beyond inside wall of chimney liner. Seal tight between vent pipe and chimney.
- I. Do not install non-listed (AGA, CGA, ETL or UL) vent damper or other obstruction in vent pipe.

14. IF AN EXISTING BOILER IS REMOVED-

WARNING

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 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:

- A. Seal any unused openings in the common venting system.
- B. 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.
- C. Insofar as 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.
- D. Place in operation the appliance being inspected. Follow the Lighting (or Operating) Instructions. Adjust thermostat so appliance will operate continuously.
- E. 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.
- F. 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.
- G. Any improper operation of the common venting system should be corrected so the installation conforms with the *National Fuel Gas Code*, NFPA 54/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 Part 11 in the *National Fuel Gas Code*, NFPA

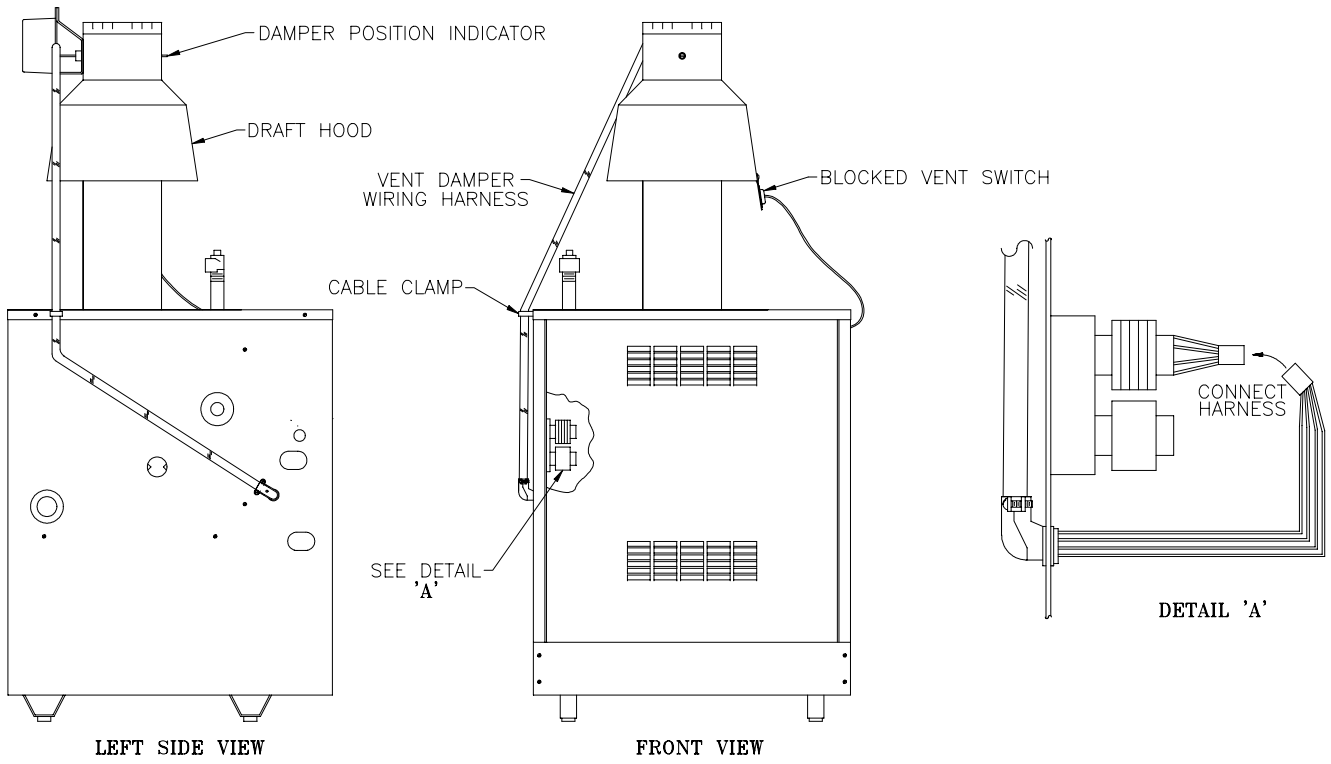


Figure 7: Plug-in Damper Installation

15. INSTALL A ROOM THERMOSTAT on an inside wall about four feet above floor. Never install thermostat on an outside wall or where it will be influenced by drafts, hot or cold water pipes, lighting fixtures, television, rays of the sun or near a fireplace. Keep large furniture away from thermostat so there will be free movement of room air around this control.

Heat Anticipator in Thermostat should be set to match the requirements of the control to which it is connected. See Table 4. If system tends to overheat above the thermostat's temperature setting, reduce heat anticipator setting by .1 or .2 amps. If system tends to short cycle without reaching desired room temperature, increase heat anticipator setting by .1 or .2 amps.

16. INSTALL ELECTRIC WIRING in accordance with National Electric Code or the Canadian Electrical Code and local regulations. See Figures 11 through 14 for applicable wiring diagram. A separate Electrical Circuit should be run from meter with a Fused Disconnect Switch in this Circuit. When installed, the boiler must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and/or the CSA C22.1 Electrical Code, if an external electrical source is utilized.

For zone valve wiring, a separate 24V transformer is required rather than attempting to use the boiler mounted control. Consult zone valve manufacturer for assistance.

17. VENT DAMPER SEQUENCE OF OPERATION
Effikal and Johnson Damper

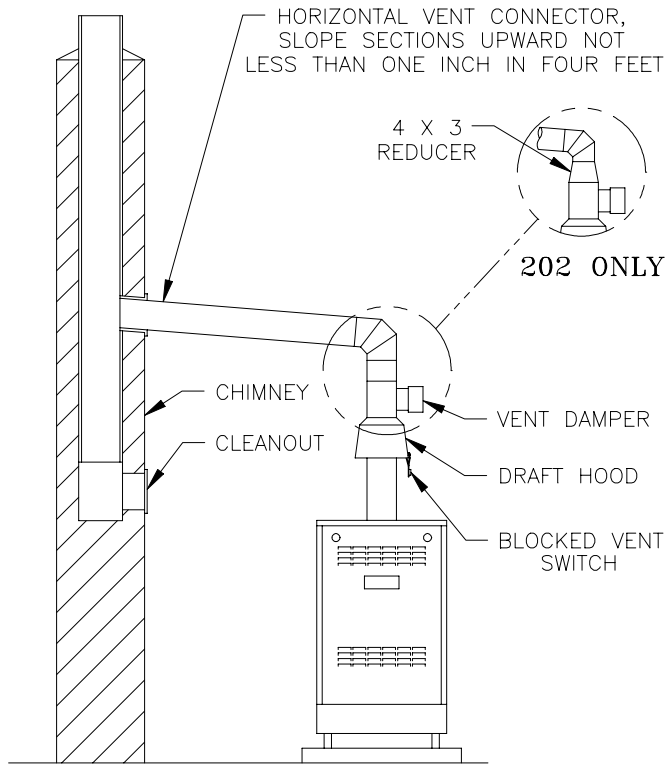


Figure 8: Typical Vent Installation

Table 4: Wiring Diagrams and Heat Anticipator Settings

Ignition Type	Circulation Method	Thermostat Heat Anticipator Setting [Amps]	Wiring Diagram	
			Figure Number	Page Number
Continuous (Standing Pilot)	Intermittent	0.6	11	13
	Constant/Gravity	1.0	14	18
Intermittent	Intermittent	0.6	12	14
	Constant/Gravity	1.0	13	16

If system tends to overheat above thermostat's temperature setting, reduce heat anticipator setting by 0.1 or 0.2 amps. If system tends to shortcycle without reaching desired room temperature, increase heat anticipator setting by 0.1 or 0.2 amps.

- A. The Vent Damper is continuously powered at Terminal 1.
- B. When there is a call for heat, the damper relay coil is energized through Terminal 5 if all limits ahead of the damper are satisfied.
- C. The relay coil closes contacts which energize the damper motor, causing the damper to open.
- D. When the damper blade reaches the fully open position, power is sent back to the ignition circuit through Terminal 2 and the damper motor is de-energized.
- E. When the call for heat is satisfied, the damper relay coil

is deenergized - closing contacts which energize the damper motor. This causes the damper to close. When the damper blade reaches the fully closed position, the damper motor is de-energized.

POWER FAILURE - The damper blade will stop in the position it was in when power failed. (Combustion can never take place unless the damper blade is in the fully open position.)

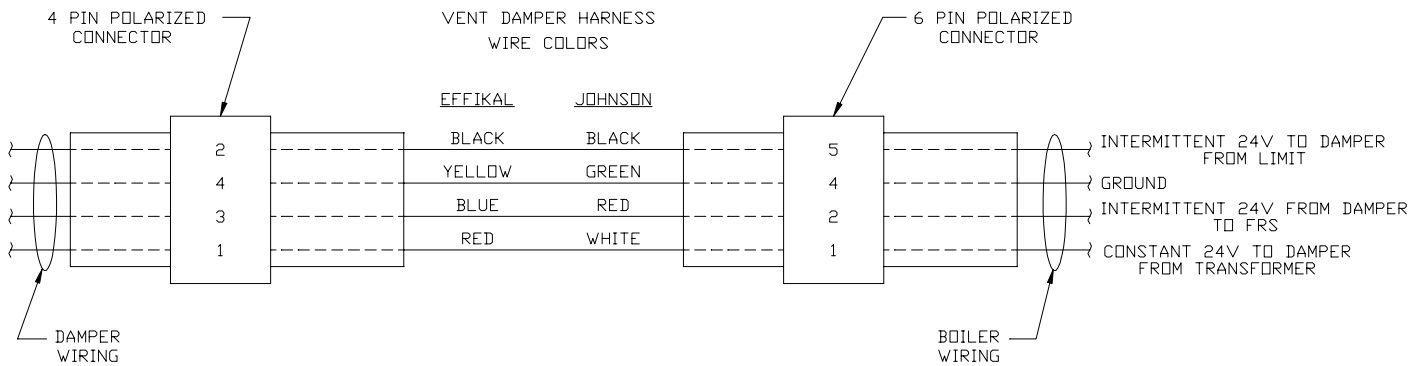
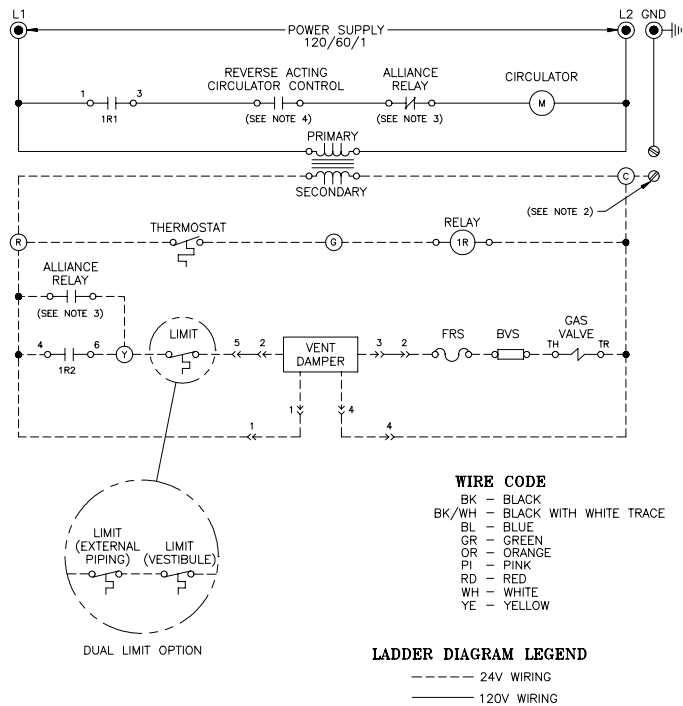
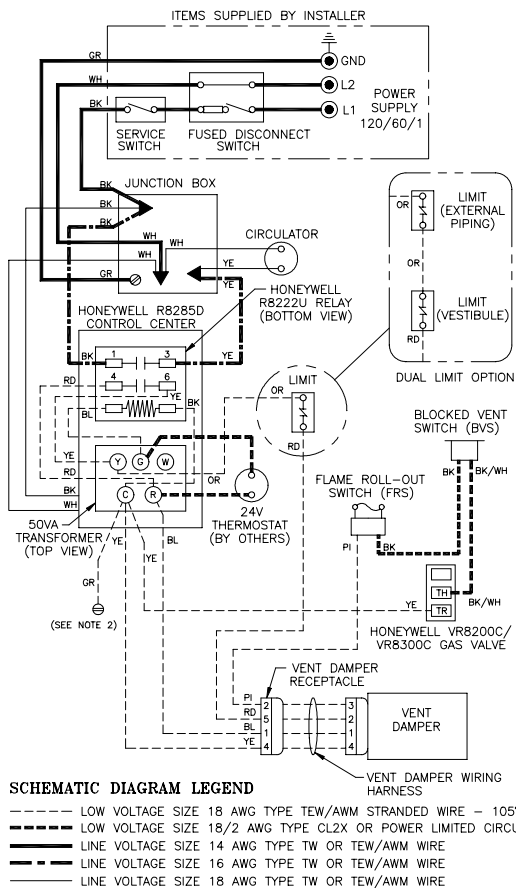


Figure 9: Vent Damper Schematic Wiring Diagram



NOTES:

1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE AS SHOWN OR ITS EQUIVALENT.
2. CANADA ONLY - GREEN GROUND WIRE ATTACHED FROM TRANSFORMER TERMINAL "C" TO JACKET SCREW IN VESTIBULE.
3. ALLIANCE WATER HEATER CONTROLS SUPPLIED BY INSTALLER (SHOWN FOR DOMESTIC HOT WATER PRIORITY AND CIRCULATOR ZONING).
4. REVERSE ACTING CIRCULATOR CONTROL, IF USED, SUPPLIED BY INSTALLER.

Figure 11: Wiring Diagram, 24 Volt Standing Pilot and Intermittent Circulation

SEQUENCE OF OPERATION

NORMAL OPERATION

1. When the thermostat call for heat, the vent damper will open (see paragraphs 17A through 17D). The circulator is started through a relay and at the same time the gas valve is energized allowing main gas flow and ignition of main burners.
2. Where condensation of flue gas is encountered in boiler flues a reverse acting circulator control should be installed to stop the circulator before the boiler water temperature drops to that which flue gas condensation may occur.
3. After the thermostat is satisfied the main valve will close and main burner flames will be extinguished. The vent damper will close (see paragraph 17E).

SAFETY SHUTDOWN

1. High Limit Switch

In the event excessive boiler water temperature is developed the high limit switch will open interrupting power to the gas valve. The main burners will be extinguished immediately, and the vent damper will close at the same time, but the circulator will continue to operated. Normal operation will be resumed when the boiler water temperature drops to a point where the high limit switch closes.

2. Blocked Vent Switch

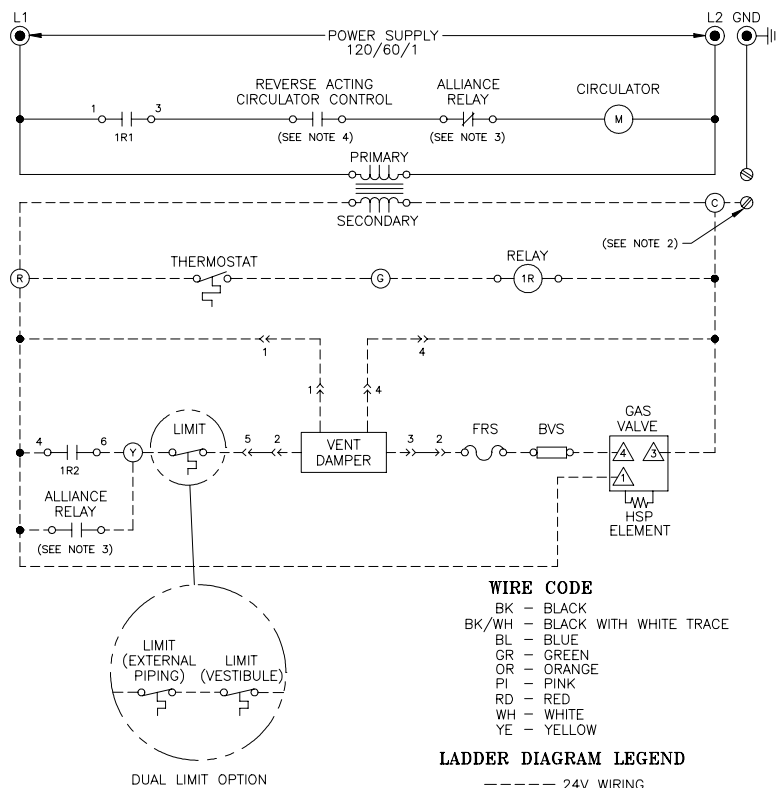
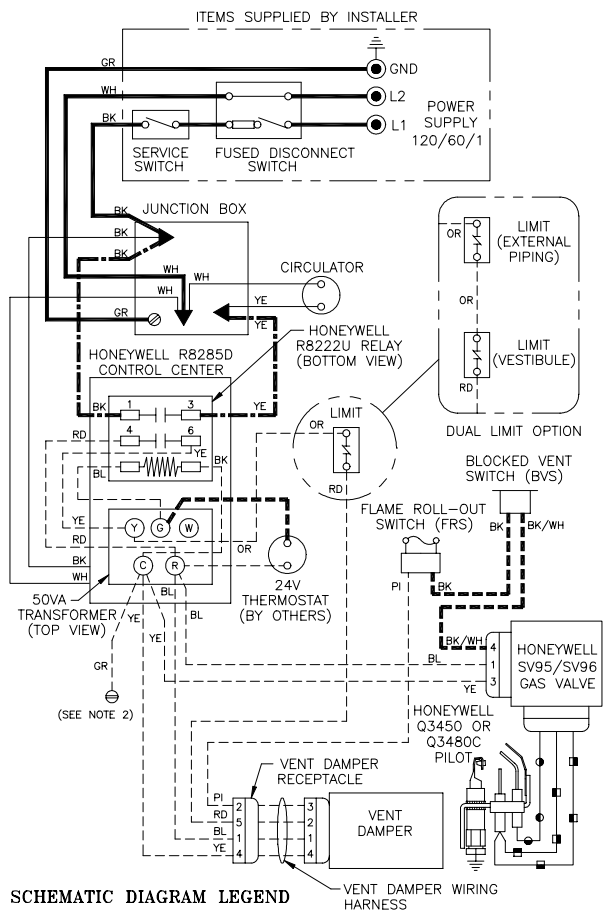
In the event excessive blockage in the vent system is developed the blocked vent switch will open interrupting power to the gas valve. The main burners will be extinguished immediately, the circulator will continue to operate, and the vent damper will remain open until the thermostat is turned off. The source of blockage must be corrected by trained and skilled personnel from a qualified service agency before resetting switch.

3. Flame Rollout Switch

In the event excessive blockage in the boiler section flue passageways is developed the flame rollout switch will open interrupting power to the gas valve. The main burners will be extinguished immediately, the circulator will continue to operate and the vent damper will remain open until the thermostat is turned off. If the flame rollout switch is activated do not attempt to place the boiler in operation. The source of blockage must be corrected and the flame rollout switch replaced by trained and skilled personnel from a qualified service agency.

4. Pilot

The thermocouple proves pilot flame and in the absence of such within 45-90 seconds causes the combination gas valve, which is equipped with a 100% shut-off provision, to be de-energized, thus, preventing main gas or pilot gas flow.



SCHEMATIC DIAGRAM LEGEND

- LOW VOLTAGE SIZE 18 AWG TYPE TEW/AWM STRANDED WIRE - 105°C
- LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X OR POWER LIMITED CIRCUIT CABLE - 105°C
- LINE VOLTAGE SIZE 14 AWG TYPE TW OR TEW/AWM WIRE
- LINE VOLTAGE SIZE 16 AWG TYPE TW OR TEW/AWM WIRE
- LINE VOLTAGE SIZE 18 AWG TYPE TW OR TEW/AWM WIRE
- HONEYWELL SENSOR - 250°C (INCLUDED WITH PILOT)
- HONEYWELL IGNITER - 250°C (INCLUDED WITH PILOT)

- WIRE CODE**
- BK - BLACK
 - BK/WH - BLACK WITH WHITE TRACE
 - BL - BLUE
 - GR - GREEN
 - OR - ORANGE
 - PI - PINK
 - RD - RED
 - WH - WHITE
 - YE - YELLOW

LADDER DIAGRAM LEGEND

- 24V WIRING
- 120V WIRING

NOTES:

1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE AS SHOWN OR ITS EQUIVALENT.
2. CANADA ONLY - GREEN GROUND WIRE ATTACHED FROM TRANSFORMER TERMINAL 'C' TO JACKET SCREW IN VESTIBULE.
3. ALLIANCE WATER HEATER CONTROLS SUPPLIED BY INSTALLER (SHOWN FOR DOMESTIC HOT WATER PRIORITY AND CIRCULATOR ZONING).
4. REVERSE ACTING CIRCULATOR CONTROL, IF USED, SUPPLIED BY INSTALLER.

Figure 12: Wiring Diagram, Intermittent Ignition and Intermittent Circulation

SEQUENCE OF OPERATION

NORMAL OPERATION

1. When the THERMOSTAT calls for heat, the RELAY is energized. The CIRCULATOR starts and the VENT DAMPER is opened (see Paragraphs 17A through 17D). When the damper blade reaches the fully open position, the GAS VALVE powers the igniter circuit and opens the pilot valve.
2. The sensing circuit between the Q3450 or Q3480 pilot and the GAS VALVE proves presence of pilot flame.*
3. The GAS VALVE de-energizes the igniter and opens the main valve, allowing main gas to flow and ignition of main burners.
4. Where condensation of flue gas is encountered in boiler flues, a REVERSE ACTING CIRCULATOR CONTROL should be installed to stop the CIRCULATOR before the boiler water temperature drops to that at which flue gas condensation may occur.
5. The burners and CIRCULATOR will operate simultaneously until the THERMOSTAT is satisfied.
6. After the THERMOSTAT is satisfied the main valve, pilot valve and the circulator will be de-energized and main burner and pilot flames will be extinguished. The VENT DAMPER will close (see Paragraph 17E).

SAFETY SHUTDOWN

1. High Limit Switch
In the event excessive boiler water temperature is developed the High Limit Switch will open, interrupting power to the VENT DAMPER and the GAS VALVE. Main Burners and Pilot Burner will be extinguished immediately. Normal operation will be resumed when the boiler water temperature drops to a point where the High Limit Switch closes.
2. Blocked Vent Switch
In the event excessive blockage in the vent system is

developed the blocked vent switch will open interrupting power to the VENT DAMPER and GAS VALVE. Main burners and pilot burner will be extinguished immediately, the VENT DAMPER will close and the CIRCULATOR will continue to operate. The source of blockage must be corrected by trained and skilled personnel from a qualified service agency before resetting switch.

3. Flame Rollout Switch
In the event excessive blockage in the boiler section flue passageways is developed the flame rollout switch will open interrupting power to the VENT DAMPER and the GAS VALVE. Main burners and pilot burner will be extinguished immediately. The VENT DAMPER will close and the CIRCULATOR will continue to operate. If the flame rollout switch is activated do not attempt to place the boiler in operation. The source of blockage must be corrected and the flame rollout switch replaced by trained and skilled personnel from a qualified service agency.
4. Pilot
 - A. Any pilot failure on the Q3450 or Q3480 Pilot will close the main gas valve and energize the igniter.
 - B. If the igniter breaks or becomes disconnected, the pilot valve coil loses power, closing the pilot valve.
5. For TROUBLE SHOOTING GUIDE, see Figure 28.
 - * • SV9500 and SV9600 Gas Valves:
The igniter and pilot gas valve will stay energized until either the pilot lights or the call for heat ends.
 - SV9501 and SV9601 Gas Valves:
If the pilot fails to light after a 90 second trial for ignition, the igniter will be de-energized and the pilot gas valve will close. After a 5 minute delay, the igniter will be re-energized and the pilot gas valve will re-open. This continuous retry cycle will end either when the pilot lights or the call for heat ends.

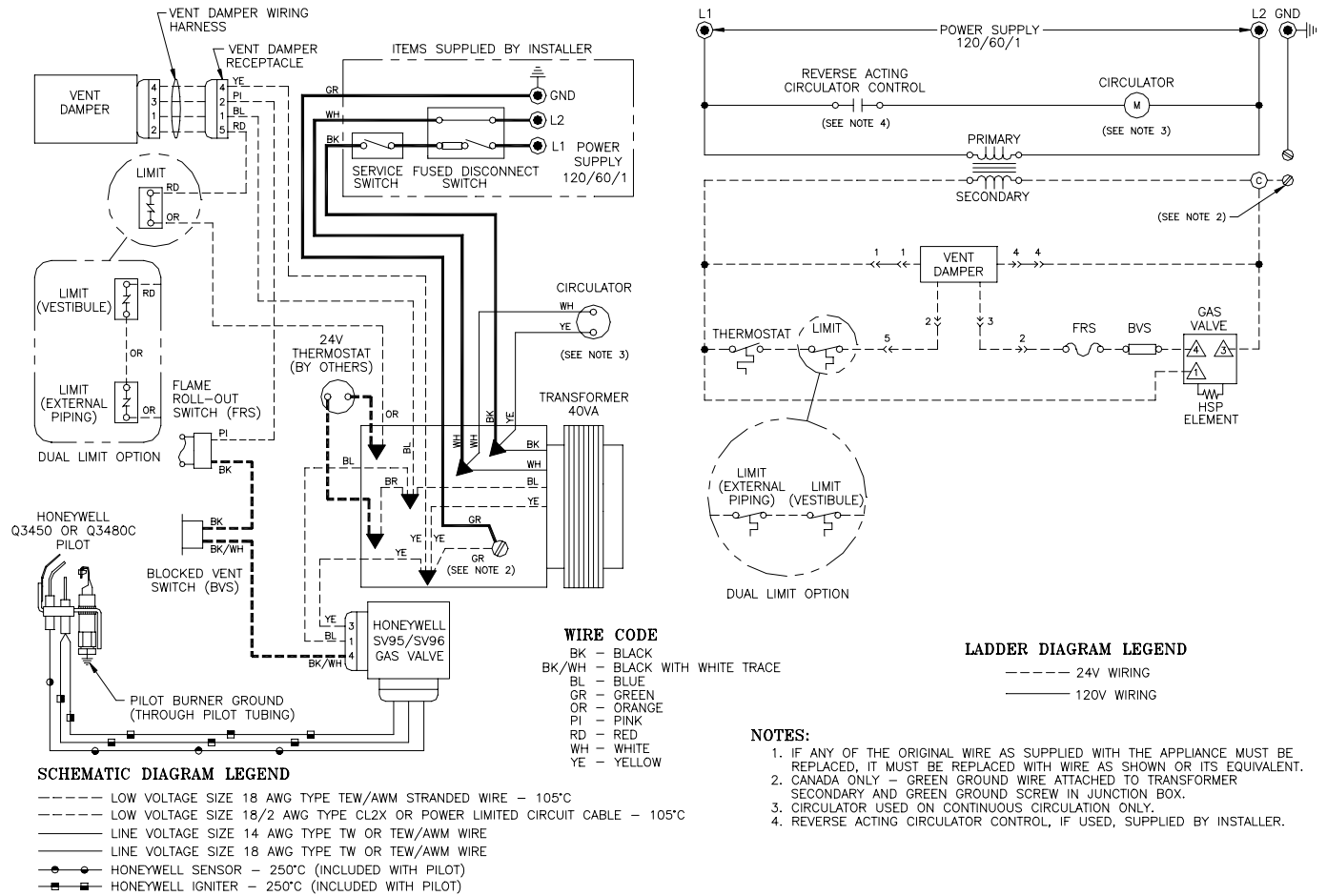


Figure 13: Wiring Diagram, Intermittent Ignition and Continuous or Gravity Circulation

SEQUENCE OF OPERATION

NORMAL OPERATION

1. When THERMOSTAT calls for heat, the VENT DAMPER is opened (see Paragraphs 17A through 17D). When the damper blade reaches the fully open position, the GAS VALVE powers the igniter circuit and opens the pilot valve.
2. The sensing circuit between the Q3450 or Q3480 pilot and the GAS VALVE proves presence of pilot flame.*
3. The GAS VALVE de-energizes the igniter and opens the main valve, allowing main gas to flow and ignition of main burners.
4. On Boilers equipped with Circulators that are wired to run continuously and, where condensation of flue gas is encountered in boiler flues, a REVERSE ACTING CIRCULATOR CONTROL should be installed to stop the Circulator before the Boiler Water Temperature drops to that at which flue gas condensation may occur.
5. The Burners will operate until the THERMOSTAT is satisfied.
6. After the THERMOSTAT is satisfied the GAS VALVE will be de-energized. The Main Burners and Pilot Burner will be extinguished. If Boiler is equipped with circulator, Circulator will continue to run. The VENT DAMPER will close (see Paragraph 17E).

SAFETY SHUTDOWN

1. High Limit Switch

In the event excessive boiler water temperature is developed, the High Limit will open, interrupting power to the IGNITION MODULE and the DUAL COMBINATION GAS VALVE. Main Burners and Pilot Burner will be extinguished immediately and the vent damper will close. Normal operation will be resumed when the Boiler Water Temperature drops to a point where the High Limit Switch closes.

2. Blocked Vent Switch

In the event excessive blockage in the vent system is developed the blocked vent switch will open interrupting power to the ignition module and dual combination gas valve. Main burners and pilot burner will be extinguished immediately and the vent damper will close. The source of blockage must be corrected by trained and skilled personnel from a qualified service agency before resetting switch.

3. Flame Rollout Switch

In the event excessive blockage in the boiler section flue passageways is developed the flame rollout switch will open interrupting power to the ignition module and the dual combination gas valve. Main burners and pilot burner will be extinguished immediately and the vent damper will close. If the flame rollout switch is activated do not attempt to place the boiler in operation. The source of blockage must be corrected and the flame rollout switch replaced by trained and skilled personnel from a qualified service agency.

4. Pilot

- A. Any pilot failure on the Q3450 or Q3480 pilot will close the main gas valve and energize the igniter.
- B. If the igniter breaks or becomes disconnected, the pilot valve coil loses power, closing the pilot valve.

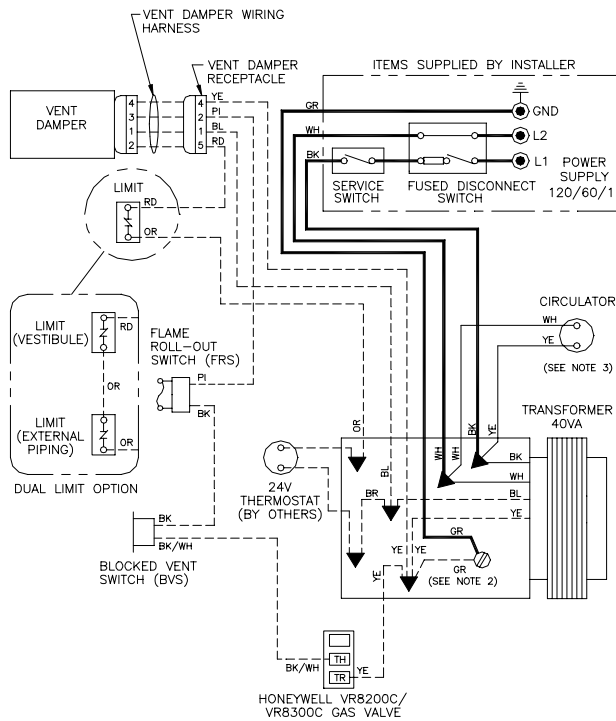
5. For TROUBLE SHOOTING GUIDE, see Figure 28.

* • SV9500 and SV9600 Gas Valves:

The igniter and pilot gas valve will stay energized until either the pilot lights or the call for heat ends.

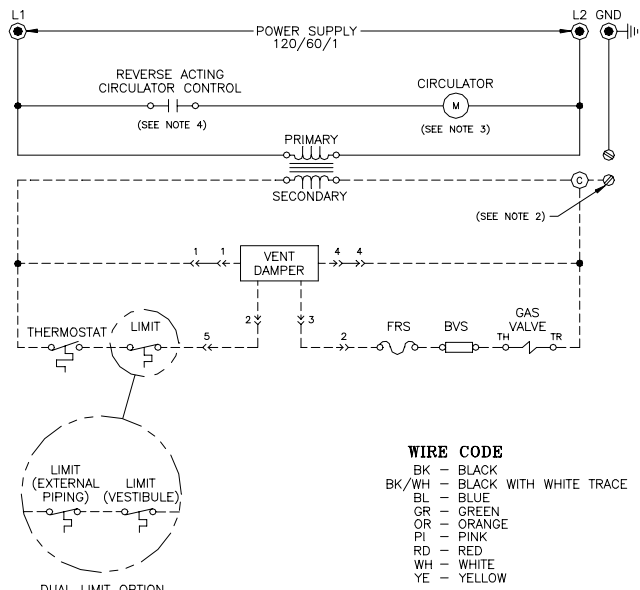
* • SV9501 and SV9601 Gas Valves:

If the pilot fails to light after a 90 second trial for ignition, the igniter will be de-energized and the pilot gas valve will close. After a 5 minute delay, the igniter will be re-energized and the pilot gas valve will re-open. This continuous retry cycle will end either when the pilot lights or the call for heat ends.



SCHEMATIC DIAGRAM LEGEND

- LOW VOLTAGE SIZE 18 AWG TYPE TEW/AWM STRANDED WIRE - 105°C
- LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X OR POWER LIMITED CIRCUIT CABLE - 105°C
- LINE VOLTAGE SIZE 14 AWG TYPE TW OR TEW/AWM WIRE
- LINE VOLTAGE SIZE 18 AWG TYPE TW OR TEW/AWM WIRE



LADDER DIAGRAM LEGEND

- 24V WIRING
- 120V WIRING

WIRE CODE

- BK - BLACK
- BK/WH - BLACK WITH WHITE TRACE
- BL - BLUE
- GR - GREEN
- OR - ORANGE
- PI - PINK
- RD - RED
- WH - WHITE
- YE - YELLOW

NOTES:

1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE AS SHOWN OR ITS EQUIVALENT.
2. CANADA ONLY - GREEN GROUND WIRE ATTACHED TO TRANSFORMER SECONDARY AND GREEN GROUND SCREW IN JUNCTION BOX.
3. CIRCULATOR USED ON CONTINUOUS CIRCULATION ONLY.
4. REVERSE ACTING CIRCULATOR CONTROL, IF USED, SUPPLIED BY INSTALLER.

Figure 14: Wiring Diagram, 24 Volt Standing Pilot with Continuous or Gravity Circulation

SEQUENCE OF OPERATION

NORMAL OPERATION

1. When the thermostat call for heat, the vent damper will open (see paragraphs 17A through 17D). The gas valve is energized allowing main gas to flow and operation of the main burners.
2. Where condensation of flue gas is encountered in boiler flues a reverse acting circulator control should be installed to stop the circulator before the boiler water temperature drops to that which flue gas condensation may occur.
3. After the thermostat is satisfied the main valve will close and main burner flames will be extinguished. The vent damper will close (see paragraph 17E). If the boiler is so equipped, circulator will continue to run.

SAFETY SHUTDOWN

1. High Limit Switch

In the event excessive boiler water temperature is developed the high limit switch will open interrupting power to the gas valve. The main burners will be extinguished immediately. Normal operation will be resumed when the boiler water temperature drops to a point where the high limit switch closes.

2. Blocked Vent Switch

In the event excessive blockage in the vent system is developed the blocked vent switch will open interrupting power to the gas valve. The main burners will be extinguished immediately and the vent damper will remain open until the thermostat is turned off. The source of blockage must be corrected by trained and skilled personnel from a qualified service agency before resetting switch.

3. Flame Rollout Switch

In the event excessive blockage in the boiler section flue passageways is developed the flame rollout switch will open interrupting power to the gas valve. The main burners will be extinguished immediately and the vent damper will remain open until the thermostat is turned off. If the flame rollout switch is activated do not attempt to place the boiler in operation. The source of the blockage must be corrected and the flame rollout switch replaced by trained and skilled personnel from a qualified service agency.

4. Pilot

The thermocouple proves pilot flame and in the absence of such within 45-90 seconds causes the combination gas valve, which is equipped with a 100% shut-off provision, to be de-energized, thus, preventing main gas or pilot gas flow.

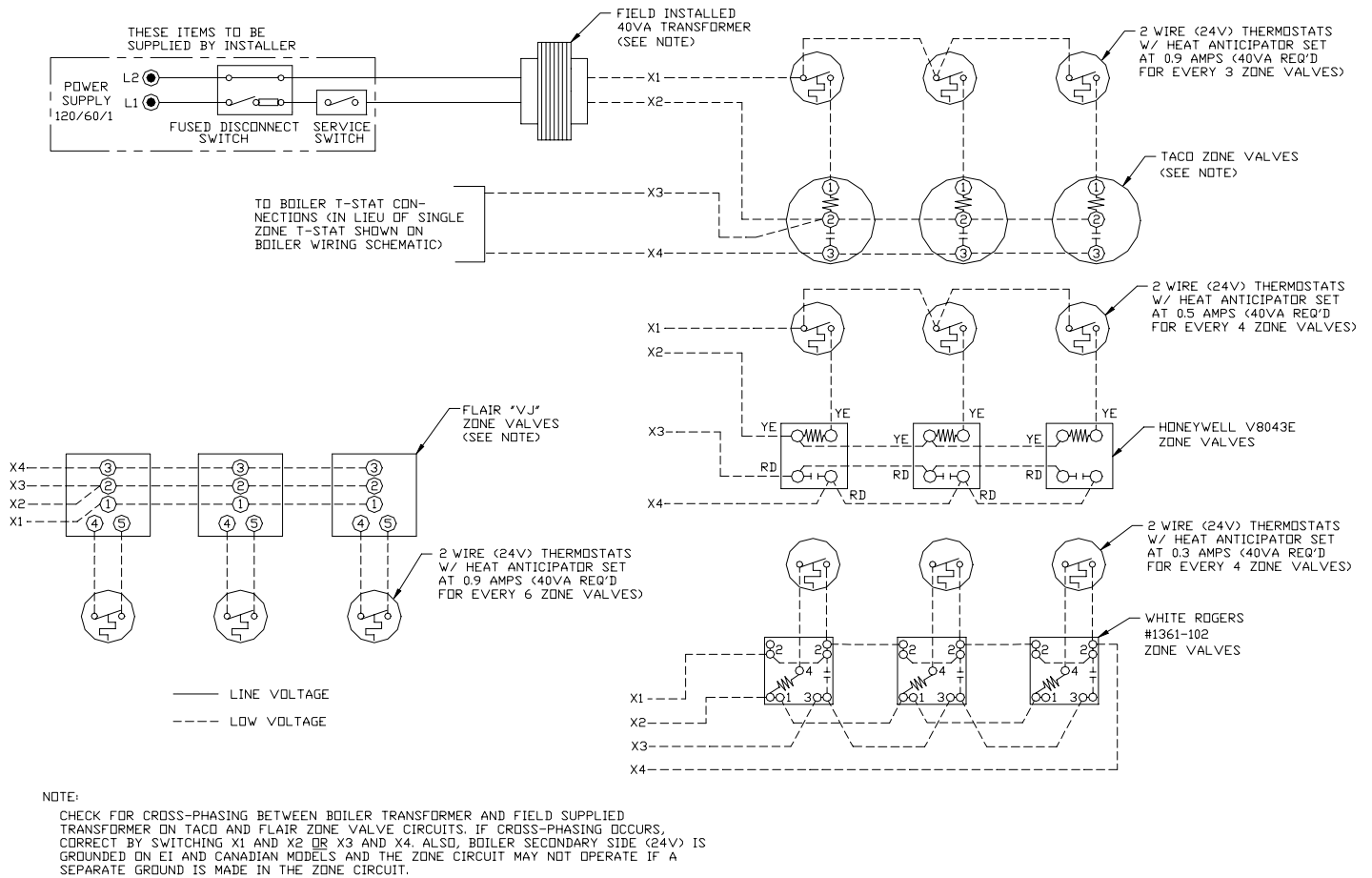


Figure 15: Wiring Schematic, Zone Valves

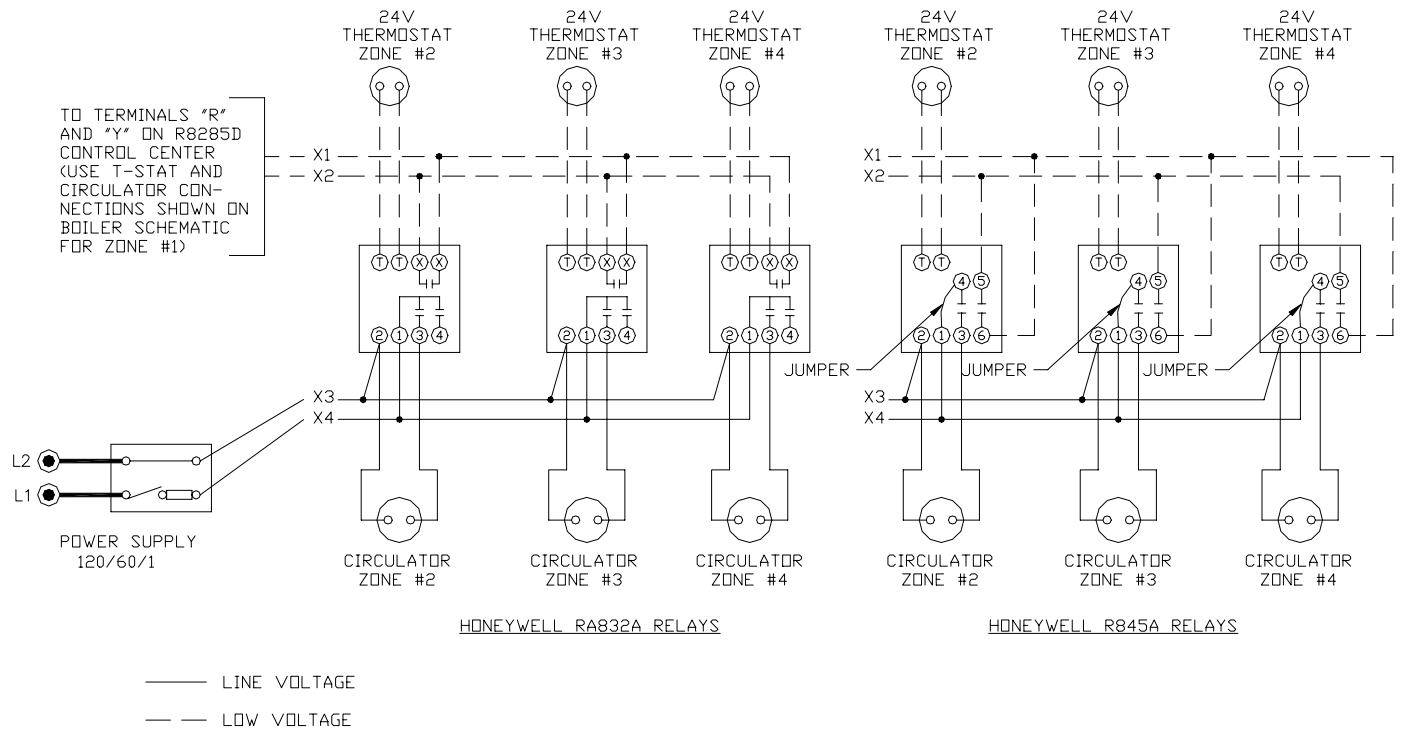


Figure 16: Wiring Schematic, Zone Circulators

SECTION II - OPERATING INSTRUCTIONS

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler when the boiler underwent tests specified in *American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers*, ANSI Z21.13b-1994.

1. MAIN BURNER CHECK - Check main burners to see that they were not dislodged during shipment. Rear of burners should be in the slots in the rear of burner tray and the front of the burners should be seated completely on the orifices.

2. INITIAL START -

A. FILL ENTIRE HEATING SYSTEM WITH WATER and vent air from system. Use the following procedure on a Series Loop System equipped with zone valves. (See Figure 3).

1. Close isolation valve in boiler supply piping.
2. Isolate all circuits by closing zone valves or balancing valves.
3. Attach a hose to bib cock located just below isolation valve in boiler supply piping. (Note - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
4. Starting with one circuit, open zone valve.
5. Open bib cock.
6. Open fill valve (Make-up water line should be located directly above isolation valve in boiler supply piping).
7. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
8. Open zone valve to the second zone to be purged, then close the first. Repeat this step until all zones have been purged, but always have one zone open. At completion, open all zone valves.
9. Close bib cock, continue filling the system until the pressure gauge reads 12 psi. Close fill valve. (Note - If make-up water line is equipped with pressure reducing valve, system will automatically fill to 12 psi. Leave globe valve open).
10. Open isolation valve in boiler supply piping.
11. Remove hose from bib cock.

B. Turn ROOM THERMOSTAT to lowest setting.

C. Be sure that gas to pilot and main burners has been off for at least five minutes and vent damper (if used) has been in the open position.

D. Turn "OFF" the electric switch serving boiler.

E. Open valve on main gas line at meter.

F. PURGE AIR FROM GAS PIPING. This procedure will vary with equipment furnished but **in all cases adequate ventilation must be provided and no smoking or open flame permitted.** To determine which of the procedures outlined in succeeding paragraphs is applicable, match suffix of boiler model found on Rating Plate with paragraph heading:

1. Standing Pilot Models (Suffix V):

- a. Keep electric switch "OFF".
- b. Open Manual Shut-off Valve upstream of Combination Gas Valve.
- c. Disconnect Pilot Tubing at gas valve (Purge **must not** be into combustion chamber).
- d. Turn Main Gas Knob on Combination Gas Valve to

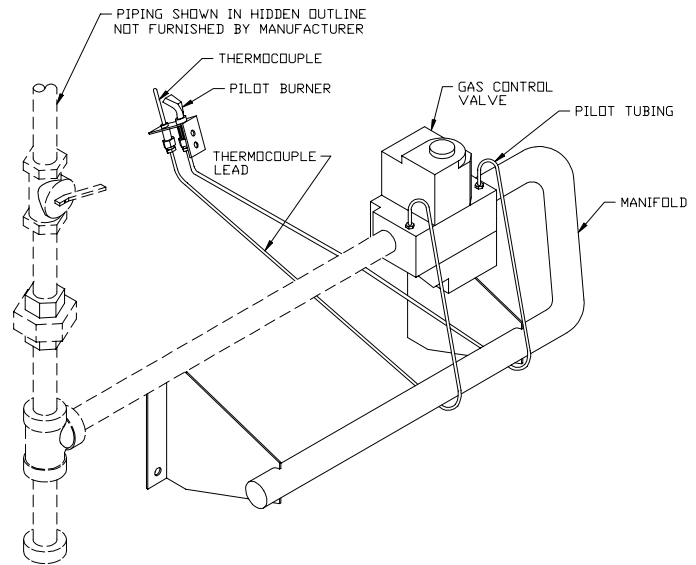


Figure 17: Schematic Pilot and Gas Piping Continuous Ignition (Standing Pilot)

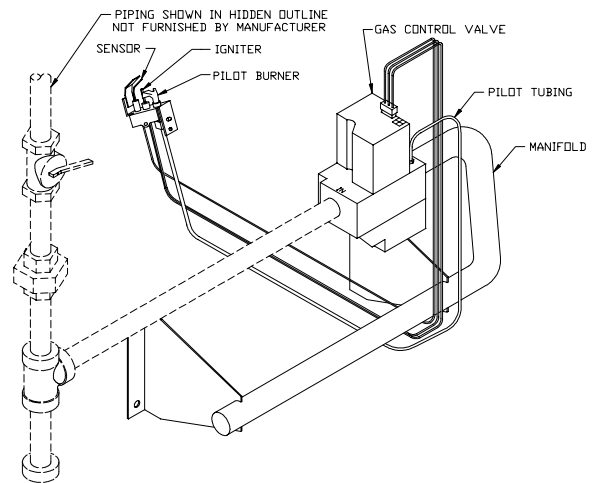


Figure 18: Schematic Pilot and Gas Piping Intermittent Ignition (HSP)

"Pilot" Position. Depress and hold in this position until purging is complete. Turn Main Gas Knob to "off" position.

e. Reconnect pilot tubing and check pipe and fittings from meter to combination Gas Valve for leaks using soap solution or other approved method.

2. Intermittent Ignition Models (Suffix S):

- a. Turn "ON" electric switch serving boiler.
- b. Open Manual Shut-off Valve upstream of Combination Gas Valve.

- c. Loosen or remove Inlet Pressure Tap Plug in Combination Gas Valve and when purging is complete, tighten or replace plug. (See Figure 19).
- d. Check pipe and fittings from meter to Combination Gas Valve using soap solution or other approved methods.
- e. Test gas piping and connections between Combination Gas Valve and manifold, orifices, and pilot piping for leaks after boiler is operating. Use soap solution or other approved method.

3. INSTRUCTIONS TO PUT THE BOILER IN OPERATION. See Figure 20 for intermittent ignition. See Figure 21 for continuous ignition system (standing pilot).

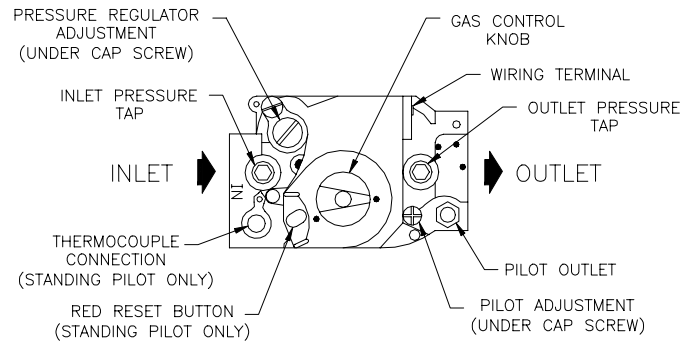


Figure 19a: Top View of SV9500, SV9600 and VR Gas Valves

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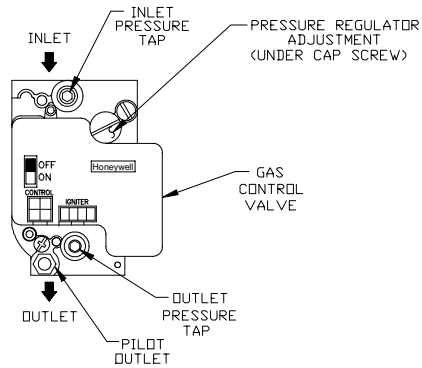


Figure 19b: Top View of Honeywell SV9501 and SV9601 Gas Valves

FOR YOUR SAFETY READ BEFORE OPERATING

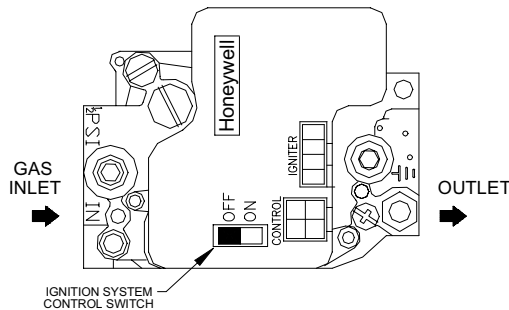
WARNING
 Fire or Explosion Hazard.
 Can cause property damage, severe injury or death.
 Force or attempted repair may result in a fire or explosion.
 Follow these instructions exactly.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
 - Do not touch any electric switch other than the gas valve; 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.
1. This appliance is equipped with an ignition device which automatically lights the pilot. **DO NOT** try to light the pilot by hand.
 2. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and settles on the floor.
 3. Use only your hand to slide the gas control switch to "ON". Never use tools. If the switch does not move by hand, **DO NOT** try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.
 4. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance. Replace any part of the control system and any gas control that has been under water.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
 2. Set the thermostat to the lowest setting.
 3. Turn off all electric power to the appliance.
 4. This appliance is equipped with an ignition device that automatically lights the pilot. **DO NOT** try to light the pilot by hand.
 5. Remove front door.
 6. Slide gas control switch to "OFF".
 7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near floor. If you smell gas, **STOP!**
- Follow step 2 in the "FOR YOUR SAFETY" section above on this label. If you do not smell gas, go to the next step.
8. Slide gas control switch to "ON".
 9. Replace front door.
 10. Turn on all electric power to the appliance.
 11. Set the thermostat to desired setting.
 12. If the appliance does not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front door.
4. Slide gas control switch to "OFF". **DO NOT** force.
5. Replace front door.

Figure 20b: Operating Instructions, SV9501 and SV9601 Gas Valves

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4. CHECK GAS INPUT RATE TO BOILER

NOTICE

USA boilers built for installation at altitudes greater than 2,000 feet above sea level have been specially orificed to reduce gas input rate 4 percent per 1,000 feet above sea level per the National Fuel Gas Code, NFPA 54/ANSI Z223.1, Section 8.1.2 and Appendix F. Canadian boilers' orifice sizing is indicated on the rating label. High altitude boiler models are identifiable by the fourth digit after the dash in the model number. 2: 0-2000', 4 or 5: above 2000'.

A. Input Rate and Maximum Inlet Pressure shown on Rating Label must not be exceeded. Inlet pressure must not be lower than minimum inlet pressure shown on Rating Label.

B. All Rate checks and all adjustments are to be made while boiler is firing - all other appliances connected to the same meter as the boiler must be off.

C. With boiler off, water Manometer or water column gauge should be connected to a shut-off cock installed in the 1/8" outlet pressure tap in the gas valve (See Figure 19). By installing gas cock upstream of manometer, gas pressure can be introduced gradually - without shut-off cock, surge of pressure when boiler is turned on, could blow liquid out of manometer. Replace plug in gas valve when rate check is finished.

D. LP Gas Input:

Adjust Regulator on Gas Valve so that manifold pressure is 10 inches water column. Turning Regulator Adjusting Screw Clockwise increases pressure. Counterclockwise rotation decreases pressure.

E. Natural Gas Input

1. Appx. Input - Adjust regulator on Gas Valve so that manifold pressure is three and a half (3½) inches water column (three inches water column for high altitude with 1" main burners). Turning Regulator Adjusting Screw Clockwise increases pressure, Counterclockwise rotation decreases pressure. If more accurate check on input is necessary see (2) below.

For minor input changes readjust Regulator Gas Valve to increase or decrease manifold pressure to obtain corresponding increase or decrease in gas input. If it is necessary to increase manifold pressure more than 0.3" of water to obtain rated input, remove orifices and drill one size larger. Reinstall and recheck input rate.

2. Additional Check on Input - Since input is a function of heating value, specific gravity, and volume of gas flow contact your utility for the first two items in order to utilize the formula below. The gas meter should then be clocked for three (3) minutes with stop watch and substituting the appropriate values in the formula below, determine what the gas flow should be in this 3 minute period to give the input shown on the Rating Label:

5. MAIN BURNER FLAMES should have a clearly defined inner cone (see Figure 22 or 23) with no yellow tipping. Orange-yellow streaks caused by dust should not be confused with true yellow tipping.

The main burners in this boiler will not operate cleanly or efficiently if they are contaminated with dirt and/or construction dust. Burners should be cleaned and the combustion chamber vacuumed following instructions in Section III - Service.

6. CHECK PILOT BURNER FLAME.

A. Continuous Ignition (Standing Pilot)

Models 202 and 202X with 1" diameter burners. See Figure 24.

Models 202 and 202X with 40mm (1-9/16") diameter burners. See Figure 25.

Natural gas Models 203 through 206 and 207 with 1" diameter burners. See Figure 25.

The pilot produces a single flame. The flame should be steady, medium hard blue enveloping 3/8 to a 1/2 inch of thermocouple.

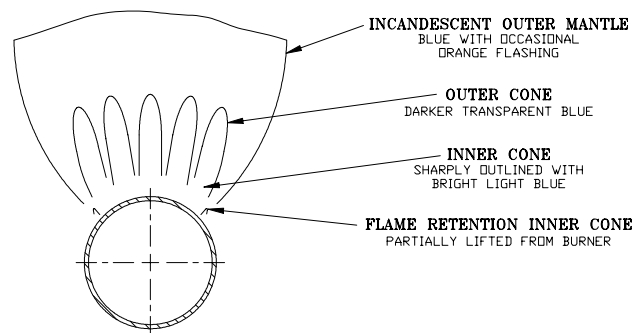


Figure 22: 40mm and 50mm Main Burner Flame

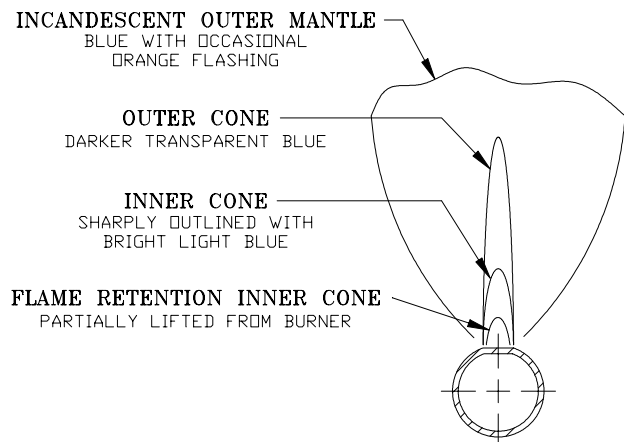


Figure 23: 1 Inch Main Burner Flame

B. Continuous Ignition (Standing Pilot)

Natural gas Models 207 with 40mm (1-9/16") diameter burners and 208 through 210. See Figure 26
LP gas Models 203 through 210. See Figure 26.
The pilot produces three (3) flames. The center flame should be steady, medium hard blue enveloping 3/8 to a 1/2 inch of thermocouple.

C. Intermittent Ignition

Models 202 with 1" diameter burners and 202X through 210. See Figure 27.
The pilot produces three (3) flames. The center flame should be steady, medium hard blue enveloping 3/8 to a 1/2 inch of sensing probe.

D. Intermittent Ignition

Model 202 with a 40mm (1-9/16") diameter burner. See Figure 27a.
The pilot produces a single flame. The flame should be steady, medium hard blue enveloping 3/8 to a 1/2 inch of sensing probe.

7. CHECK THERMOSTAT OPERATION. Raise and lower temperature setting as required to start and stop burners.

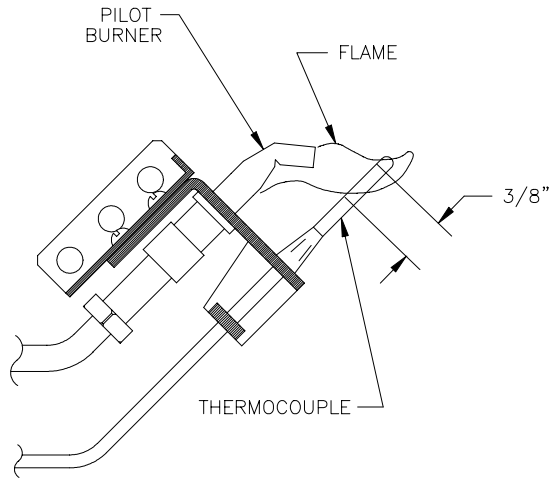


Figure 24: Typical Pilot Flame, Robertshaw 7CL-6

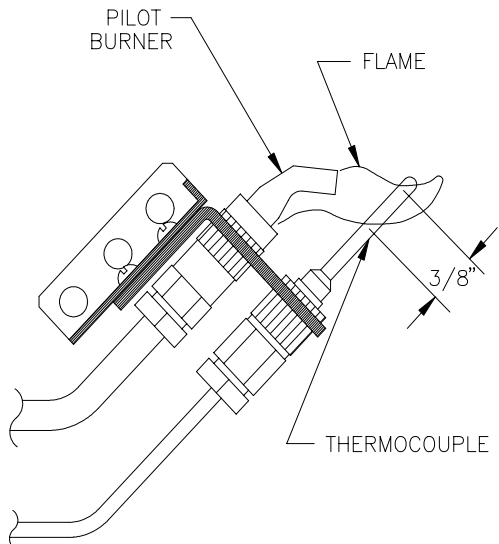


Figure 25: Typical Pilot Flame, Honeywell Q350

8. CHECK HIGH LIMIT CONTROL. Jumper Thermostat Terminals or Thermostat connections in Limit Control. Allow burners to operate until shutdown by limit. REMOVE JUMPER.

9. CHECK DAMPER OPERATION if Boiler is equipped with Vent Damper. Vent Damper must be open when boiler is running. Start boiler, refer to instructions on damper to determine if damper is in the full open position.

10. CHECK IGNITION SYSTEM SAFETY SHUT-OFF DEVICE.

A. 24 volt-loosen thermocouple at gas valve.

B. Intermittent Ignition - Remove pilot lead wires from gas valve.

If burners do not shut down determine cause of malfunction. Replace necessary items and check operation.

11. COMBUSTION CHAMBER BURN-OFF

A. The mineral wool combustion chamber panels contain a cornstarch based binder that must be burned out at installation to prevent odors during subsequent boiler operation.

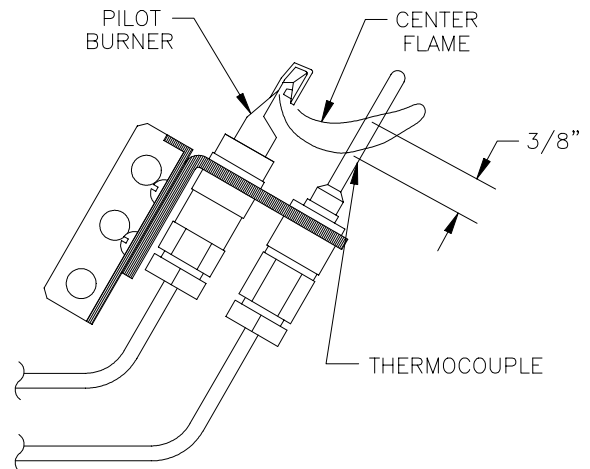


Figure 26: Typical Pilot Flame, Honeywell Q327

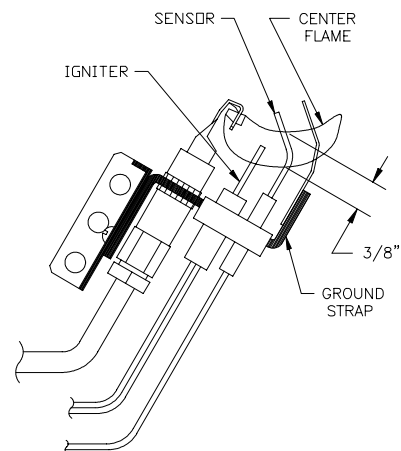


Figure 27: Typical Pilot Flame, Honeywell Q3480

- B. Ventilate the boiler room, set the high limit to its maximum setting, set the thermostat to call for heat. Allow the boiler to fire for at least an hour or until the odor from the cornstarch has dissipated.
- C. Return the high limit and thermostat to their desired settings.

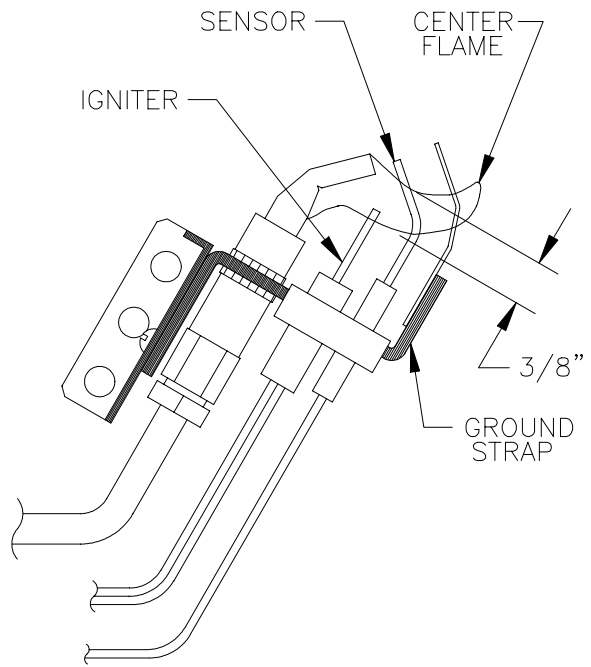


Figure 27a: Typical Pilot Flame, Honeywell Q3450

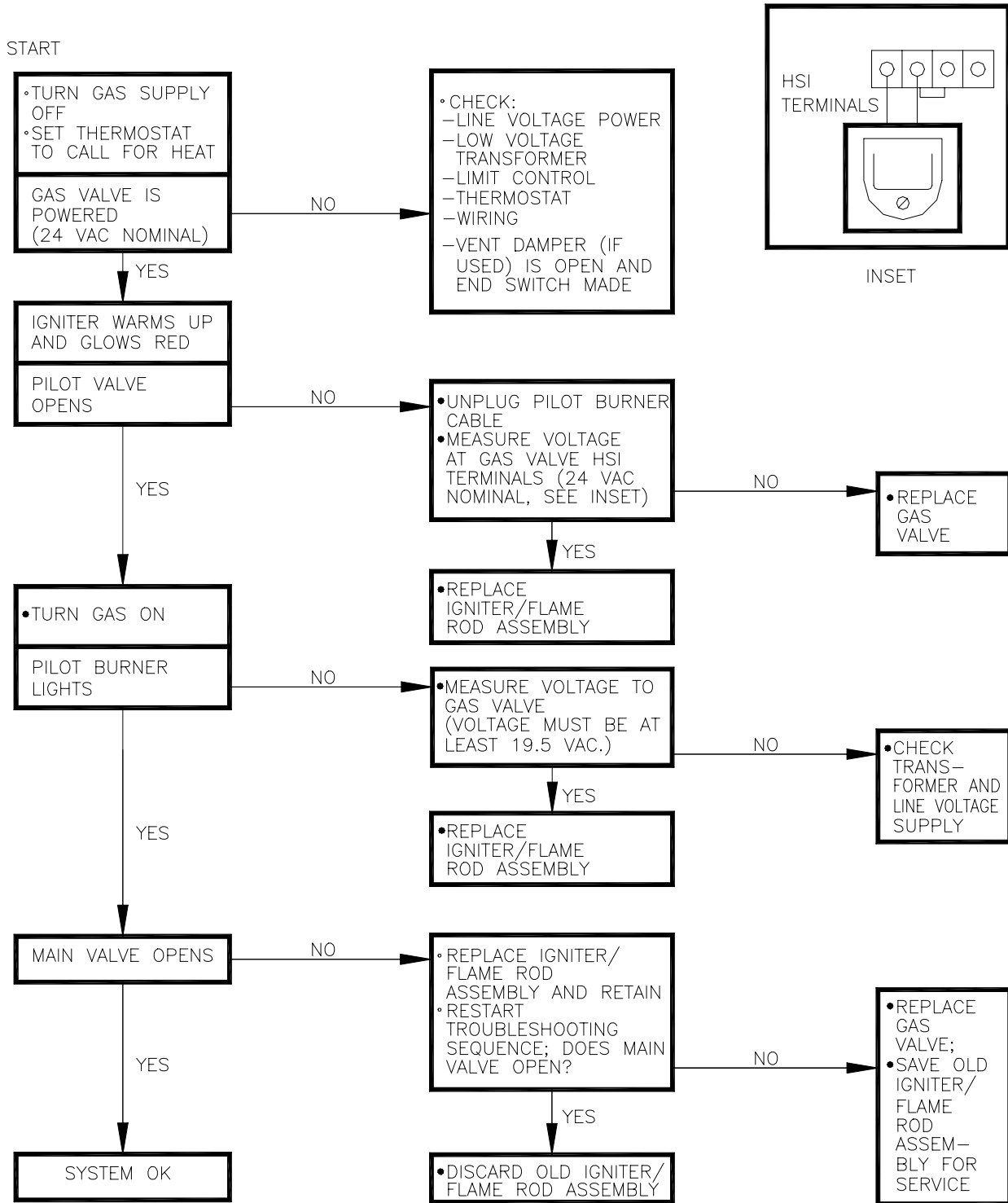


Figure 28: Troubleshooting Guide, Honeywell Intermittent Ignition

SECTION III - SERVICE

1. Inspection should be conducted annually. Service as frequently as specified in paragraphs below. While service or maintenance is being done, Electrical Power and all Gas Supply to the Boiler must be "off".

2. VENT SYSTEM. Vent system (see Figure 8 for typical installation) should be checked annually for:

- A. Obstructions.
- B. Accumulations of soot.
- C. Deterioration of vent pipe or vent accessories due to condensation or other reasons.
- D. Proper support - no sags, particularly in horizontal runs.
- E. Tightness of joints.
- F. Proper vent damper operation - see Section II, paragraph 9.
- G. Remove all accumulations of soot with wire brush and vacuum, see Fig. 29. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints.

3. CLEANING BOILER FLUES, see Fig. 29.

Flue passageways in the boiler sections should be checked annually for any blockage or accumulation of soot. To obtain access to flueways:

- A. Remove vent pipe, damper (if boiler is so equipped), blocked vent switch, and draft hood.
- B. Remove sheet metal screws securing Jacket Top Panel, lift panel and rotate about relief valve piping until top of boiler is exposed.
- C. Remove bolts securing Canopy to Boiler Sections. Remove Canopy - flueways are now exposed.
- D. Models with flue gas baffles only: Remove baffles by lifting out of flueways.

Using flashlight, examine all flue passageways. If passageways are free of soot and obstruction, replace canopy (and flue gas baffles, if applicable), and seal. Reinstall Jacket Top Panel, draft hood, blocked vent switch, damper (if boiler is so equipped), and vent pipe.

If the flue passageways need cleaning, remove burners as described in paragraph 4 below. Using long handle wire or bristle flue brush and vacuum, brush flueways thoroughly from top of boiler as illustrated in Fig. 29. Replace canopy and seal with boiler putty. Reinstall Jacket Top Panel, draft hood, blocked vent switch, damper (if boiler is so equipped), and vent pipe.

NOTICE

4. BURNERS AND FIREBOX SHOULD BE CLEANED ANNUALLY, AND IF NECESSARY ADJUSTED ONCE A YEAR BY A QUALIFIED SERVICE AGENCY.

A. TO REMOVE BURNERS FOR CLEANING, CHANGING ORIFICE PLUGS, OR REPAIRS.

1. Remove the jacket front panel.
2. Disconnect pilot tubing at the gas valve. (See Figures 17 and 18)..
3. Disconnect thermocouple (standing pilot) or pilot lead wires (intermittent ignition) at the gas valve.
4. 40mm and 50 mm burners only. Remove injection shield assembly, where used. (See Figure 30).
5. Remove wires to flame roll-out switch.
6. Remove the burner access panel.
7. 50mm dia. burners only. Remove orifice hitch pin clips.

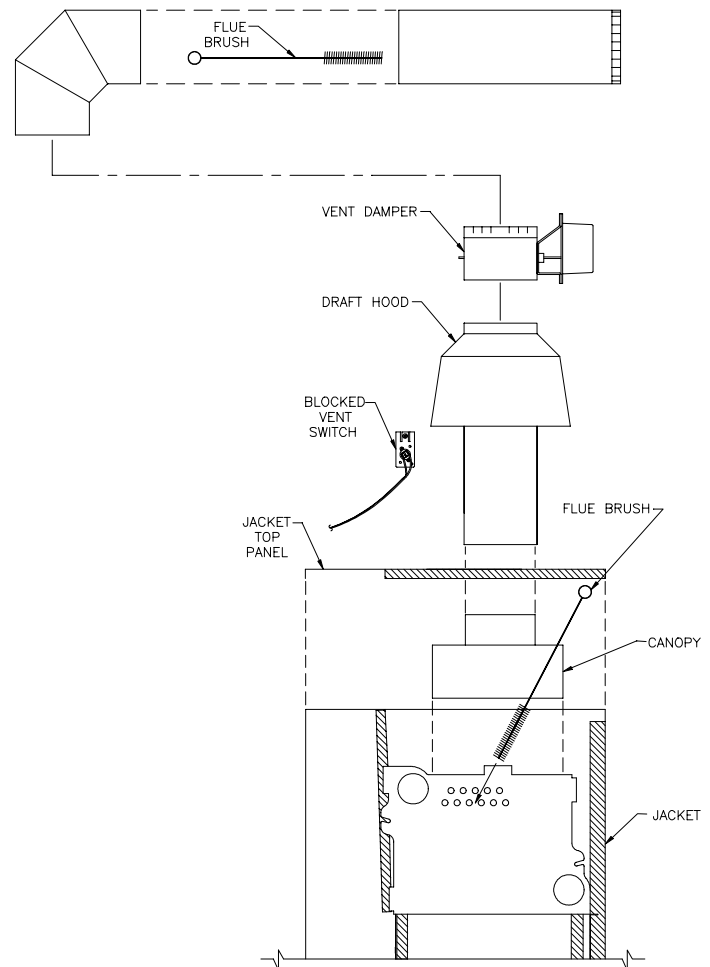


Figure 29: Cleaning of Vent System and Boiler Flues

8. Mark the location of the pilot main burner on the manifold if the marking on manifold is missing or obliterated.
9. Hold burner at throat,
 - a. 1 inch and 40mm diameter burners. Lift front of burner to clear orifice. Burner which holds pilot can only be removed by lifting the burner adjacent to its right first.
 - b. 50 mm dia. burners only. Push toward the rear until the burner face plate clears the orifice. Lift burner out.
10. Brush top of burners with a soft bristle brush, see Fig. 30. Vacuum burners. Check orifices to see that drilled passageways are free of lint or dirt.
11. Vacuum tip of Pilot Burner.

B. CLEAN FIREBOX by vacuuming. Exercise care not to disturb insulation inside the base.

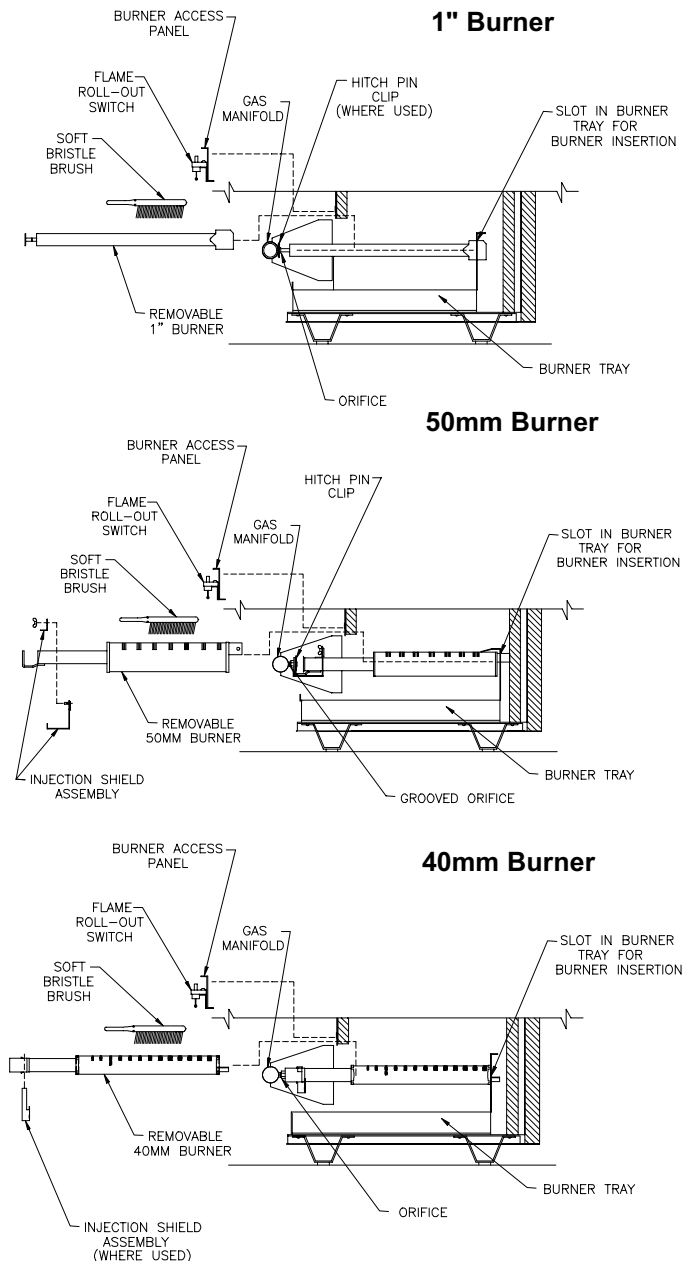


Figure 30: Burner Cleaning and Installation

C. INSTALL BURNERS by reversing procedure used to remove burners. Make sure burner with pilot assembly is in same location as original installation - see Table 5 Check burners to see that they are located properly in slot at rear of burner tray, see Fig. 30. Reinstall injection shield assembly (40mm and 50mm burners only, where used) and burner access panel. Reconnect flame roll-out switch wires, pilot gas supply, thermocouple lead or pilot lead.

D. CHECK MAIN BURNER and PILOT FLAMES, see procedure Section II, paragraphs 5 and 6.

5. CHECK ALL CONTROL AND DAMPER OPERATION ANNUALLY see procedure in Section II, paragraphs 7 through 10.

6. REMOVAL OR REPLACEMENT OF PILOT ASSEMBLY OR PILOT ASSEMBLY PARTS

If pilot assembly, thermocouple or pilot orifice need replacing, remove main burner with pilot using procedure described in Paragraph 4.

A. To replace orifice:

1. Disconnect pilot tubing. The Robertshaw 7CL-6, Honeywell Q350 and Q3450 pilot orifices are insert type retained by the compression fitting. The Honeywell Q327 and Q3480 pilot orifice is a spud type screwed into pilot burner. Replace with desired orifice. See Key No. 5B.
2. Reconnect pilot tubing and check for leaks.

B. To replace Honeywell Q309A thermocouple in Q327 or Q350 pilot:

1. Loosen attachment nut securing thermocouple to barrel of pilot burner. Disconnect other end at combination gas valve.
2. Remove thermocouple and replace with equal.

C. To replace Q3450 or Q3480 igniter-sensor rod assembly:

1. Remove spring clip by pulling it away from the pilot burner.
2. Remove assembly from pilot burner and disconnect harness from gas valve.
3. Replace with equal.

D. To replace complete pilot assembly.

1. Remove machine screws holding pilot burner to pilot bracket.
2. Disconnect pilot piping.
3. Disconnect all other leads to pilot.
4. Select pilot assembly with identical model number, reconnect leads and pilot tubing - resecure to pilot bracket.

E. Reinstall main burner following procedure described in Paragraph 4.

7. LUBRICATION

There are no parts requiring lubrication on the part of

the service technician or the User. Circulator bearings are water lubricated.

Table 5: Pilot Burner Location

Boiler Model	Main Burner with Pilot Bracket *			Pilot Burner Located Between Main Burners*		
	1 Inch	50mm	40mm	1 Inch	50 mm	40mm
202	1	---	1	1 & 2	---	---
202X	1	---	1	1 & 2	---	1 & 2
203	1	1	1	1 & 2	1 & 2	1 & 2
204	2	2	2	2 & 3	2 & 3	2 & 3
205	3	2	2	3 & 4	2 & 3	2 & 3
206	4	3	3	4 & 5	3 & 4	3 & 4
207	6	3	3	6 & 7	3 & 4	3 & 4
208	7	4	4	7 & 8	4 & 5	4 & 5
209	8	4	4	8 & 9	4 & 5	4 & 5
210	9	5	5	9 & 10	5 & 6	5 & 6

* Main burners numbered left to right as viewed from front of boiler.

SECTION IV REPAIR PARTS

Section Assembly and Canopy Group	32
Base Assembly	34
Manifold and Main Burners	
1 Inch Main Burners	36
50mm Main Burners	38
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Continuous Ignition (Standing Pilot).....	42
Intermittent Ignition	44
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Controls	50
Draft Hood and Vent Damper	51

All Series 2 repair parts may be obtained through your local Burnham Wholesale Distributor. Should you require assistance in locating a Burnham Distributor in your area, or have questions regarding the availability of Burnham products or repair parts, please contact your Burnham Regional Sales Office as listed below.

Burnham Corporation Regional Offices

<p>A. Burnham Corporation - Central & Western Regions P.O. Box 3079 Lancaster, PA 17604-3079 Phone: (717) 481-8400 FAX: (717) 481-8408</p>	<p>C. Burnham Corporation - Metropolitan Region P.O. Box 3079 Lancaster, PA 17604-3079 Phone: (717) 481-8400 FAX: (717) 481-8409</p>
<p>B. Burnham Sales Corporation - Northeast Region 19-27 Mystic Avenue Somerville, MA 02145 Phone: (617) 625-9735 FAX: (617) 625-9736</p>	<p>D. Burnham Corporation - Mid-Atlantic Region P.O. Box 3079 Lancaster, PA 17604-3079 Phone: (717) 481-8400 FAX: (717) 481-8409</p>

Contact Regional Office Indicated for your State

Alabama	A	Nebraska	A	Oregon	A		
Alaska	A	Nevada	A	Pennsylvania	D		
Arizona	A	New Hampshire	B	Rhode Island	B		
Arkansas	A	New Jersey <i>Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Monmouth, Ocean, Salem Counties</i> <i>All other Counties</i>	D	South Carolina	A		
California	A			South Dakota	A		
Colorado	A			Tennessee	A		
Connecticut	B			Texas	A		
Delaware	D			Utah	A		
Florida	A			Vermont	B		
Georgia	A			Virginia <i>Arlington, Accomack, Clarke, Fairfax, Frederick, Fauquier, Loudoun, Northampton and Prince William Counties</i> <i>All other Counties</i>	D	Washington	A
Hawaii	A					Washington, D.C.	D
Idaho	A					West Virginia	D
Illinois	A					Wisconsin	A
Indiana	A	Wyoming	A				
Iowa	A	Ohio <i>Athens, Belmont, Gallia, Jefferson, Lawrence, Meigs, Monroe, and Washington Counties</i> <i>All other Counties</i>	D				
Kansas	A						
Kentucky	A						
Louisiana	A			North Carolina	A		
Maine	B			North Dakota	A		
Maryland	D			Oklahoma	A	Canada	A
Massachusetts	B						
Michigan	A						
Minnesota	A						
Mississippi	A						
Missouri	A						
Montana	A						

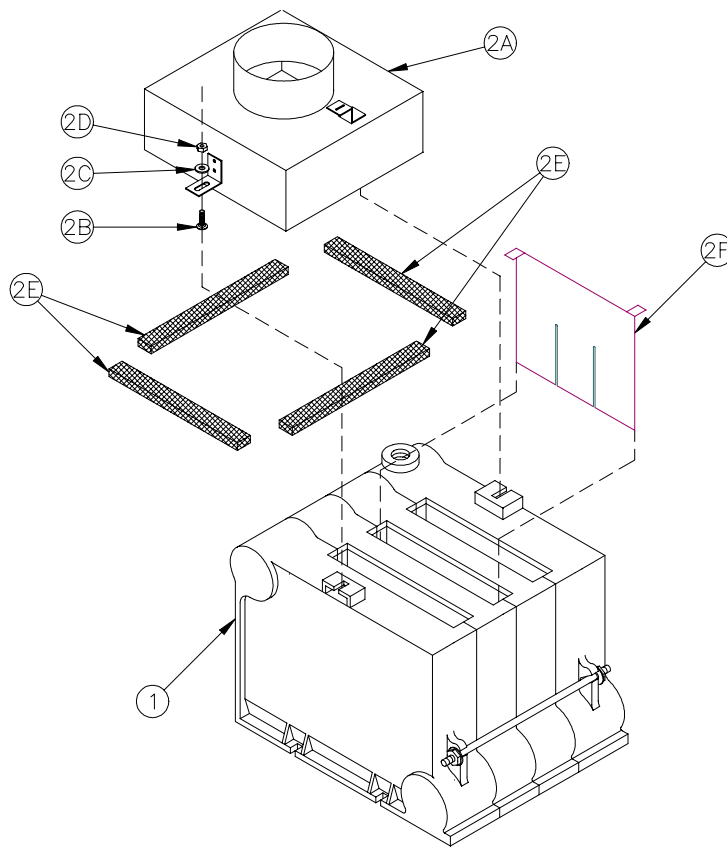


Figure 33: Section Assembly and Canopy Group

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
1. Section Assembly (Intermittent and Continuous Circulation Only)												
1	Section Assembly, Complete	617170221	1	---	---	---	---	---	---	---	---	---
		617170321	---	1	1	---	---	---	---	---	---	---
		617170421	---	---	---	1	---	---	---	---	---	---
		617170521	---	---	---	---	1	---	---	---	---	---
		617170621	---	---	---	---	---	1	---	---	---	---
		617170721	---	---	---	---	---	---	1	---	---	---
		617170821	---	---	---	---	---	---	---	1	---	---
		617170921	---	---	---	---	---	---	---	---	1	---
		617171021	---	---	---	---	---	---	---	---	---	1
1. Section Assembly (Gravity circulation Only)												
1	Section Assembly, Complete	617170231	1	---	---	---	---	---	---	---	---	---
		617170331	---	1	1	---	---	---	---	---	---	---
		617170431	---	---	---	1	---	---	---	---	---	---
		617170531	---	---	---	---	1	---	---	---	---	---
		617170631	---	---	---	---	---	1	---	---	---	---
		617170731	---	---	---	---	---	---	1	---	---	---
		617170831	---	---	---	---	---	---	---	1	---	---
		617170931	---	---	---	---	---	---	---	---	1	---
		617171031	---	---	---	---	---	---	---	---	---	1

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
2. Canopy Group												
2A	Canopy Assembly (except for 206H)	61117022	1	---	---	---	---	---	---	---	---	---
		611170300	---	1	---	---	---	---	---	---	---	---
		611170302	---	---	1	---	---	---	---	---	---	---
		611170402	----	---	---	1	---	---	---	---	---	---
		611170502	---	---	---	---	1	---	---	---	---	---
		611170602	---	---	---	---	---	1	---	---	---	---
		611170702	---	---	---	---	---	---	1	---	---	---
		611170802	---	---	---	---	---	---	---	1	---	---
		611170902	---	---	---	---	---	---	---	---	1	---
		Canopy Assembly 206H	611171002	----	---	---	---	---	---	---	---	1
		6111706010	---	---	---	---	---	1	---	---	---	
2B	Carriage Bolt, ¼-20 x 1"	Common Hardware	2	2	2	2	2	2	2	2	2	2
2C	Flat Washer, ¼"	Common Hardware	2	2	2	2	2	2	2	2	2	2
2D	Nut, Hex, ¼-20	Common Hardware	2	2	2	2	2	2	2	2	2	2
2E	Cerafelt Sealing Strip, ½" x 1" x 10' (Canopy to Section Assy)	6206001	1	1	1	1	1	1	1	1	1	1
2F	Flue Gas Baffle (*Standing Pilot 1" and 50mm Burners Only) (** LP Standing Pilot 1" and 50mm Burners Only) (+2H Models Only) (*** Standing Pilot Models Only)	71106001	1***	---	2**+	3**+	4**+	5**+	6**	7*	8*	9*

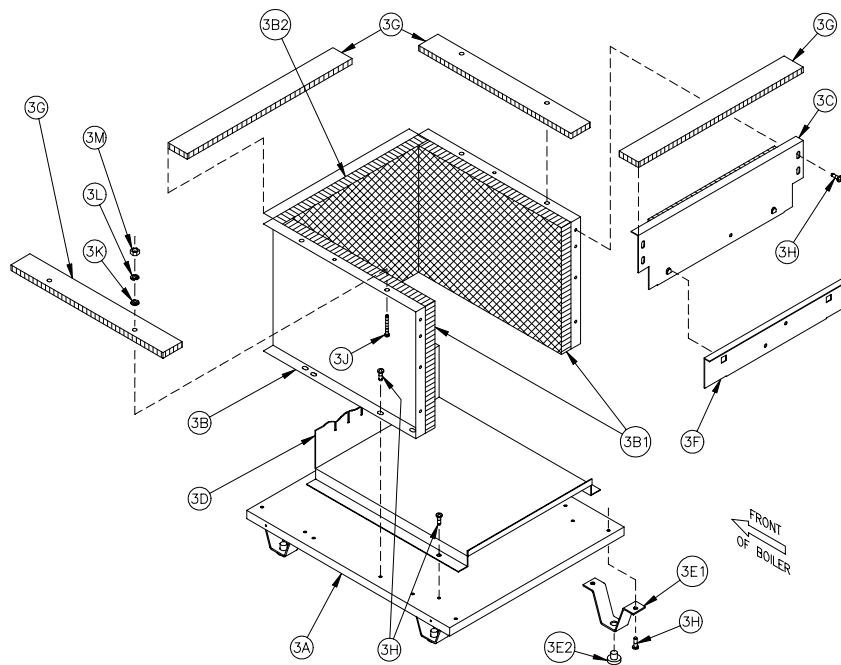


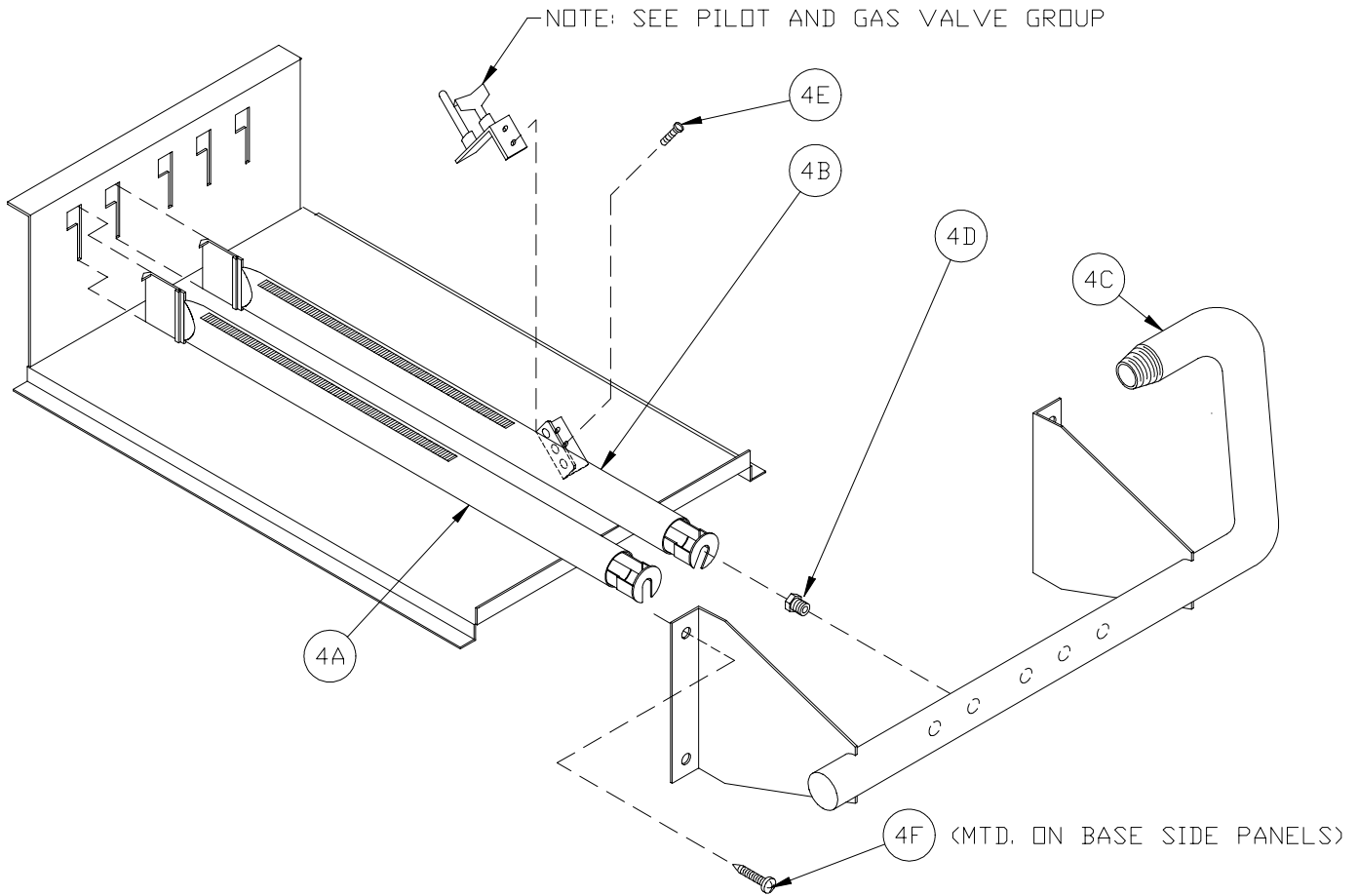
Figure 34: Base Assembly

Key No.	Description	Boiler Size	Part No.	Qty.
3. Base Assembly				
3	Base Assembly (Complete) Available for 1 Inch Burners Only	202	618600291	1
		202X	618600391	1
		203	618600391	1
		204	618600491	1
		205	618600591	1
		206	618600691	1
		207	618600791	1
		208	618600891	1
		209	618600991	1
		210	618601091	1
		3A	Base Tray	202
202X	718600391			1
203	718600391			1
204	718600491			1
205	718600591			1
206	718600691			1
207	718600791			1
208	718600891			1
209	718600991			1
210	718601091			1

Key No.	Description	Boiler Size	Part No.	Qty.
3. Base Assembly Continued				
3B	Base Wrapper	202	718600211	1
		202X	718600311	1
		203	718600311	1
		204	718600411	1
		205	718600511	1
		206	718600611	1
		207	718600711	1
		208	718600811	1
		209	718600911	1
		210	718601011	1
		3B1	Base End Insulation	All
3B2	Base Rear Insulation	202	72060025	1
		202X	72060035	1
		203	72060035	1
		204	72060045	1
		205	72060055	1
		206	72060065	1
		207	72060075	1
		208	72060085	1
		209	72060095	1
		210	72060105	1

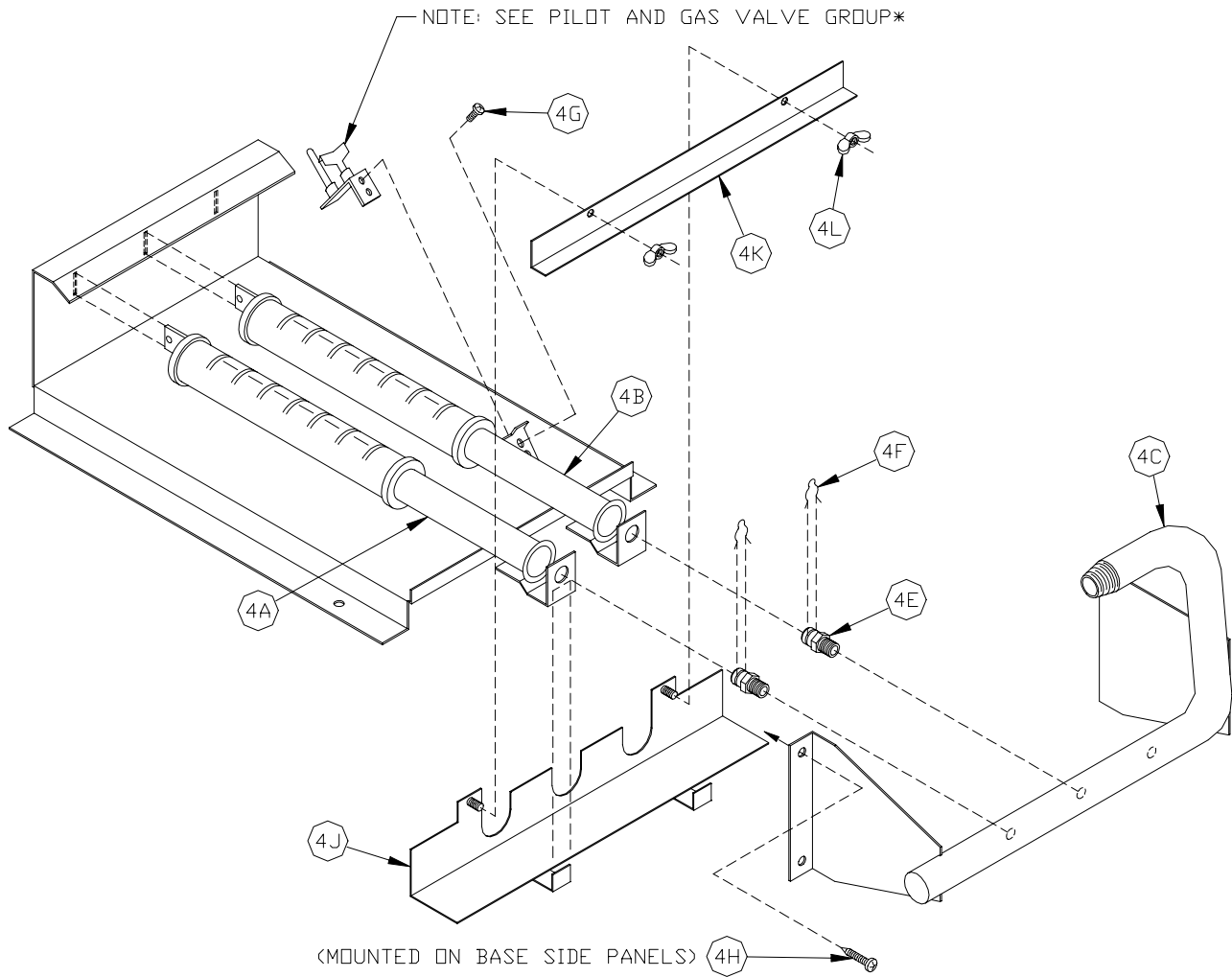
Key No.	Description	Boiler Size	Part No.	Qty.
3. Base Assembly Continued				
3C	Base Front Panel Assembly	202	618600241	1
		202X	618600341	1
		203	618600341	1
		204	618600441	1
		205	618600541	1
		206	618600641	1
		207	618600741	1
		208	618600841	1
		209	618600941	1
		210	618601041	1
3D	Burner Tray (1" Main Burners)	202	718600205	1
		202X	718600305	1
		203	718600305	1
		204	718600405	1
		205	718600505	1
		206	718600605	1
		207	718600705	1
		208	718600805	1
		209	718600905	1
		210	718601005	1
	Burner Tray (50 mm Main Burners)	203	7817038	1
		204	7817048	1
		205	7817058	1
		206	7817068	1
		207	7817078	1
		208	7817088	1
		209	7817098	1
	Burner Tray (40mm Main Burners)	202	718600206	1
		202X	71806037	1
		203	71806037	1
204		71806047	1	
205		71806057	1	
206		71806067	1	
207		71806077	1	
208		718600806	1	
209		718600906	1	
210		718601006	1	

Key No.	Description	Boiler Size	Part No.	Qty.
3. Base Assembly Continued				
3E	Base Leg Assembly	All	6186001	4
3E1	Base Leg	All	71860021	4
3E2	Nylon Glide	All	8186006	4
3F	Burner Access Panel	202	718600261	1
		202X	718600361	1
		203	718600361	1
		204	718600461	1
		205	718600561	1
		206	718600661	1
		207	718600761	1
		208	718600861	1
		209	718600961	1
		210	718601061	1
3G	Cerafelt Sealing Strip, 1" x 2" x 10' (Section Assembly to Base)	All	6206002	1
3H	Self-Tapping Screw, 1/4" - 20 x 1/2"	202 thru 206	80860700	20
		207 thru 210	80860700	21
3J	Self-Tapping Screw, 5/16" - 18 x 1-1/4"	All	80860717	4
3K	Flat Washer, 5/16", USS	All	Common Hardware	4
3L	Lock Washer, 5/16"	All	Common Hardware	4
3M	Hex Nut, 5-16,	All	Common Hardware	4



**Figure 35: Manifold and Main Burners
(1 Inch Main Burners)**

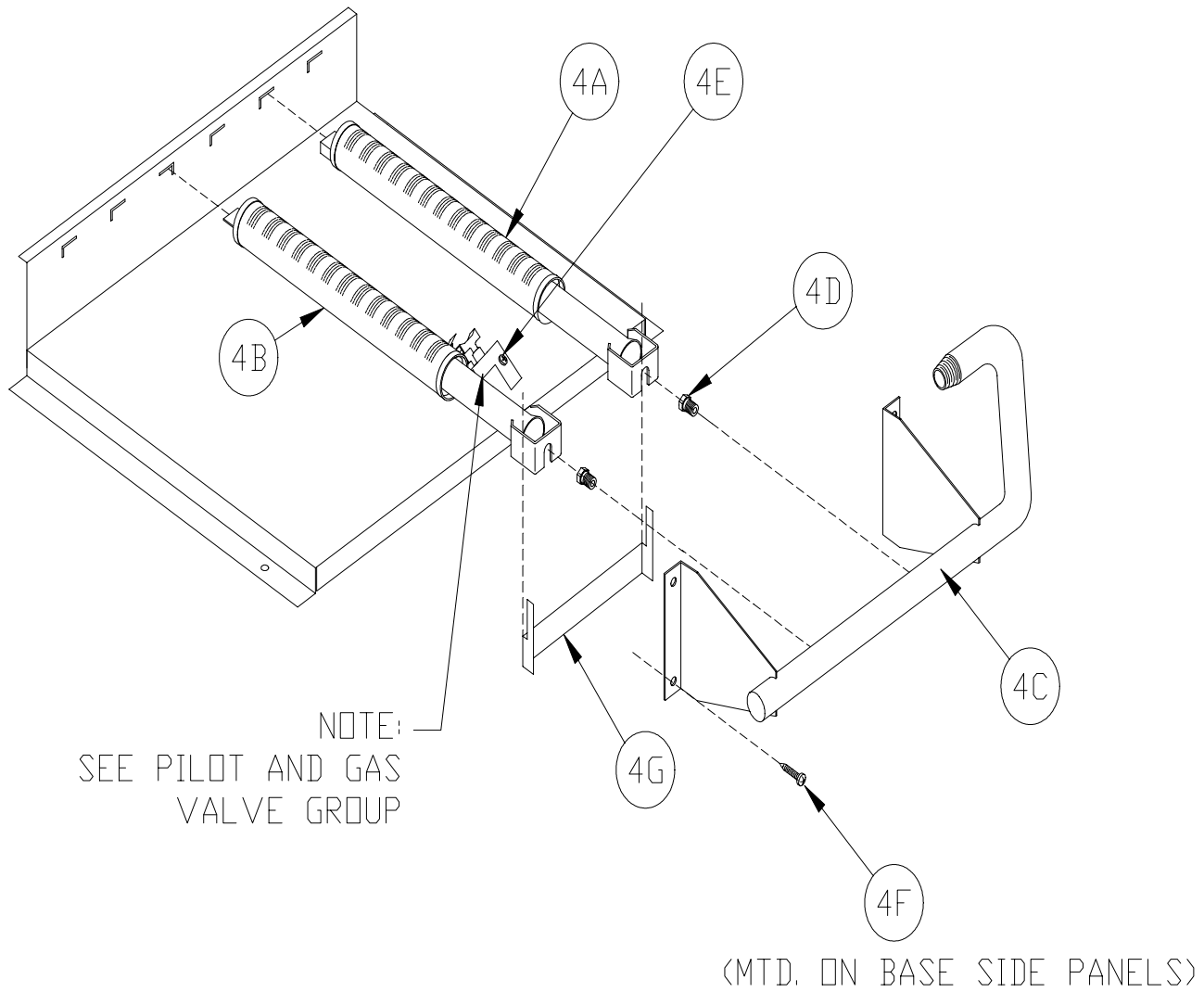
Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
4. Manifold and Main Burners (1 Inch Main Burners Only)												
4A	Main Burner	8236099	1	2	2	4	6	8	11	13	15	17
4B	Main Burner with Pilot Bracket	----	See Table Below									
4C	Manifold	82260023	1	----	----	----	----	----	----	----	----	----
		82260033	----	1	1	----	----	----	----	----	----	----
		82260043	----	----	----	1	----	----	----	----	----	----
		82260053	----	----	----	----	1	----	----	----	----	----
		82260063	----	----	----	----	----	1	----	----	----	----
		82260073	----	----	----	----	----	----	1	----	----	----
		82260083	----	----	----	----	----	----	----	1	----	----
		82260093	----	----	----	----	----	----	----	----	1	----
82260103	----	----	----	----	----	----	----	----	----	----	1	
4D	Main Burner Orifice	----	See Table Below									
4E	Screw, Machine, Slotted Round Head 10-32 x 3/16" (Standing Pilot)	80860800	2	2	2	2	2	2	2	2	2	2
	Screw, Machine, Philips Head w/Captive Lockwasher, #10-32 x 1/4" (Intermittent Ignition)	80860874	1	1	1	1	1	1	1	1	1	1
4F	Screw, Self Tapping, Phillips Pan Head, 1/4-20 x 1/2"	80860700	4	4	4	4	4	4	4	4	4	4
4B. 1 Inch Main Burner with Pilot Bracket, 24-volt Continuous Ignition (Standing Pilot) Natural Gas Only												
4B	Main Burner with 70° 7CL-6 Pilot Bracket and Offset Lancing	8231706	1	1	----	----	----	----	----	----	----	----
	Main Burner with 70° Q350 Pilot Bracket and Offset Lancing	8236097	----	----	1	1	1	1	1	----	----	----
	Main Burner with 60° Pilot Bracket	8236098	----	----	----	----	----	----	----	1	1	1
4B. 1 Inch Main Burner with Pilot Bracket, 24-volt Continuous Ignition (Standing Pilot) LP Gas Only												
4B	Main Burner with 70° 7CL-6 Pilot Bracket and Offset Lancing	8231706	1	1	----	----	----	----	----	----	----	----
	Main Burner with 45° Pilot Bracket	8236111	----	----	1	1	1	1	1	1	1	1
4B. 1 Inch Main Burner with Pilot Bracket, Intermittent Ignition Only												
4B	Main Burner with 60° Pilot Bracket	8236098	1	1	1	1	1	1	1	1	1	1
4D. 1 Inch Main Burner Orifices, Natural Gas, Normal Altitude, U.S.A. and Canada												
4D	Main Burner Orifice, #47 (White)	822710	2	3	----	----	----	----	12	14	16	18
	Main Burner Orifice, #44 (Orange)	822712	----	----	3	----	----	----	----	----	----	----
	Main Burner Orifice, #45 (Pink)	822711	----	----	----	5	7	9	----	----	----	----
4D. 1 Inch Main Burner Orifices, LP/Propane, Normal Altitude, U.S.A. and Canada												
4D	Main Burner Orifice, 1.25 mm (Purple)	822705	2	----	----	5	7	9	----	----	----	----
	Main Burner Orifice, #55 (Green)	822708	----	----	3	----	----	----	----	----	----	----
	Main Burner Orifice, 3/64" (Blue)	822704	----	3	----	----	----	----	12	14	16	18



- * Continuous Pilot Ignition:
- Q327A Only
 - Not suitable for use with Q350A 24V Continuous Pilot Ignition
- Intermittent Ignition: Q3480C

**Figure 36: Manifold and Main Burners
(50 mm Main Burners)**

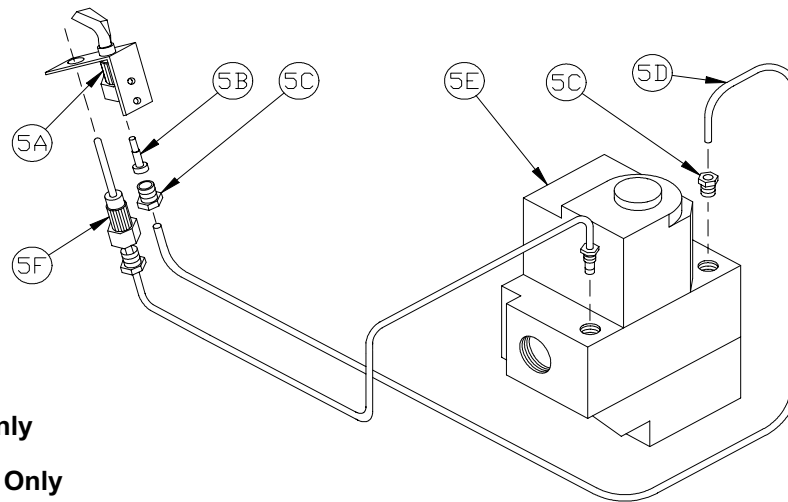
Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
4. Manifold and Main Burners (50 mm Main Burners Only)												
4A	Main Burner	8236091	---	---	1	2	3	4	5	6	7	8
4B	Main Burner with 45° Pilot Bracket	8236092	---	---	1	1	1	1	1	1	1	1
4C	Manifold	82260034	---	---	1	---	---	---	---	---	---	---
		82260044	---	---	---	1	---	---	---	---	---	---
		82260054	---	---	---	---	1	---	---	---	---	---
		82260064	---	---	---	---	---	1	---	---	---	---
		82260074	---	---	---	---	---	---	1	---	---	---
		82260084	---	---	---	---	---	---	---	1	---	---
		82260094	---	---	---	---	---	---	---	---	1	---
		82260104	---	---	---	---	---	---	---	---	---	1
4E	50 mm Main Burner Orifices, Natural Gas, High Altitude, U.S.A. and Canada, 2000-5000 Ft. Altitude											
	Main Burner Orifice, #38	822680	---	---	2	---	---	---	---	---	---	---
	Main Burner Orifice, #37	822601	---	---	---	3	4	5	6	7	8	9
	50 mm Main Burner Orifices, LP/Propane, High Altitude, U.S.A. and Canada, 2000-5000 Ft. Altitude											
	Main Burner Orifice, #53	8226002	---	---	2	---	---	---	---	---	---	---
	Main Burner Orifice, #52	822641	---	---	---	3	4	5	6	7	8	9
4F	External Hitch Pin Clip	822604	---	---	2	3	4	5	6	7	8	9
4G	Screw, Machine, Philips Head w/Captive Lockwasher, #10-32 x ¼"	80860874	---	---	1	1	1	1	1	1	1	1
4H	Screw, Self Tapping, Phillips Pan Head, ¼-20 x ½"	80860700	---	---	4	4	4	4	4	4	4	4
4J	Lower Injection Shield	618600301	---	---	1	---	---	---	---	---	---	---
		618600401	---	---	---	1	---	---	---	---	---	---
		618600501	---	---	---	---	1	---	---	---	---	---
		618600601	---	---	---	---	---	1	---	---	---	---
		618600701	---	---	---	---	---	---	1	---	---	---
		618600801	---	---	---	---	---	---	---	1	---	---
		618600901	---	---	---	---	---	---	---	---	1	---
		618601001	---	---	---	---	---	---	---	---	---	1
4K	Upper Injection Shield	718600303	---	---	1	---	---	---	---	---	---	---
		718600403	---	---	---	1	---	---	---	---	---	---
		718600503	---	---	---	---	1	---	---	---	---	---
		718600603	---	---	---	---	---	1	---	---	---	---
		718600703	---	---	---	---	---	---	1	---	---	---
		718600803	---	---	---	---	---	---	---	1	---	---
		718600903	---	---	---	---	---	---	---	---	1	---
		718601003	---	---	---	---	---	---	---	---	---	1
4L	Wing Nut, ¼-20, Size B	80860900	---	---	2	2	2	2	3	3	3	3



**Figure 36a: Manifold and Main Burners
(40mm Main Burners)**

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
4. 40MM MAIN BURNERS ONLY												
4A	Main Burner	8236135	--	1	1	2	3	4	5	6	7	8
Intermittent Ignition Only												
4B	Main Burner with 48° Pilot Bracket	8236143	1	--	--	--	--	--	--	--	--	--
	Main Burner with 41° Pilot Bracket	8236136		1	1	1	1	1	1	1	1	1
24-volt Continuous Ignition (Standing Pilot) Natural Gas Only												
4B	Main Burner with 48° Pilot Bracket	8236143	1	1	1	1	1	1	--	--	--	--
	Main Burner with 41° Pilot Bracket	8236136	--	--	--	--	--	--	1	1	1	1
24-volt Continuous Ignition (Standing Pilot) LP Gas Only												
4B	Main Burner with 48° Pilot Bracket	8236143	1	1	--	--	--	--	--	--	--	--
	Main Burner with 41° Pilot Bracket	8236136	--	--	1	1	1	1	1	1	1	1

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
4. 40MM MAIN BURNERS ONLY(Continued)												
4C	Manifold	82260028	1	--	--	--	--	--	--	--	--	--
		82260038	--	1	1	--	--	--	--	--	--	--
		82260048	--	--	--	1	--	--	--	--	--	--
		82260058	--	--	--	--	1	--	--	--	--	--
		82260068	--	--	--	--	--	1	--	--	--	--
		82260078	--	--	--	--	--	--	1	--	--	--
		82260088	--	--	--	--	--	--	--	1	--	--
		82260098	--	--	--	--	--	--	--	--	1	--
82260108	--	--	--	--	--	--	--	--	--	1	--	
Natural Gas, Sea Level to 2000 Ft.												
4D	Main Burner Orifice, 3.00 mm	822780	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #41	822729	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #36	822771	--	--	2	--	--	--	--	--	--	--
	Main Burner Orifice, 7/64"	822772	--	--	--	3	4	5	6	7	8	9
LP Gas, Sea Level to 2000 Ft.												
4D	Main Burner Orifice, #49	822709	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #53	822722	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #51	822733	--	--	2	3	4	5	6	7	8	9
Natural Gas, High Altitude (2000-5000 Ft.) U.S.A. Only												
4D	Main Burner Orifice, #36	822771	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #44	822712	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #41	822729	--	--	2	--	--	--	--	--	--	--
	Main Burner Orifice, #40	822728	--	--	--	3	--	--	--	--	--	--
	Main Burner Orifice, #39	822727	--	--	--	--	4	5	6	7	8	9
LP Gas, High Altitude (2000-5000 Ft.) U.S.A. Only												
4D	Main Burner Orifice, #52	822721	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #55	822708	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #53	822722	--	--	2	3	4	5	6	7	8	9
Natural Gas, High Altitude (2000-4500 Ft.) Canada Only												
4D	Main Burner Orifice, 7/64"	822772	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #43	822713	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #38	822720	--	--	2	--	--	--	--	--	--	--
	Main Burner Orifice, #37	822719	--	--	--	3	4	5	6	7	8	9
LP Gas, High Altitude (2000-4500 Ft.) Canada Only												
4D	Main Burner Orifice, #50	822732	1	--	--	--	--	--	--	--	--	--
	Main Burner Orifice, #54	822734	--	2	--	--	--	--	--	--	--	--
	Main Burner Orifice, #52	822721	--	--	2	3	4	5	6	7	8	9
4E	Screw, Machine, Slotted Round Head, #10-32 x 3/16" (Standing Pilot)	80860800	2	2	2	2	2	2	2	2	2	2
	Screw, Machine, Phillips Head w/Captive Lockwasher, #10-32 x 1/4" (Intermittent Ignition)	80860874	1	1	1	1	1	1	1	1	1	1
4F	Screw, Self Tapping, Phillips Pan Head, 1/4-20 x 1/2"	80860700	4	4	4	4	4	4	4	4	4	4
4G	Injection Shield Assembly		A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R



* 1" Burner Only

** 40mm Burner Only

Figure 37

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
5. Pilot Burner and Gas Valve, 24-volt Continuous Ignition, Natural Gas (1 Inch and 40mm Main Burners Only)												
5A	Pilot Burner, Robertshaw 7CL-6	8231702	1*	1*	---	---	---	---	---	---	---	---
	Pilot Burner, Honeywell Q350A1644	8236102	1**	1**	1	1	1	1	1*	---	---	---
	Pilot Burner, Honeywell Q327A1949	8236103	---	---	---	---	---	---	1**	1	1	1
5B	Pilot Orifice, Robertshaw 76376-1 .010"	Included with 5A	1*	1*	---	---	---	---	---	---	---	---
	Pilot Orifice, Honeywell 390686-22 .012"		1**	1**	1	1	1	1	1*	---	---	---
	Pilot Orifice, Honeywell 388146AG .026"		---	---	---	---	---	---	1**	1	1	1
5C	Adptr, 1/4"OD x 1/4" NPT Included w/5A & 5E	8236109	2*	2*	---	---	---	---	---	---	---	---
	Adptr, 1/8"OD x 1/4" NPT Included w/5A & 5E	8236108	2**	2**	2	2	2	2	2	2	2	2
5D	Pilot Tubing, 1/8" OD x 30" LG	8236110	1**	1**	1	1	1	1	1	---	---	---
	Pilot Tubing, 1/8" OD x 40" LG	8236100	---	---	---	---	---	---	---	1	1	1
5E	Gas Valve, Honeywell VR8200C3005	81660143	1*	1*	---	---	---	---	---	---	---	---
	Gas Valve, Honeywell VR8200C6008	81660182	---	---	1*	1*	1*	1*	---	---	---	---
	Gas Valve, Honeywell VR8300C4134	81660183	---	---	---	---	---	---	1*	1	1	1
	Gas Valve, Honeywell VR8200C6032	81660241	1**	1**	1**	1**	1**	1**	---	---	---	---
	Gas Valve, Honeywell VR8300C4183	81660242	---	---	---	---	---	---	1**	1**	1**	1**
5F	Thermocouple, 30", Robertshaw 42930	8231704	1*	1*	---	---	---	---	---	---	---	---
	Thermocouple, 30", Honeywell Q309A	8236024	1**	1**	1	1	1	1	1	1	1	1
5G	Pilot Tubing, 1/4" OD x 9" LG	8236047	2*	2*	---	---	---	---	---	---	---	---
5H	Male Adapter, 1/4" OD x 1/8" NPT	822630	2*	2*	---	---	---	---	---	---	---	---
5J	Regulator, 3.5" w.c., Maxitrol RV12LT	8231705	1*	1*	---	---	---	---	---	---	---	---
5K	Pilot Tubing, 1/4" OD x 6" LG	8236094	1*	1*	---	---	---	---	---	---	---	---
5L	Compression Coupling, 1/4" x 1/4" x 90°	8236046	1*	1*	---	---	---	---	---	---	---	---

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
5. Pilot Burner and Gas Valve, 24-volt Continuous Ignition, LP/Propane (1 Inch and 40mm Main Burners Only)												
5A	Pilot Burner, Robertshaw 7CL-6	8231703	1*	1*	--	--	--	--	--	--	--	--
	Pilot Burner, Honeywell Q327A1915	8236106	--	--	1	1	1	1	1	1	1	1
	Pilot Burner, Honeywell Q350A2279	8236105	1**	1**	--	--	--	--	--	--	--	--
5B	Pilot Orifice, Robertshaw 27270-1 (.008")	Included With 5A	1*	1*	--	--	--	--	--	--	--	--
	Pilot Orifice, Honeywell 388146KR (.014")		--	--	1	1	1	1	1	1	1	1
	Pilot Orifice, Honeywell 390686-23 (.008")		1**	1**	--	--	--	--	--	--	--	--
5C	Adptr, 1/4"OD x 1/4" NPT Included w/5A & 5E	8236109	2*	2*	--	--	--	--	--	--	--	--
	Adptr, 1/8"OD x 1/4" NPT Included w/5A & 5E	8236108	2**	2**	2	2	2	2	2	2	2	2
5D	Pilot Tubing, 1/8" OD x 30" LG	8236110	1**	1**	1	1	1	1	1	--	--	--
	Pilot Tubing, 1/8" OD x 40" LG	8236100	--	--	--	--	--	--	--	1	1	1
5E	Gas Valve, Honeywell VR8200C3013	81660144	1*	1*	--	--	--	--	--	--	--	--
	Gas Valve, Honeywell VR8200C6040	81660243	1**	1**	1	1	1	1	--	--	--	--
	Gas Valve, Honeywell VR8300C4548	81660244	--	--	--	--	--	--	1	1	1	1
5F	Thermocouple, 30", Robertshaw 42930	8231704	1*	1*	--	--	--	--	--	--	--	--
	Thermocouple, 30", Honeywell Q309A	8236024	1**	1**	1	1	1	1	1	1	1	1
5G	Pilot Tubing, 1/4" OD x 18" LG	8236048	1*	1*	--	--	--	--	--	--	--	--
5L	Compression Coupling, 1/4" x 1/4" x90°	8236046	1*	1*	--	--	--	--	--	--	--	--
5M	Pilot Tubing, 1/4" OD x 9" LG	8236047	1*	1*	--	--	--	--	--	--	--	--

* 1" Burner Only

** 40mm Burner Only

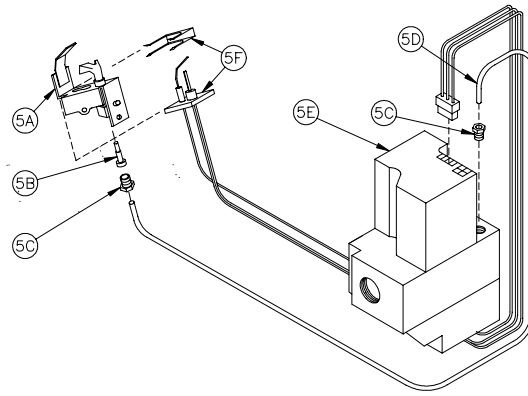


Figure 38

Key No.	Description	Part No.	Quantity										
			202	202X	203	204	205	206	207	208	209	210	
5. Pilot Burner and Gas Valve, Intermittent Ignition, Natural Gas													
5A	Pilot Burner, Honeywell Q3480C1197	8236124	1	1	1	1	1	1	1	1	1	1	
	Pilot Burner, Honeywell Q3450B1039	8236144	1**	---	---	---	---	---	---	---	---	---	
	Pilot Burner, Honeywell Q3480C1254	8236133	---	1**	1**	1**	1**	1**	1**	1**	1**	1**	
5B	Pilot Orifice, Honeywell with NE22 Orifice, 388146NE (.022")	Included with 5A	1	1	1	1	1	1	1	1	1	1	
	Pilot Orifice, Honeywell with BCR18 Orifice, 390686-4 (.018")		1**	---	---	---	---	---	---	---	---	---	
5C	Adapter, 1/4" OD x 1/4" NPT Included with 5A and 5E	8236109	2	2	2	2	2	2	2	2	2	2	
5D	Pilot Tubing, 1/4" OD x 30" LG	8236122	1	1	1	1	1	1	1	---	---	---	
	Pilot Tubing, 1/4" OD x 40" LG	8236123	---	---	---	---	---	---	---	1	1	1	
5E	Gas Valve, Honeywell SV9501P2004	81660213	1	1	1	1	1	1	---	---	---	---	
	Gas Valve, Honeywell SV9601P4107	81660216	---	---	---	---	---	---	1	1	1	1	
	Gas Valve, Honeywell SV9501P2087	81660237	1**	1**	1**	1**	1**	1**	---	---	---	---	
	Gas Valve, Honeywell SV9601P4172	81660238	---	---	---	---	---	---	1**	1**	1**	1**	
5F	Ignitor/Sensor Assembly with clip Honeywell Q3400A1024 (Included with 5A)	8236114	1	1	1	1	1	1	1	1	1	1	
5. Pilot Burner and Gas Valve, Intermittent Ignition, LP/Propane													
5A	Pilot Burner, Honeywell Q3480C1437	8236125	1	1	1	1	1	1	1	1	1	1	
	Pilot Burner, Honeywell Q3450B1047	8236145	1**	---	---	---	---	---	---	---	---	---	
	Pilot Burner, Honeywell Q3480C1452	8236134	---	1**	1**	1**	1**	1**	1**	1**	1**	1**	
5B	Pilot Orifice, Honeywell with KR14 Orifice, 388146KP (.014")	Included with 5A	1	1	1	1	1	1	1	1	1	1	
	Pilot Orifice, Honeywell with BBR12 Orifice, 390686-25 (.012")		1**	---	---	---	---	---	---	---	---	---	
5C	Adapter, 1/4" OD x 1/4" NPT Included with 5A and 5E	8236109	2	2	2	2	2	2	2	2	2	2	
5D	Pilot Tubing, 1/4" OD x30" LG	8236122	1	1	1	1	1	1	1	---	---	---	
	Pilot Tubing, 1/4" OD x40" LG	8236123	---	---	---	---	---	---	---	1	1	1	
5E	Gas Valve, Honeywell SV9601P4115	81660215	---	---	---	---	---	---	1	1	1	1	
	Gas Valve, Honeywell SV9501P2020	81660239	1	1	1	1	1	1	---	---	---	---	
	Gas Valve, Honeywell SV9601P4164	81660240	---	---	---	---	---	---	1**	1**	1**	1**	
5F	Ignitor/Sensor Assembly with clip Honeywell Q3400A1024 (Included with 5A)	8236114	1	1	1	1	1	1	1	1	1	1	

** 40mm Burners Only

Service Notes

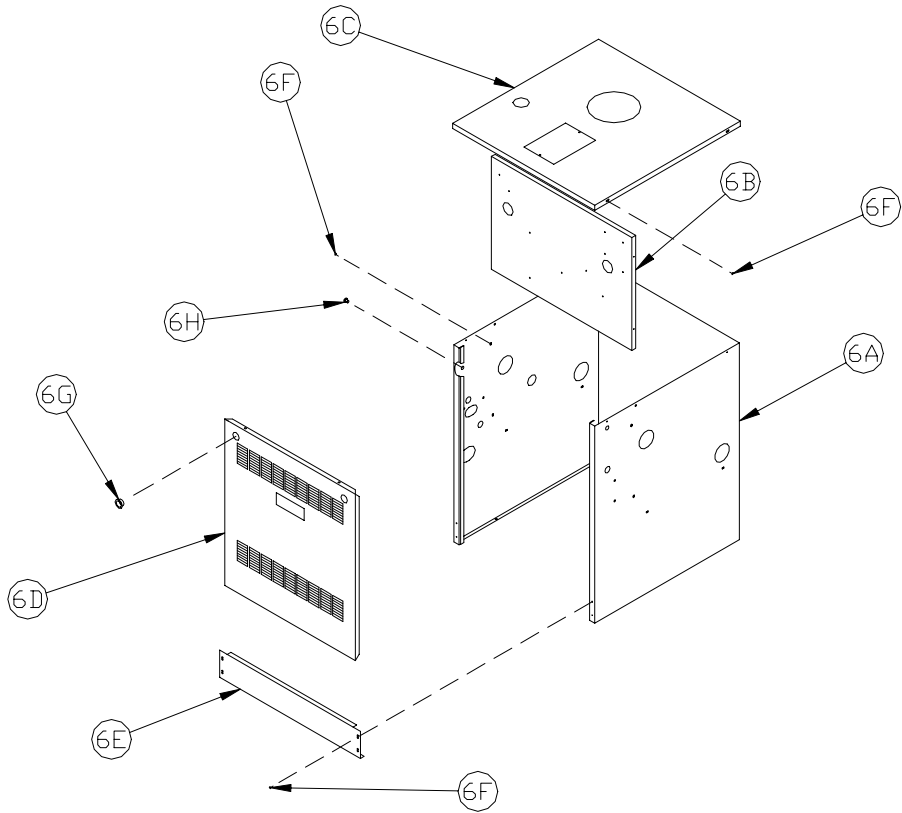


Figure 39

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
6. Jacket Assembly, Complete												
6	Jacket Assembly, Complete	604 170254	1	---	---	---	---	---	---	---	---	---
		604 170354	---	1	1	---	---	---	---	---	---	---
		604 170454	---	---	---	1	---	---	---	---	---	---
		604 170554	---	---	---	---	1	---	---	---	---	---
		604 170654	---	---	---	---	---	1	---	---	---	---
		604 170754	---	---	---	---	---	---	1	---	---	---
		604 170854	---	---	---	---	---	---	---	1	---	---
		604 170954	---	---	---	---	---	---	---	---	1	---
		604 171054	---	---	---	---	---	---	---	---	---	1
6. Jacket Assembly												
6A	Jacket Wrap-Around Panel	604 170215	1	---	---	---	---	---	---	---	---	---
		604 170315	---	1	1	---	---	---	---	---	---	---
		604 170415	---	---	---	1	---	---	---	---	---	---
		604 170515	---	---	---	---	1	---	---	---	---	---
		604 170615	---	---	---	---	---	1	---	---	---	---
		604 170715	---	---	---	---	---	---	1	---	---	---
		604 170815	---	---	---	---	---	---	---	1	---	---
		604 170915	---	---	---	---	---	---	---	---	1	---
		604 171015	---	---	---	---	---	---	---	---	---	1

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
6. Jacket Assembly (Continued)												
6B	Jacket Vestibule Panel	604 170223	1	---	---	---	---	---	---	---	---	---
		604 170323	---	1	1	---	---	---	---	---	---	---
		604 170423	---	---	---	1	---	---	---	---	---	---
		604 170523	---	---	---	---	1	---	---	---	---	---
		604 170623	---	---	---	---	---	1	---	---	---	---
		604 170723	---	---	---	---	---	---	1	---	---	---
		604 170823	---	---	---	---	---	---	---	1	---	---
		604 170923	---	---	---	---	---	---	---	---	1	---
		604 171023	---	---	---	---	---	---	---	---	---	1
6C	Jacket Top Panel	604 170233	1	---	---	---	---	---	---	---	---	---
		604 170333	---	1	1	---	---	---	---	---	---	---
		604 170433	---	---	---	1	---	---	---	---	---	---
		604 170533	---	---	---	---	1	---	---	---	---	---
		604 170633	---	---	---	---	---	1	---	---	---	---
		604 170733	---	---	---	---	---	---	1	---	---	---
		604 170833	---	---	---	---	---	---	---	1	---	---
		604 170933	---	---	---	---	---	---	---	---	1	---
6D	Jacket Front Removable Door	604 170242	1	---	---	---	---	---	---	---	---	---
		604 170342	---	1	1	---	---	---	---	---	---	---
		604 170442	---	---	---	1	---	---	---	---	---	---
		604 170542	---	---	---	---	1	---	---	---	---	---
		604 170642	---	---	---	---	---	1	---	---	---	---
		604 170742	---	---	---	---	---	---	1	---	---	---
		604 170842	---	---	---	---	---	---	---	1	---	---
		604 170942	---	---	---	---	---	---	---	---	1	---
6E	Jacket Lower Front Panel	604 170216	1	---	---	---	---	---	---	---	---	---
		604 170316	---	1	1	---	---	---	---	---	---	---
		604 170416	---	---	---	1	---	---	---	---	---	---
		604 170516	---	---	---	---	1	---	---	---	---	---
		604 170616	---	---	---	---	---	1	---	---	---	---
		604 170716	---	---	---	---	---	---	1	---	---	---
		604 170816	---	---	---	---	---	---	---	1	---	---
		604 170916	---	---	---	---	---	---	---	---	1	---
604 171016	---	---	---	---	---	---	---	---	---	1		
6F	Sheet Metal Screw, Type AB, Phillips Truss Head, #8 x 1/2"	80860000	26	26	26	26	26	26	26	26	26	26
6G	Snap Bushing, Heyco SB-1093-15	8136257	2	2	2	2	2	2	2	2	2	2
6H	Snap Bushing, Heyco SB-437-5	8136048	1	1	1	1	1	1	1	1	1	1

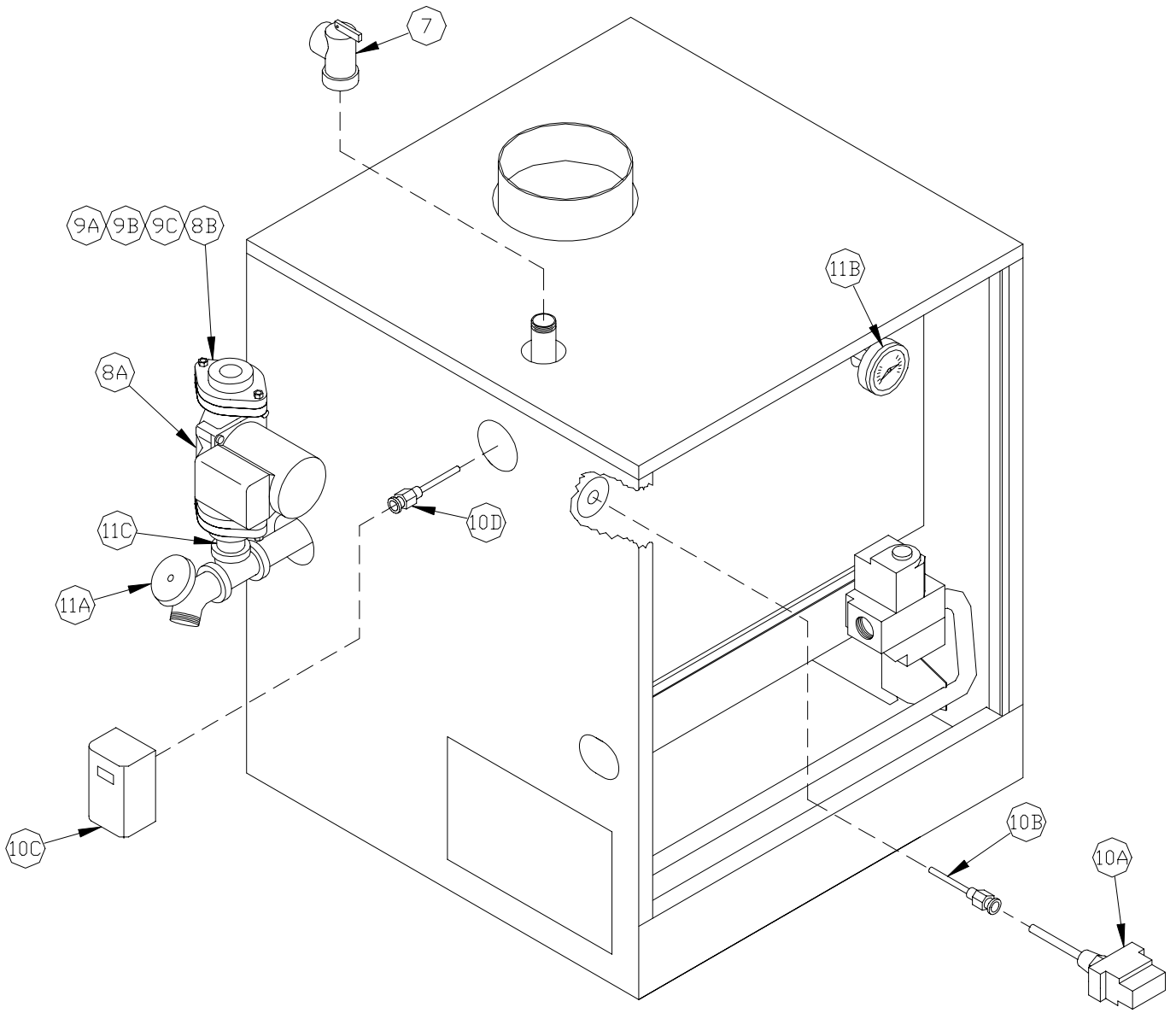


Figure 40: Water Trim

Key No.	Description	Part No.	Quantity										
			202	202X	203	204	205	206	207	208	209	210	
7	Safety Relief Valve, 30 psi, ¾ NPT, Conbraco 10-408-05	81660319	1	1	1	1	1	1	1	1	1	1	1
8. Circulator, Bell & Gossett SLC-30 Option (Intermittent and Continuous Circulation Only)													
8A	Circulator with Gaskets, Bell & Gossett NRF-22	8056174	1	1	1	1	1	1	1	1	1	1	1
8B	Gasket, Bell & Gossett NRF-22	806602029	2	2	2	2	2	2	2	2	2	2	2
8. Circulator, Grundfos Option (Intermittent and Continuous Circulation Only)													
8A	Circulator with Gaskets, Grundfos UP15-42F	8056173	1	1	1	1	1	1	1	1	1	1	1
8B	Gasket, Grundfos 510179	806602016	2	2	2	2	2	2	2	2	2	2	2
8. Circulator, Taco 007 Option (Intermittent and Continuous Circulation Only)													
8A	Circulator with Gaskets, Taco 007F	8056170	1	1	1	1	1	1	1	1	1	1	1
8B	Gasket, Taco '00' Series	806602006	2	2	2	2	2	2	2	2	2	2	2
8. Circulator, Taco 0010 Option (Intermittent and Continuous Circulation Only)													
8A	Circulator with Gaskets, Taco 0010	8056176	1	1	1	1	1	1	1	1	1	1	1
8B	Gasket, Taco '00' Series	806602006	2	2	2	2	2	2	2	2	2	2	2
9. Miscellaneous Circulator Hardware (Intermittent and Continuous Circulation Only)													
9A	Flange, 1¼ NPT	806602013	2	2	2	2	2	2	2	2	2	2	2
9B	Screw, Cap Hex Head, 7/16-14 x 1½"	80861301	4	4	4	4	4	4	4	4	4	4	4
9C	Nut, Hex, 7/16-14	80860406	4	4	4	4	4	4	4	4	4	4	4
10. Limit Control													
10A	Limit, Honeywell L4080D1036	80160156	1	1	1	1	1	1	1	1	1	1	1
10B	Well, ½ NPT (Included w/10A)	----	1	1	1	1	1	1	1	1	1	1	1
10C	Limit, Honeywell L4080B1212 (Dual Limit Only)	80160474	1	1	1	1	1	1	1	1	1	1	1
10D	Well, ¾ NPT, Honeywell 123870A (Dual Limit Only)	80160426	1	1	1	1	1	1	1	1	1	1	1
11. Miscellaneous Trim													
11A	Drain Cock, Conbraco 31-606-02	806603011	1	1	1	1	1	1	1	1	1	1	1
11B	Temperature-Pressure Gauge,	8056164U	1	1	1	1	1	1	1	1	1	1	1
11C	Nipple, 1¼ NPT x 3"	806600005	1	1	1	1	1	1	1	1	1	1	1

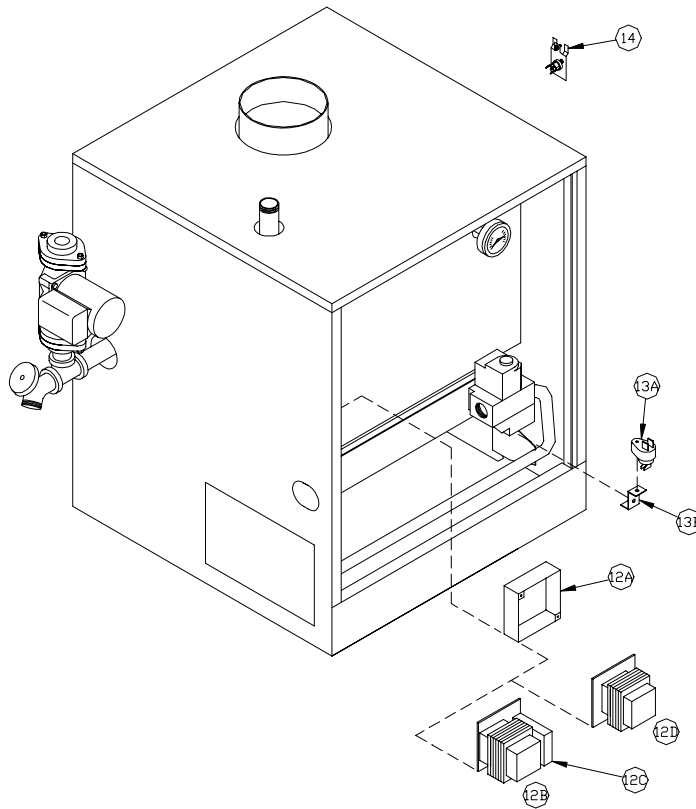
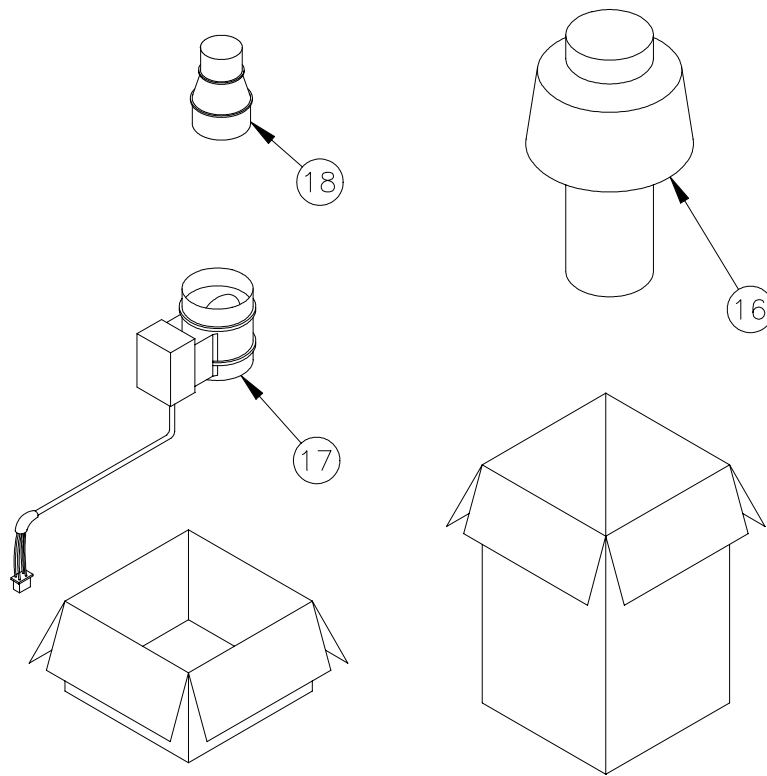


Figure 41

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
12. Transformer/Relay Assembly (Intermittent Circulation Only)												
12A	Junction Box, 4" x 4" x 1½"	8136259	1	1	1	1	1	1	1	1	1	1
12B	Transformer/Relay, Honeywell R8285D5001 (Includes Key No. 12C) 50VA	80160155U	1	1	1	1	1	1	1	1	1	1
12C	Relay, Honeywell R8222U1006	80160096U	1	1	1	1	1	1	1	1	1	1
12. Transformer (Continuous and Gravity Circulation Only)												
12A	Junction Box, 4" x 4" x 1½"	8136259	1	1	1	1	1	1	1	1	1	1
12D	Transformer, 40VA, Honeywell AT140D1012 or AT72D1188	80160039	1	1	1	1	1	1	1	1	1	1
13. Flame Rollout Switch												
13A	Flame Rollout Switch	80160044	1	1	1	1	1	1	1	1	1	1
13B	Flame Rollout Switch Mounting Bracket (*40mm Burner Only)	7186018	1*	1	1	1	1	1	1	1	1	1
14. Blocked Vent Switch												
14	Blocked Vent Switch Replacement Assembly	6016058	1	1	1	1	1	1	1	1	1	1



VENT DAMPER CARTON

DRAFT HOOD CARTON

Figure 42

Key No.	Description	Part No.	Quantity									
			202	202X	203	204	205	206	207	208	209	210
16. Draft Hood Carton												
16	Draft Hood	8116067	1	1	1	---	---	---	---	---	---	---
		8111702	---	---	---	1	---	---	---	---	---	---
		8111703	---	---	---	---	1	1	---	---	---	---
		8111704	---	---	---	---	---	---	1	1	---	---
		8111705	---	---	---	---	---	---	---	---	1	1
17. Vent Damper Carton (U.S.A. - Standard; Canada - Optional)												
17	Automatic Vent Damper, 4" Effikal RVGP-KS-4; or Johnson Y15A	8116143 8116122	1	1	1	---	---	---	---	---	---	---
	Automatic Vent Damper, 5" Effikal RVGP-KS-5; or Johnson Y15B	8116144 8116123	---	---	---	1	---	---	---	---	---	---
	Automatic Vent Damper, 6" Effikal RVGP-KS-6; or Johnson Y15C	8116145 8116124	---	---	---	---	1	1	---	---	---	---
	Automatic Vent Damper, 7" Effikal RVGP-KS-7; or Johnson Y15D	8116146 8116125	---	---	---	---	---	---	1	1	---	---
	Automatic Vent Damper, 8" Effikal RVGP-KS-8; or Johnson Y15E	8116147 8116126	---	---	---	---	---	---	---	---	1	1
18. Vent Reducer												
18	Reducer, 4" x 3"	8116164	1	---	---	---	---	---	---	---	---	---

