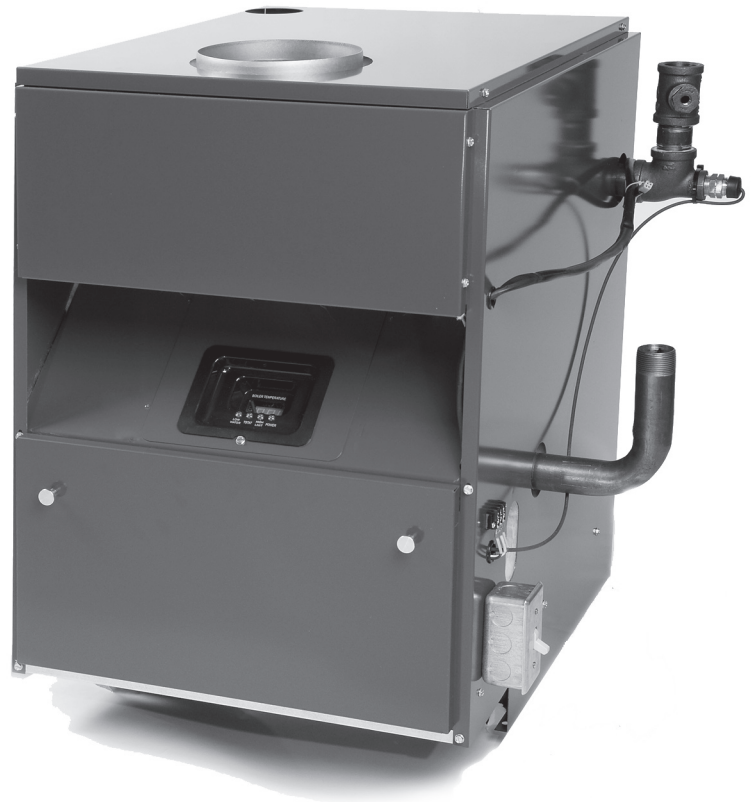


**Dunkirk**

**PWXL**  
Cast Iron Gas Fired  
Hot Water Boilers

**INSTALLATION, OPERATION &  
MAINTENANCE MANUAL**



**ecr**  
innovative living™



An ISO 9001-2000 Certified Company

**DUNKIRK BOILERS**  
85 Middle Rd.  
Dunkirk, NY 14048  
[www.dunkirk.com](http://www.dunkirk.com)

P/N 240007958 REV A [09/09]

## TABLE OF CONTENTS

Safety Symbols.....	4
Boiler Ratings and Capacities .....	5
Before You Start.....	6
Locating the Boiler .....	7
Combustion And Ventilation Air.....	8
System Piping .....	11
Chimney and Vent Pipe Operation .....	13
Vent Damper Operation .....	14
Gas Supply Piping .....	16
Electrical Wiring.....	17
Equipment and Optional Accessories .....	21
Starting the Boiler .....	22
Initial Operational Boiler Test Check-Out Procedure .....	24
Initial Operational Boiler Test Check-Out Certificate & Signed Receipt .....	25
Operating Your Boiler.....	26
Checking and Adjusting .....	27
Maintaining Your Boiler .....	27
Sequence of Operation.....	28
Troubleshooting .....	29
Hydrolevel Hydrostat Model 3100 .....	29
Service Hints.....	30




C.S.A. Certified for  
Natural Gas or Propane





Tested for 50 LB. ASME  
Working Pressure

## SAFETY SYMBOLS

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

 **DANGER**  
Indicates an imminently hazardous situation which, if not avoided, WILL result in death, serious injury or substantial property damage.


 **CAUTION**  
Indicates an imminently hazardous situation which, if not avoided, may result in injury or property damage.


 **WARNING**  
Indicates an imminently hazardous situation which, if not avoided, may result in death, serious injury or substantial property damage.

**NOTICE**  
Indicates information which should be followed to ensure proper installation and operation.

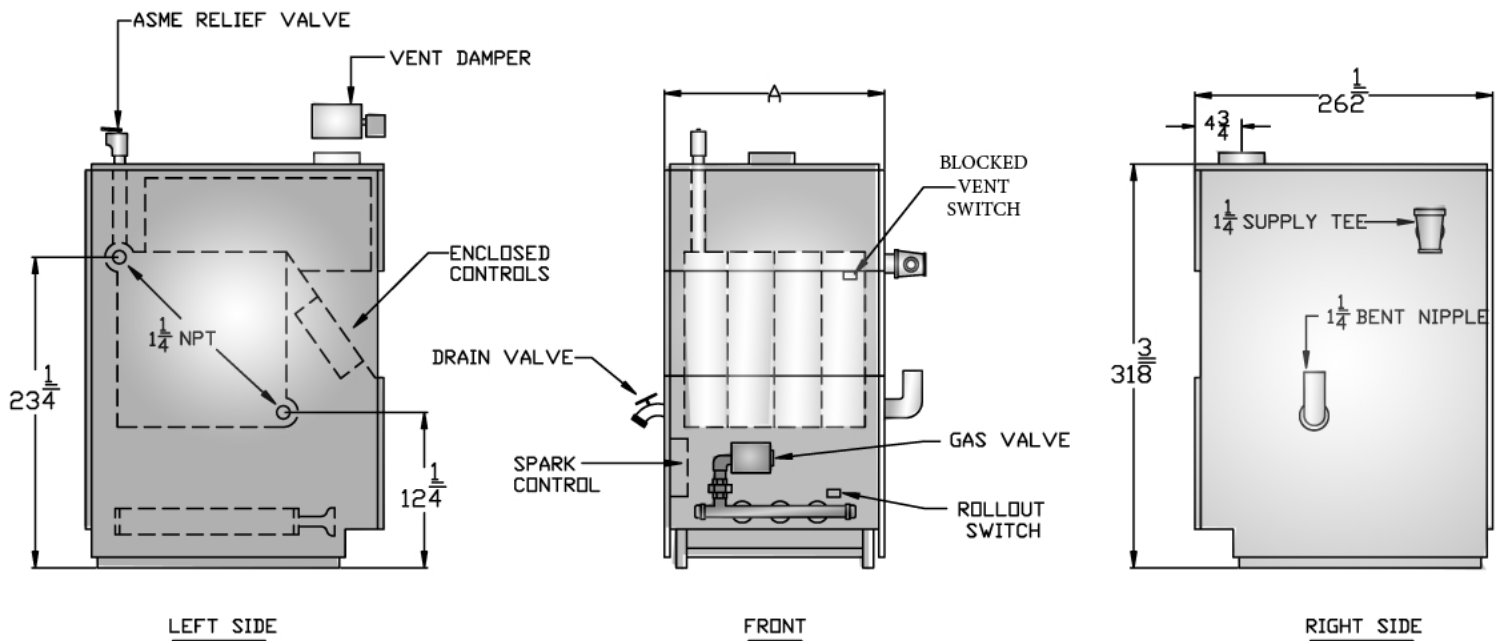
**IMPORTANT: Read the following instructions COMPLETELY before installing!**

**NOTICE**  
These Instruction must be affixed on or adjacent to the boiler. Retain for future reference.

 **WARNING**  
All installations of boilers and venting should be done only by a qualified expert and in accordance with the appropriate manual. Installing or venting a boiler or any other gas appliance with improper methods or materials may result in serious injury or death due to fire or to asphyxiation from poisonous gases such as carbon monoxide which is odorless and invisible.

 **WARNING**  
Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.  
DO NOT obstruct air openings to the boiler room.  
Modification, substitution or elimination of factory equipped, supplied or specified components may result in property damage, personal injury or the loss of life.  
TO THE OWNER - Installation and service of this boiler must be performed by a qualified installer.  
TO THE INSTALLER - Leave all instructions with the boiler for future reference.  
When this product is installed in the Commonwealth of Massachusetts the installation must be performed by a Licensed Plumber or Licensed Gas Fitter.

## BOILER RATINGS AND CAPACITIES



**Table 1- Boiler Ratings and Capacities**

Number of Boiler Sections	Natural or Propane Gas			Dimensions	
	AGA Input *MBH	Heating Capacity *MBH+	Net I=B=R Rating *MBH	Flue Diameter	Dim. A
3	70	57	50	5"	11-1/4"
4	105	85	74	6"	14-1/2"
5	140	113	98	6"	17-3/4"
6	175	142	123	7"	21"
7	210	170	148	7"	24-1/4"
8	245	198	172	7"	27-1/2"
9	280	226	197	7"	30-3/4"

\* MBH = 1,000 BTUH = British Thermal Unit Per Hour. Boilers are equipped for altitudes up to 2,000 feet only. For altitudes above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level.

+ Heating Capacity based on D.O.E. (Department of Energy) test procedure.

### New York City MEA Number 484-84 E Vol. IV.

The Ratings marked "Net I=B=R Ratings" indicate the amount of remaining heat input that can be used to heat the radiation units. The net I=B=R Ratings shown are based on an allowance of 1.15 in accordance with the factors shown on the I=B=R Standard as published by the Hydronics Institute. Selection of boiler size should be based upon "Net I=B=R Rating" being equal to or greater than the calculated heat loss of the building. The Manufacturer should be consulted before selecting a boiler for installations having unusual piping and pickup requirements.

### Boilers For Use At High Altitude

This boiler is factory equipped for use at altitudes of 0-2,000 feet above sea level. For use at altitudes above sea level, the input ratings are reduced by a change in main orifice size.

For altitudes above 2,000 feet above sea level, input ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. Consult the latest edition of the National Fuel Gas Code (NFPA54/ANSI Z223.1) for correct orifice sizing information. High altitude orifices are available from the boiler manufacturer.

## BEFORE YOU START

Check to be sure you have the right size boiler before starting the installation. See rating and capacity table on previous page. Also be sure the new boiler is for the type of gas you are using. Check the rating plate on the right side of the boiler.

You must see that the boiler is supplied with the correct type of gas, fresh air for combustion, and a suitable electrical supply. The boiler must be connected to a suitable venting system and an adequate piping system. A thermostat, properly located, is needed for control of the heating system. If you have any doubts as to the various requirements, check with local authorities. Take the time to complete all of the steps for SAFE and PROPER operation of the heating system.

If this boiler is installed in a building under construction, special care must be taken to insure a clean combustion air supply during the construction process. Airborne particulates such as from dry-wall dust and from fiberglass insulation can clog the burner ports, flueway passages and cause incomplete combustion and sooting.

Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1.

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1-latest revision.

Installers - Follow local regulations with respect to installation of CO detectors. Follow maintenance recommendations in this instruction manual.

### WARNING



Keep boiler area clean and free from combustible materials, gasoline and other flammable vapors and liquids. Failure to keep boiler area clean may result in death, serious injury, or substantial property damage.

## LOCATING THE BOILER

1. Select level location as centralized with piping system, and as near chimney as possible.
2. Place crated boiler at selected location, remove crate by pulling crate sides from top and bottom boards.
3. This boiler must be set on non-combustible floor or optional non-combustible Base Plate placed over the top of a combustible floor. Refer to Repair Parts and Optional Kits for additional details (3-6 section Boiler Base Plate Part #14614031; or 7-9 Section Boiler base Plate Part #14614032). A combustible floor is defined as materials made of or surfaced with wood, compressed paper, plant fibers, or other materials that are capable of being ignited and burned. Such material shall be considered combustible even though flame-proofed, fire-retardant treated, or plastered. This boiler must not be installed on carpeting.
4. Boiler is to be level. Metal shims may be used under base legs for final leveling.
5. Additional clearance for service may exceed clearance for fire protection. Always comply with the minimum fire protection clearance shown on the boiler. An 18 inch clearance should be maintained on any side where passage is required to access another side for cleaning, servicing, inspection or replacement of any part that may need attention.
6. To determine minimum clearances to combustibles refer to Table 2b, for rooms with a single boiler only. Rooms that are large in comparison with the size of the boiler are defined as rooms having a volume equal to or greater than 16 times the volume of the boiler. Where the actual ceiling height of a room is greater than 8' the volume of a room shall be figured on the basis of a ceiling height of 8'. Determination of room size should be based on the total volume of all gas fired equipment install in the room. Consult the latest revision of the National Fuel Gas Code for further information.
7. Equipment shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas, proper venting, and maintenance of ambient temperature at safe limits under normal conditions of use. Equipment shall be located so as not to interfere with proper circulation of air. When normal infiltration does not provide the necessary air, outside air shall be introduced. **(See "Combustion and Ventilation Air")**
8. Advise owner to keep air passages free of obstructions. Ventilating and combustion air must enter boiler room without restrictions.
9. The boiler shall be installed such that the automatic gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (condensate trap, control replacement, etc.).

<b>Table 2a - Determination of Room Size</b>		
If room does not contain minimum volume shown to be considered a Large Room, use "Small Room or Alcove" values.		
Boiler Size	Volume (Ft <sup>3</sup> )	Minimum Room Volume To Be Considered a Large Room (Ft <sup>3</sup> )
3 Section	5.4	86.6
4 Section	7.0	111.6
5 Section	8.5	136.6
6 Section	10.1	161.7
7 Section	11.7	186.7
8 Section	13.2	211.7
9 Section	14.8	236.7

<b>Table 2b - Minimum Clearances</b>			
Minimum Clearances	Small Room or Alcove		Large Room
	3-5 section	6-9 section	3-9 section
Top	6"	6"	6"
Rear	6"	6"	6"
Right Side	8"	24"	6"
Left Side	6"	24"	6"
Front	18"	18"	18"
Flue/Vent	6"	6"	6"
Near Boiler Piping	1"	1"	1"

## COMBUSTION AND VENTILATION AIR

Provision for combustion and ventilation air must be in accordance with the latest revision of the National Fuel Gas Code, ANSI Z223.1, or applicable provisions of the local building codes. You must provide for enough fresh air to assure proper combustion. The fire in the boiler uses oxygen. It must have a continuous supply. Outside air must enter the house to replace that used by the burner.

**EXAMPLE 1: Boiler Located In Unconfined Space** An unconfined space is defined as a space whose volume is not less than 50 cubic feet per 1,000 Btu per hour of the total input rating of all appliances installed in that space.

If your boiler is in an open area (non-partitioned basement) in a conventional house, the air that leaks through the cracks around doors and windows will usually be adequate to provide air for combustion. The doors should not fit tightly. Do not caulk the cracks around the windows.

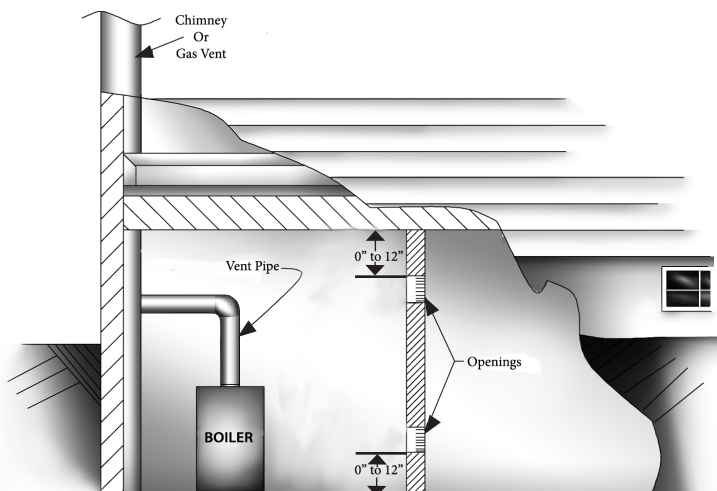
### NOTICE

Equipment located in buildings of tight construction shall be provided with air for combustion, ventilation, and dilution of flue gases using the methods described in example 2 (below) or shall be specially engineered. The authority having jurisdiction must approve specially engineered installations. A building of tight construction is defined as: 1) walls exposed to the outdoor atmosphere have a continuous water vapor retarder with a rating of one perm or less with openings gasketed or sealed; and 2) openable windows and doors which meet the air leakage requirements of the International Energy Conservation Code, Section 502.1.4; and 3) caulking or sealants are applied to areas such as joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines, and at other openings.

### EXAMPLE 2: Boiler Located in Confined Space

- 1. All Air from Inside the Building:** The confined space shall be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of one square inch per 1,000 Btu per hour of the total input rating of all gas utilization equipment in the confined space, but not less than 100 square inches. One opening shall be within 12 inches of the top and one within 12 inches of the bottom of the enclosure. The minimum dimension of air openings shall not be less than 3 inches (see **Figure 1**).

**Figure 1 - Boiler Located in Confined Space**



### WARNING

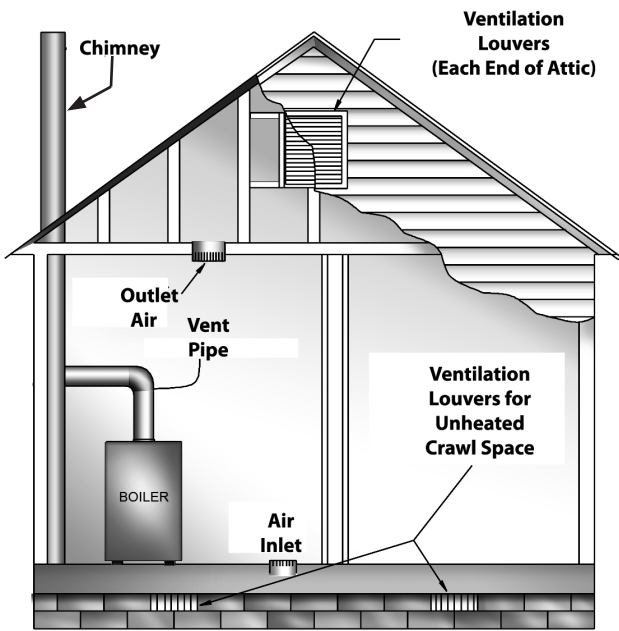
Be sure to provide enough fresh air for combustion. Enough air insures proper combustion and assures that no hazard will develop due to lack of oxygen.

If you use a fireplace or a kitchen or bathroom exhaust fan, you should install an outside air intake. Otherwise exhaust fans will rob the boiler and water heater of combustion air.

## COMBUSTION AND VENTILATION AIR

- 2. All Air from Outdoors:** The confined space shall communicate with the outdoors in accordance with methods A or B. The minimum dimension of air openings shall not be less than 3 in. Where ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect.
- A. Two permanent openings, one commencing within 12 inches of the top, and one commencing within 12 inches of the bottom, of the enclosure shall be provided. The openings shall communicate directly, or by the ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.
- I. Where directly communicating with the outdoors (**see Figure 2**) or where communicating to the outdoors through vertical ducts (**see Figure 3**), each opening shall have a minimum free area of 1 sq. in. per 4000 Btu per hour of total input rating of all equipment in the enclosure.

**Figure 2 - Directly Communicating to the Outdoors**



**Figure 3 - Vertical Ducts Communicating to the Outdoors**

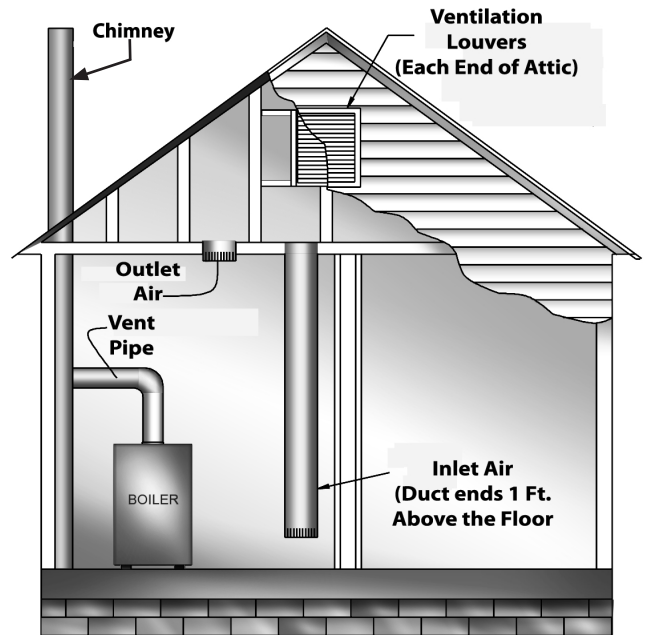


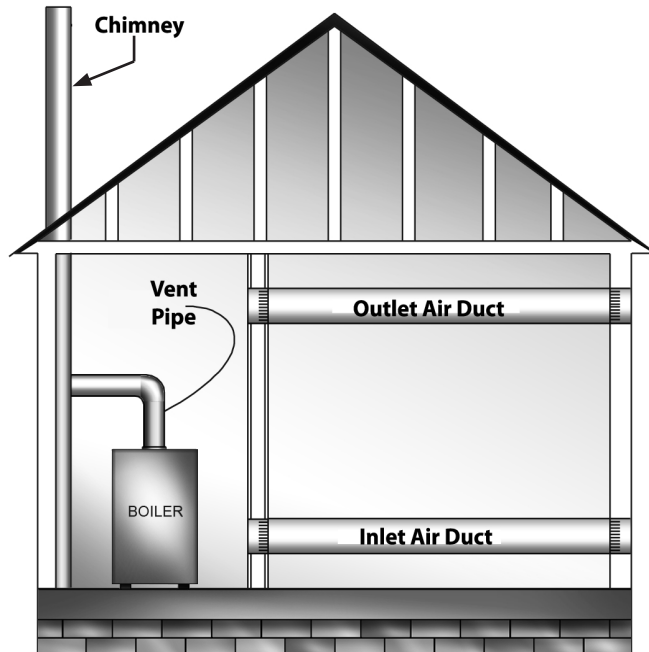
Table 3 FRESH AIR DUCT CAPACITIES (1 Square inch per 4,000 Btu) see Figures - 2 and 3			
Fresh Air Duct Size	100% Free Area 1/4" Wire Mesh	75% Free Area Metal Louvers	25% Free Area Wood Louvers
3" x 12"	144,000	108,000	36,000
8" x 8"	256,000	192,000	64,000
8" x 12"	384,000	288,000	96,000
8 1/2" x 16"	512,000	384,000	128,000



## COMBUSTION AND VENTILATION AIR

II. Where communicating with the outdoors through horizontal ducts (see **Figure 4**), each opening shall have a minimum free area of 1 area of sq. in. per 2000 Btu per hour of total rating of all equipment in the enclosure.

**Figure 4 - Horizontal Ducts Communicating to the Outdoors**



**Table 4**  
**FRESH AIR DUCT CAPACITIES (1 Square inch per 2,000 Btuh)**  
see Figure 3D

Fresh Air Duct Size	100% Free Area 1/4" Wire Mesh	75% Free Area Metal Louvers	25% Free Area Wood Louvers
3" x 12"	72,000	54,000	18,000
8" x 8"	128,000	96,000	32,000
8" x 12"	192,000	144,000	48,000
8 1/2" x 16"	256,000	192,000	64,000

- B. One permanent opening commencing within 12 inches of the top of the enclosure shall be permitted where the equipment has clearance of at least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or to a crawl space or attic that freely communicate with the out doors, and shall have a minimum free area of:
- I. 1 sq. inch per 3000 Btu per hour of the total input of all equipment located in the enclosure (see chart below).
  - II. Not less than the sum of the areas of all vent connectors in the confined space.

**Table 5**  
**FRESH AIR DUCT CAPACITIES (1 Square inch per 3,000 Btuh)**

Fresh Air Duct Size	100% Free Area 1/4" Wire Mesh	75% Free Area Metal Louvers	25% Free Area Wood Louvers
3" x 12"	108,000	81,000	27,000
8" x 8"	192,000	144,000	48,000
8" x 12"	288,000	216,000	72,000
8 1/2" x 16"	384,000	288,000	96,000

## SYSTEM PIPING

1. Place boiler in the selected location (as near chimney as possible.) Your boiler is shipped assembled. You need only to install the Relief Valve and a drain line to carry any water or steam to a drain.
2. Install Relief Valve into the  $\frac{3}{4}$ " pipe on the top of the boiler. **See Figure 5.** Use  $\frac{3}{4}$ " Pipe and an elbow (not furnished) to carry the water or steam to a nearby drain. Do not connect directly to a drain but leave an air gap. No shutoff of any description shall be placed between the safety relief valve and the boiler, or on discharge pipes between such safety valves and the atmosphere. Installation of the safety relief valve shall conform to the requirements of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV. The manufacturer is not responsible for any water damage. Install Drain Valve in lower left side of boiler as marked.
3. Connect Supply and Return Lines to boiler. The connections may require certain additional fittings and parts, see **(Figures 5 and 6).**
4. This boiler is equipped with  $1\frac{1}{4}$ " supply and return connections on the right side of the boiler.

In connecting the cold water supply to the water inlet valve, make sure that a clean water supply is available. When the water supply is from a well or pump, a sand strainer should be installed at the pump.

A hot water boiler installed above radiation level must be equipped with a low water cutoff device. A periodic inspection is necessary, as is flushing of float type devices, per manufactures specific instruction. Refer to local codes for low water cut-off requirements.

### For Use With Cooling Units

1. This boiler, when used in connection with chilled water systems, must be installed so that the chilled water is piped parallel with the heating boiler. Appropriate valves must be used to prevent the chilled water from entering the heating boiler **(Figure 6).**
2. When this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, the piping system shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

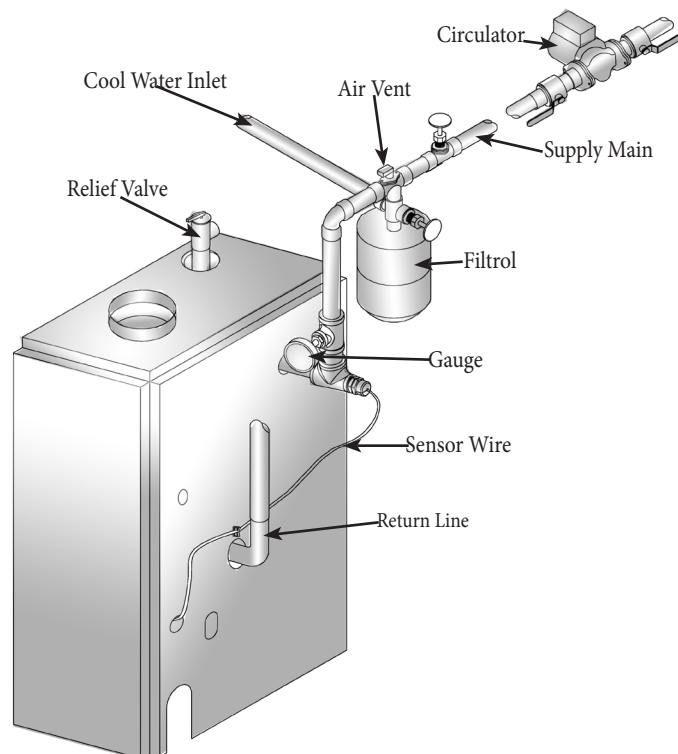
### Low Design Water Temperature Systems (Below 140°)

3. If the boiler is to be used in a heating system where water temperatures below 140°F are desired (e.g. radiant floor heating) a 3-way or 4-way mixing valve or suitable alternative is required to prevent low temperature return water from entering the boiler.

Follow the mixing valve manufacturer's installation instructions.

4. The minimum design return water temperature to the boiler to prevent condensation in the boiler and venting is 120°F. The minimum high limit setting is 140° F.

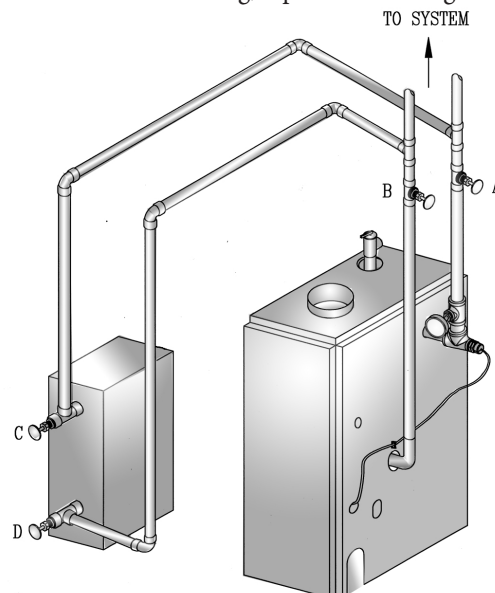
**Figure 5 - Typical Hot Water Piping**



**Figure 6 - Chilled Water Piping**

Valves A & B - Open For Heating; Closed For Cooling

Valves C & D - Closed For Heating; Open For Cooling



### Temperature/Pressure Gauge Installation

To install the temperature/pressure gauge on the boiler:

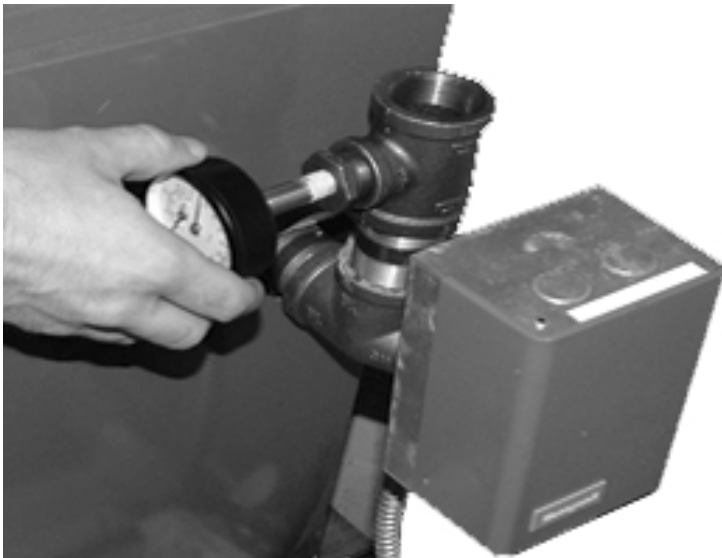
1. Remove the box containing the new gauge from the parts bag and remove the gauge from the box.
2. Apply pipe sealant to the threads on the shaft of the gauge as shown in **Figure 7**.

**Figure 7 - Apply Pipe Sealant On Shaft of Gauge**



3. Thread the gauge into the supply water tee as shown in **Figure 8**. To prevent damage do not overtighten.

**Figure 8 - Thread Gauge Into Supply Water Tee**



### NOTICE

**IMPORTANT: DO NOT TIGHTEN GAUGE BY HAND!!**  
Gauge should be tightened using a crescent wrench or 9/16" open end wrench as shown in **Figure 9**

**Figure 9 - Tighten Gauge With Crescent Wrench**



4. Once installation is complete, remove sticker from front of the gauge as shown in **Figure 10**.

**Figure 10 - Remove Sticker From Front of Gauge**



## CHIMNEY AND VENT PIPE OPERATION

Boilers for connection to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting Equipment, of the National Fuel Gas Code, ANSI Z2231 - latest revision, and applicable provisions of the local building code.

### Check Your Chimney

This is a very important part of your heating system. It must be clean, the right size, properly constructed and in GOOD CONDITION. No boiler can function properly with a bad chimney.

**Table 6** gives typical chimney size. **Fig.11** gives you an idea how a boiler might be vented to a chimney. Note that the height (HT) is measured from the vent pipe to the top of the chimney.

**Table 6 - Typical Chimney Sizes**

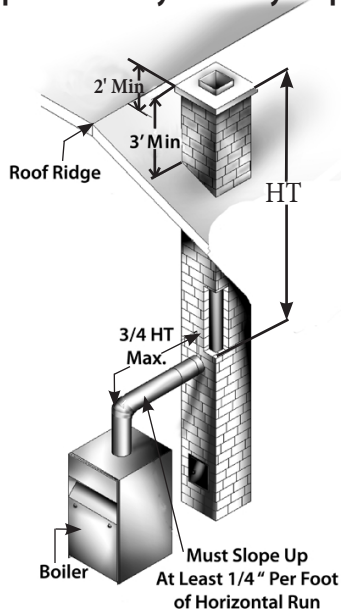
Boiler Input (Btuh)	Flue Area in Inches		
	HT 10-15 Ft	HT 15-25 Ft	HT 25 Ft & up
Up to 100,000	6" x 6"	6" x 5"	5" x 5"
Up to 155,000	6" x 7"	6" x 6"	6" x 5"
Up to 230,000	7" x 8"	7" x 7"	6" x 7"
Up to 350,000	9" x 9"	8" x 9"	8" x 8"

\*HT = Top of Thimble to top of Flue. See **Figure 11**.

### Chimney Sizing

Chimney sizing, and all other aspects of the vent installation must be in accordance with National Fuel Gas Code, ANSI Z223.1 - latest revision, and applicable provisions of the local building codes.

**Figure 11 - Typical Masonry Chimney Requirements**



### Connecting The Vent Damper And Vent Connector

Refer to **Table 1** (page 4) flue diagram for the size and location of the vent (flue opening). Use a 28 gauge (minimum) galvanized pipe to connect to the chimney.

#### NOTICE

**IMPORTANT** -The damper blade on the furnished vent damper has a 1/2 square inch hole (approximately 3/4" diameter). On boilers equipped with standing pilot, the hole must be left open. On boilers equipped with intermittent ignition, the hole should be plugged by using the plug supplied with the vent damper.

1. Position furnished vent damper on top of flue outlet collar. Fasten damper securely to flue outlet collar with sheet metal screws. Make sure damper blade has clearance to operate inside of diverter.
  - As an option, the damper may be installed in any horizontal or vertical position, closer to the flue outlet collar preferred. Follow the diagrams - **Figures 12, 13 and 14**.
2. Install the vent damper to service only the single boiler for which it is intended. The damper position indicator shall be in a visible location following installation. Locate the damper so that it is accessible for servicing.
3. The damper must be in the open position when appliance main burners are operating.
4. The boiler is equipped with a factory wired harness that plugs into the vent damper.
5. Vent pipe must be same size as the flue outlet collar.
6. Slope pipe up from boiler to chimney not less than 1/4" per foot.
7. Run pipe as directly as possible with as few elbows as possible.
8. Do not connect to fireplace flue.
9. End of vent pipe must be flush with inside face of chimney flue. Use a sealed-in thimble for the chimney connection.
10. Horizontal run should not be longer than 3/4 the chimney height (HT) for single appliance venting. (**see Figure 11**)

The sections of vent pipe should be fastened with sheet metal screws to make the piping rigid. Horizontal portions of the vent system must be supported to prevent sagging. Use stovepipe wires every 5' to support the pipe from above. If the vent pipe must go through a

## CHIMNEY AND VENT PIPE CONNECTION

crawl space, double wall vent pipe should be used. Where vent pipe passes through a combustible wall or partition, use a ventilated metal thimble. The thimble should be 4" larger in diameter than the vent pipe.

### Minimum Vent Pipe Clearance

Wood and other combustible materials must not be closer than 6" from any surface of single wall metal vent pipe. Listed Type B vent pipe or other listed venting systems shall be installed in accordance with their listing.

### REMOVING EXISTING BOILER FROM COMMON VENTING SYSTEM

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

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

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other

spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1-latest revision. When re-sizing any portion of the common venting system, the common venting system should be re-sized to approach the minimum size as determined using the appropriate tables in the National Fuel Gas Code, ANSI Z223.1-latest revision.

### NOTICE

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

## VENT DAMPER OPERATION

### Typical Installation For Vent Damper

#### WARNING



Install the vent damper to service only the single appliance for which it is intended. If improperly installed, a hazardous condition, such as an explosion or carbon monoxide poisoning, could result.

Do not install the vent damper on pipe curve.

Do not run wires near high temperature surfaces. Use standoff brackets if necessary.

For safe, efficient operation, the vent damper and all flue product carrying areas of the appliance must be checked annually by you, with particular attention given to deterioration from corrosion or other sources. If you see corrosion or other deterioration, contact your heating contractor for repairs. Check vent damper operation as follows:

1. When the boiler is off, check that the vent damper positions indicator points to the closed position, **Fig. 14.**
2. Turn the thermostat or controller up to call for heat and check the vent damper indicator points to the open position, **Fig. 14.**

## VENT DAMPER OPERATION

- Turn the thermostat or controller down again and check that the damper position indicator returns to the closed position.

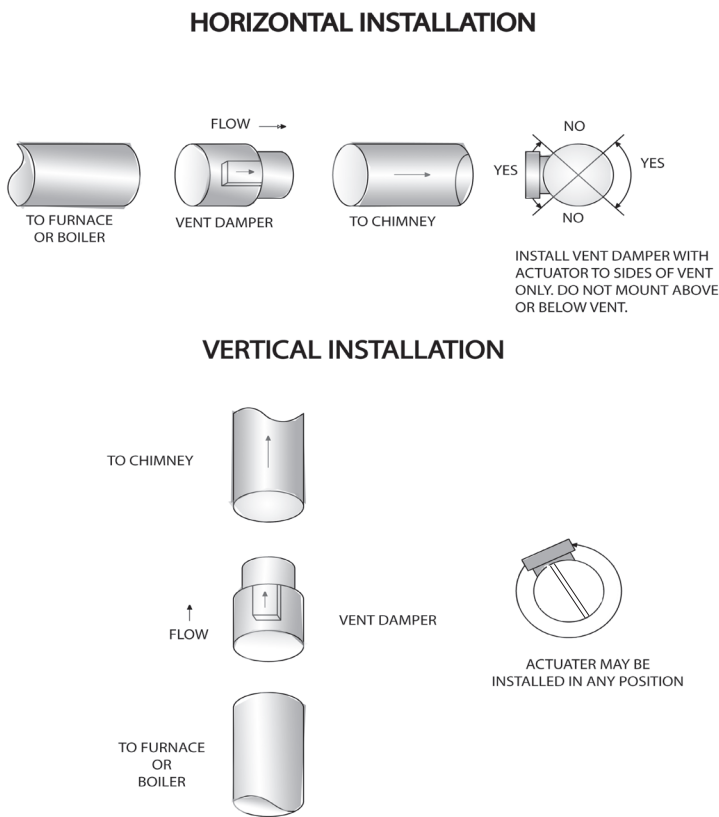
### Manual Operation Of The Vent Damper

The vent damper may be placed in the open position to permit burner operation by using the "HOLD DAMPER OPEN" switch, located on the damper controller. The thermostat will control the burner firing as before, while the damper will remain open. **DO NOT** turn damper open manually or motor damage will result. Set switch to "AUTOMATIC OPERATION" to close vent damper during burner off cycle.

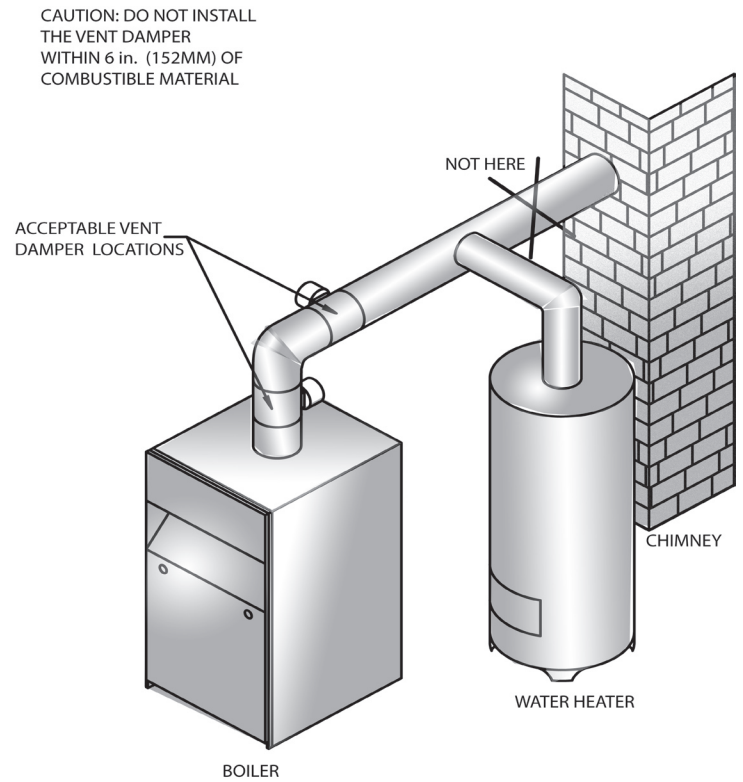
For further information, and for a vent damper troubleshooting guide, refer to the manual that was packaged with the vent damper.

The vent damper must be inspected at least once a year by a trained, experienced service technician. The name of the person who originally installed your vent damper is shown on the installation label.

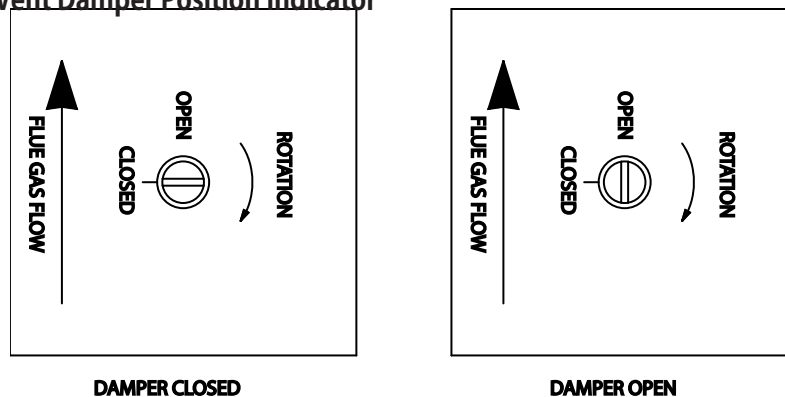
**Figure 12 - Damper Installation**



**Figure 13 - Damper Installation**



**Figure 14 - Vent Damper Position Indicator**



SHOWING OPEN AND CLOSED POSITION

## Check Gas Supply

The gas pipe to your boiler must be the correct size for the length of the run and for the total Btu per hour input of all gas utilization equipment connected to it. See **Table 7** for the proper size. Be sure your gas line complies with local codes and gas company requirements.

Testing pressures in excess of 1/2psig:

- The boiler and its individual shutoff valve must be disconnected from the gas supply piping system when testing pressures in excess of 1/2 psig (3.5 kPa) during any pressure testing of that system.

Testing pressures equal to or less than 1/2 psig:

- The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve when testing pressures equal to or less than 1/2 psig (3.5kPa) during any pressure testing of the gas supply piping system.

## Connecting The Gas Piping

Refer to **Fig. 15** for the general layout at the boiler. It shows the basic fittings you will need. The gas line enters the boiler from the right side.

The following rules apply:

1. Use only those piping materials and joining methods listed as acceptable by the authority having jurisdiction, or in the absence of such requirements, by the National Fuel Gas Code, ANSI Z223.1-latest revision.
2. Use pipe joint compound suitable for LP gas on male threads only.
3. Use ground joint unions.
4. Install a sediment trap upstream of gas controls.
5. Use two pipe wrenches when making the connection to the gas valve to keep it from turning.
6. Install a manual shut-off valve in vertical pipe about 5 feet above floor.
7. Tighten all joints securely.
8. Propane gas connections should only be made by a licensed propane installer.
9. Two-stage regulation should be used by the propane installer.
10. Propane gas piping should be checked out by the propane installer.

## Checking The Gas Piping

Upon completion of piping, check immediately for gas leaks. Open the manual shut-off valve. Test for leaks by applying soap suds (or a liquid detergent) to each joint. Bubbles forming indicate a leak.

**CORRECT EVEN THE SMALLEST LEAK AT ONCE.**



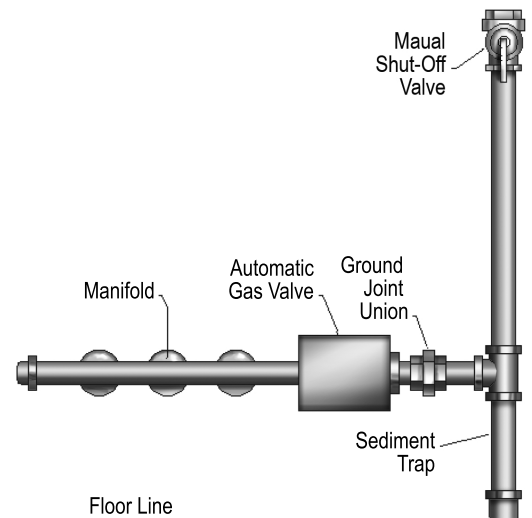
### WARNING

NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS.

<b>TABLE 7 - GAS SUPPLY PIPE SIZES</b>					
Natural Gas	Pipe Length (ft)	Pipe Capacity - KBtuh Input (includes Fittings)			
		1/2"	3/4"	1"	1 1/4"
	20	92	190	350	625
	40	63	130	245	445
	60	50	105	195	365
Propane Gas	Pipe Length (ft)	Pipe Capacity - KBtuh Input (includes Fittings)			
		Copper Tube*		Iron Pipe	
		5/8"	3/4"	1/2"	3/4"
	20	131	216	189	393
	40	90	145	129	267
	60	72	121	103	217

\* Dimension is outside diameter.  
The length of pipe or tubing should be measured from the gas meter or propane second stage regulator.

**Figure 15 - Gas Piping At Boiler**



**WARNING**

Turn off electrical power at fuse box before making any line voltage connections. Follow local electrical codes

All electrical work must conform to local codes as well as the National Electrical Code, ANSI/NFPA-70, latest revision.

**Electric Power Supply**

Prior to making any line voltage connections, service switch at boiler should be in the off position and the power turned off at the fuse box.

Run a separate 120 Volt circuit from a separate over current protective device in the electrical service entrance panel. This should be a 15 ampere circuit. A service switch has been provided and should be mounted to the Junction box located on the exterior boiler jacket. see **Fig. 16-1** for diagram showing power supply connection points.

The boiler, when installed, must be electrically grounded in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA - 70, latest revision.

Run a 14 gauge or heavier copper wire from the boiler to a grounded connection in the service panel or a properly driven and electrically grounded ground rod.

**Install Your Thermostat****NOTICE**

All low volt interconnect wiring must be at least 18 AWG.

The thermostat location has an important effect on the operation of your boiler system. **BE SURE TO FOLLOW THE INSTRUCTIONS INCLUDED WITH YOUR THERMOSTAT.** Locate the thermostat about five feet (5') above the floor on an inside wall. It may be mounted directly on the wall or on a vertically mounted outlet box. It should be sensing average room temperature.

**THERMOSTAT LOCATIONS TO AVOID**

DEAD SPOTS	HOT SPOTS	COLD SPOTS
Behind doors	Concealed pipes	Concealed pipes or ducts
	Fireplace	
	TV sets	Stairwells - drafts
Corners & alcoves	Radios	Doors - drafts
	Lamps	Unheated room on other side of wall
	Direct sunlight	
	Kitchens	

Connect 24 Volt thermostat leads to the white (TW) and red (TR) wires located in service switch junction box, located on outer jacket of boiler see **Fig.16-1** for service switch junction box and thermostat field wiring connections.

**Vent Damper Wiring**

The boiler is equipped with a factory wired harness with 4 pin Molex plug, that plugs into a 4 pin Molex receptacle inside the vent damper operator. The vent damper must be connected for the boiler to operate. Follow the wiring diagram follow for the various different models.

**CAUTION**

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

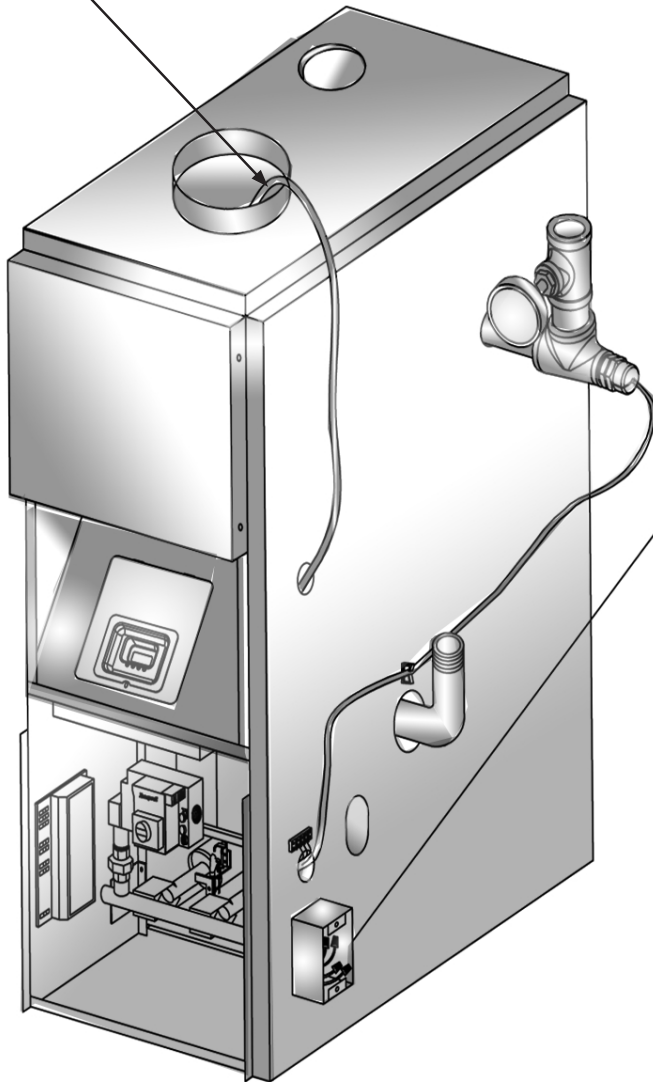
**Connect Circulator Pump Wiring**

See **Fig. 16 -1** for line voltage, thermostat and circulator pump field wiring connections. A five (5) foot wiring harness with flexible metal conduit is supplied to connect the circulator pump to the service switch junction box. If the two 120 Volt circulator wire terminals inside the junction box are not used, do not remove the two wire nuts to prevent a short circuit.

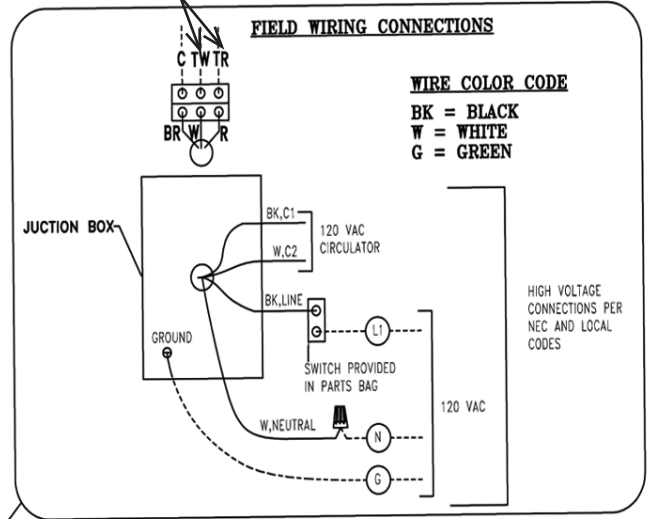


Figure 16-1 - Field Wiring Connections -Circulator Pump Wiring

VENT DAMPER HARNESS



Thermostat TW & TR  
Referenced on Page 15

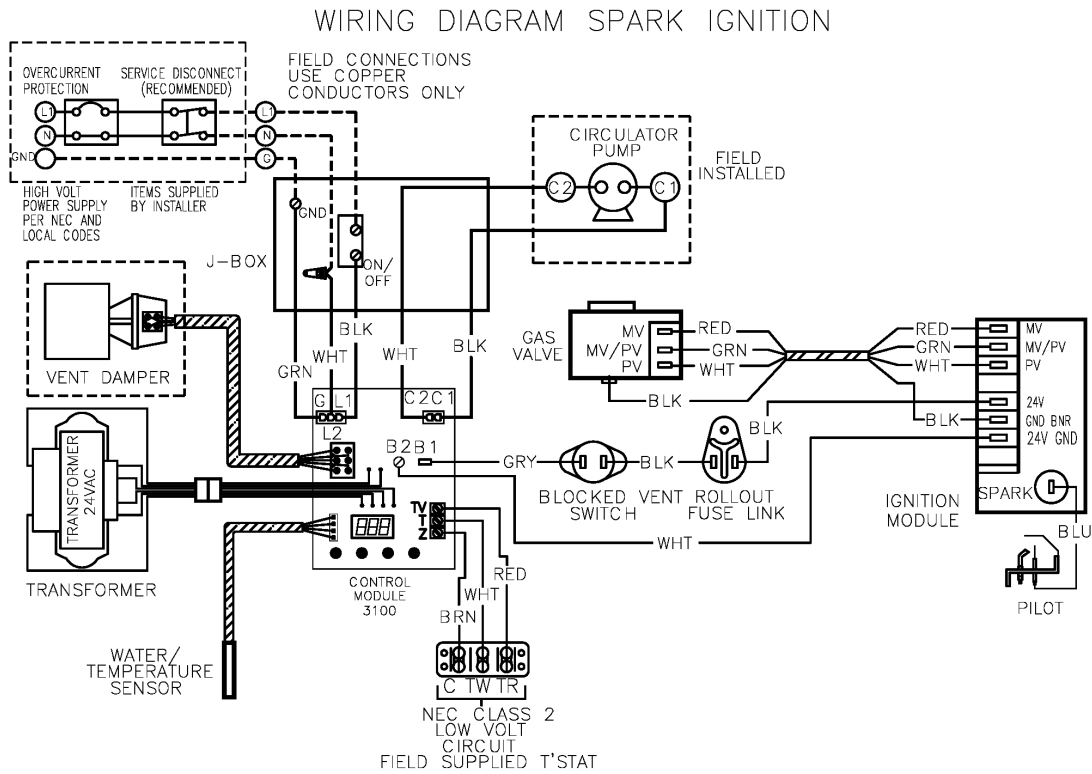


**NOTES:**

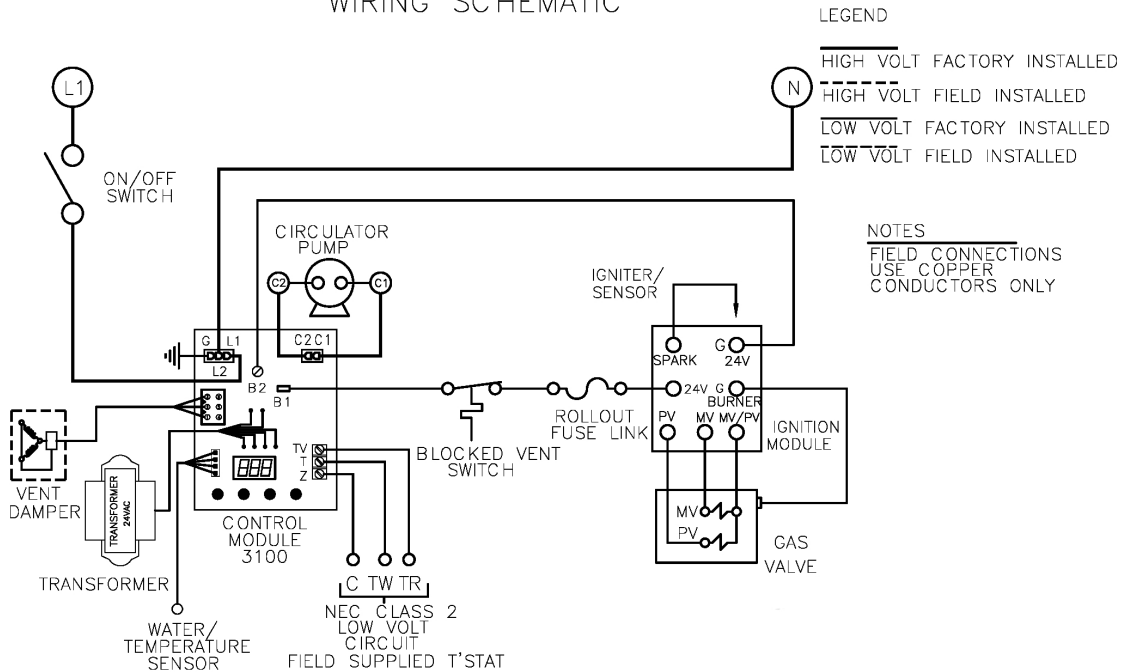
**VENT DAMPER SHIPPED LOOSE IN CRATE.**

**VENT DAMPER HARNESS MUST BE CONNECTED TO VENT  
WHEN MOUNTED**

Figure 16-2 - Wiring Diagram - Electronic Ignition



WIRING SCHEMATIC

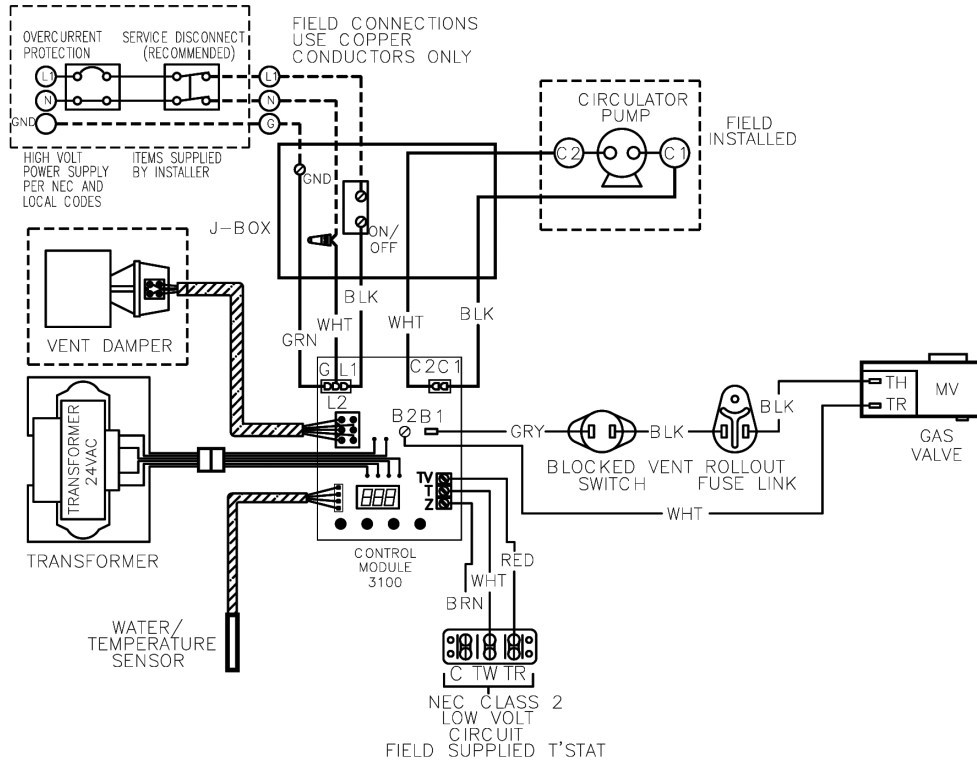


**NOTICE**

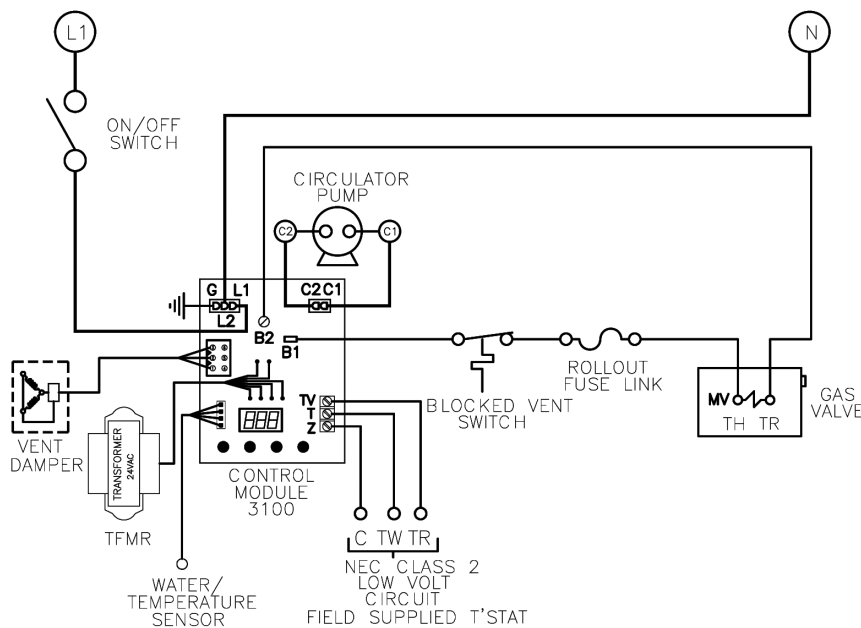
If any of the original wire as supplied with this appliance must be replaced, It must be replaced with type 105°C thermoplastic wire or it's equivalent

Figure 16-3 - Wiring Diagram - Standing Pilot

WIRING DIAGRAM STANDING PILOT



WIRING SCHEMATIC



LEGEND

- HIGH VOLT FACTORY INSTALLED
- - - HIGH VOLT FIELD INSTALLED
- LOW VOLT FACTORY INSTALLED
- - - LOW VOLT FIELD INSTALLED

NOTES

FIELD CONNECTIONS USE COPPER CONDUCTORS ONLY

NOTICE

If any of the original wire as supplied with this appliance must be replaced, It must be replaced with type 105°C thermoplastic wire or it's equivalent

## Relief Valve

You must have a relief valve on your boiler. Water expands as it is heated. If there is no place for the water to expand into, water pressure will build up inside the boiler and system. Should this happen, the relief valve will automatically open at a predetermined pressure. This will relieve the strain on the boiler and system. Run a pipe from the relief valve outlet (pipe must be same size as outlet and the open end must not be threaded) to an open drain, tub or sink, or other suitable drainage point not subject to freezing. Failure to do so may cause water damage or injury should relief valve release.

## Expansion Tank

In a properly assembled system, the expanding water flows into a expansion tank. This tank should be of the correct size. The tank is partially filled with air. As the water expands it compresses the air in the tank to form an air pressure cushion. This “spring-like” cushion serves to maintain correct operating water pressure regardless of water temperature. This assures a “full measure” of a water, even in the highest radiation unit of the system. It also prevents blowing off of the relief valve. The air in the tank in the beginning (with system filled with cold water) is sufficient for proper operation. The tank also serves as a trap for excess air in the system. The air would cause gurgling in the pipes and inefficient circulation in the radiators if left in the system. It is possible for a tank to become “waterlogged” (filled with water). It can also become overfilled with air. This can happen after filling the system with new water. Fittings provided on the tank and in the line to the tank are for bleeding off excess water or air. When installing this tank, it is important:

1. That the tank be higher than the boiler top.
2. That the pipe to the tank continuously rises up to the tank (so that air can “bubble” up to it).

## Diaphragm Type Expansion Tank

The diaphragm type expansion tank (EXTROL) takes the place of the conventional expansion tank. Carefully read the instructions packed with your EXTROL tank assembly.

The EXTROL tank comes to you with a 10-12 pounds per square inch air charge. This is the same as the pressure produced in the system by the automatic fill valve. When the system is first filled, the EXTROL tank will contain little or no water.

As the water is heated its pressure increases. It expands into the EXTROL tank, compressing the air in the tank. This compressed air cushion permits the water in the system to expand as the temperature changes. The diaphragm type tank can be mounted on the air purger fitting or at any convenient place in the supply or return line.

## Air Eliminating Fitting (Air Purger)

An air purger is used to remove excess air from the system. It is installed in the supply line. It will eliminate air from the water before it reaches the radiators and bleed off this air.

## Main Air Vent For Down Flow Systems Or Diaphragm Type Expansion Tank

Before a system is filled with water, there is air in the pipes and radiation units. Some of it will be trapped as the system is filled. It is possible to eliminate most of this air through the air vent on the radiation units. A main air vent will speed and simplify this. It should be installed on the highest point in the supply main when all radiation is below top of boiler.

## Automatic Fill Valve

For safe, efficient operation, a hot water system must be completely filled with water. Adding new water, when needed can be done manually (by use of a hand valve in the water supply line). This requires regular attention to the system's needs. An automatic fill valve accomplishes this without attention. It is installed in the supply line on hot water boilers only. The valve operates through water pressure differentials. It does not require an electrical connection.

## Drain Valve

This manual valve provides a means of draining all water from the boiler and system. It is often installed in the 3/4" tapping at the bottom of the end boiler section. Or it can be installed in a tee where the return line enters the boiler.

## Circulating Pump

Every forced hot-water system requires a circulating pump. This pump must have the capacity to provide the circulation required by your system. The pump is connected into the return main just ahead of the boiler. It is also wired to the electrical system.

## Vent Damper

This product is an automatic, motorized stack damper that has been developed to increase the efficiency of heating systems by reducing standby losses from the heating apparatus and the conditioned air space. The damper closes the chimney vent when the burner is off and fully opens it when combustion is required.

## Rollout Switch (Flame Rollout Safety Shutoff)

The rollout switch is a temperature-sensitive fuse link device. It is located on the boiler base just outside the fire box. In the event of heat exchanger flueway blockage causing flame to roll out of the fire box, the fuse does not change in appearance when blown. If the rollout switch blows, it must be replaced with an exact replacement. Check heat exchanger flueways for blockage when restoring system to operating condition. DO NOT operate system without a rollout switch.

## Blocked Vent Safety Shutoff

The blocked vent switch is a manual reset disc thermostat with a fixed setpoint (340° F), and normally closed contacts. It is located at the relief opening of the integral draft diverter. In the event of chimney or venting system blockage causing products of combustion to spill out of the relief opening, the blocked vent switch disc heats up and the blocked vent switch contacts open, shutting down the flow

of gas to the main burners by removing power to the gas valve. In the event that the blocked vent switch contacts open, the reset button on the back of the switch will pop up. The blocked vent switch must be reset manually, after the switch has cooled off, by pushing the reset button down. Check the venting system and chimney for blockage when restoring the system to operating condition. **DO NOT** operate the boiler without a blocked vent switch.

## STARTING THE BOILER

### How A Hot-Water System Operates

Your entire heating system (boiler, piping and radiation units) is filled with water. As the water in the boiler is heated, it is pumped from the top of the boiler through the supply main to the radiation units. The cooler water in them flows back through the return main to the boiler. This provides positive and rapid response to the thermostat.

closed. The air bleed screw on the expansion tank drain fitting should be closed. Open the valve in the line from the boiler to the expansion tank. Open the water inlet to your boiler and leave it open. Start with the lowest radiation unit. Open the air vent on this unit. When all the air has escaped and water starts to flow from the vent, close it. Go to the next radiation unit, and repeat this process. Repeat until you have covered every radiation unit in the system (ending up at the highest unit in the system). If your units have automatic vents, this manual venting is unnecessary but it will speed up the proper filling of your system. If your system is a closed expansion tank system, you may leave it open to refill the system automatically as needed. Check the temperature pressure gauge, **NOT** the position of the hand indicating the pressure. This should be between 10 and 15 lbs. any lowering of this movable hand below 10 lbs. will indicate loss of water due to leakage. The automatic fill valve should compensate for this. Instructions are packaged with the valve.



### WARNING

Never run water into a hot empty boiler.

### Filling System With Water

Close the air vents on all radiation units. Open the valves to these units. Make sure the boiler and expansion tank drain cocks are

## WARNING

### FOR YOUR SAFETY READ BEFORE OPERATING

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

1. Some boilers are equipped with an intermittent ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
2. Some boilers are equipped with a continuous pilot and must be manually lighted. (See lighting instructions.)
3. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

### WHAT TO DO IF YOU SMELL GAS

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

## STARTING THE BOILER

### Intermittent Ignition Boiler - VR8204A/VR8304M Gas Valve Operating Instructions

1. **STOP!** Read the **WARNING** on the previous page.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
5. Remove lower front panel.
6. Rotate the gas control knob clockwise to "OFF"
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow the safety information the previous page. If you don't smell gas, go to next step.
8. Rotate the gas control knob counterclockwise to "ON."
9. Replace lower front panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

### To Turn Off Gas To Appliance

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Push in gas control knob slightly and turn clockwise to "OFF" Do not force.

### Continuous Pilot Boiler - VR8200A/VR8300A Gas Valve Operating Instructions

1. **STOP!** Read the **WARNING** on the previous page.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. Remove lower front panel.
5. Rotate the gas control knob clockwise to "OFF"
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow the safety information the previous page. If you don't smell gas, go to next step.
7. Find pilot - follow metal tube from gas control. The pilot is between two burner tubes as shown in **Fig. 18**.
8. Turn knob on gas control counterclockwise to "PILOT"
9. Push down and hold the red reset button while you light pilot burner with a match. Do not release reset button.
10. After about one minute, release reset button. Pilot should remain lit. If it goes out, turn gas control knob clockwise to OFF. To relight, repeat steps 5-9.
  - If button does not pop up when released, stop and immediately call your service technician or gas supplier.
  - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
11. After pilot remains lit when red reset button is released, turn gas control knob counterclockwise to "ON."
12. Replace lower front panel.
13. Turn on all electric power to the appliance.
14. Set thermostat to desired setting.

Figure 17- Automatic Gas Valve

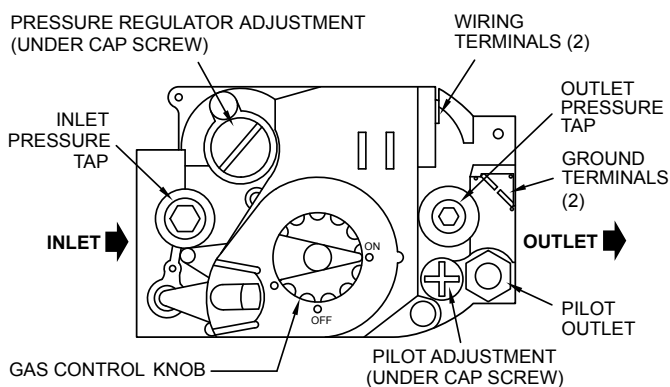
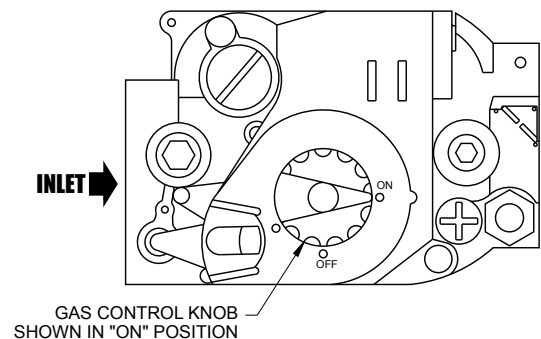


Figure 18 - Manual Gas Valve



## INITIAL OPERATIONAL BOILER TEST CHECK-OUT PROCEDURE

Cast Iron Gas-Fired Cast Iron Boilers

Check off each step as completed.

- o Verify base insulation is securely fastened to base panels.
- o Verify air purged from hydronic heating system.
- o Purge air from gas piping; check gas piping for leaks.
- o Verify proper orifices have been installed.
- o Follow Lighting Instructions in Installation, Operation and Maintenance Manual furnished with boiler.
- o Visually check the main burner flame and verify it has a well defined inner blue mantel with a lighter blue outer mantel.
- o Inspect vent system to verify it is functional, unobstructed, and not leaking.
- o Test the temperature limit control: With burner operating, adjust indicator on limit control below actual boiler water temperature. Verify burners turn off. Verify the circulator continues to operate. Adjust the indicator on limit control above actual boiler water temperature and verify burners reignite.
- o Test any additional field-installed controls. If boiler has a low water cut-off or additional high limit, test for operation as outlined by the controls manufacturer. Burners should be operating and should go off when controls are tested. When controls are reset, burners should reignite.
- o Test safety control circuit: With main burner operating, disconnect the ignition cable from the intermittent pilot control box. Verify that the main gas control closes, shutting off the gas to the main burner. After verifying safety control circuit, turn off electric power and reconnect ignition cable. Once ignition cable securely reset to intermittent pilot control box, turn electric power on.
- o For multiple heating system zones, balance flow through each zone so that it is about equal per zone.
- o Verify several operating cycles of proper operation.
- o Measure Gas Input:

### **Natural Gas Procedure**

- o Operate boiler for 10 minutes.
- o Turn off all other gas appliances piped with the boiler.
- o At the gas meter, measure the cubic feet of gas used in 10 seconds (CF10).
- o Calculate input:  $BTU_h = CF10 \times 360,000$
- o Verify the  $BTU_h$  is approximate to the input rating on the boiler rating plate.

### **LP Gas Procedure**

- o LP gas input rate is determined by measuring gases produced during combustion. Refer to Boiler Manual for combustion guidelines and corresponding  $BTU_h$  input
- o Verify the  $BTU_h$  is approximate to the input rating on the boiler rating plate.
- o Record the  $BTU_h$  input on the OPERATIONAL BOILER TEST CERTIFICATE & SIGNED RECEIPT form.
- o Set operating control (thermostat(s)) to the desired design requirement.
- o Forward boiler manuals, instructions, wiring diagrams, piping diagrams, and supporting information shipped with this boiler to owner and/or maintenance personnel.
- o Complete and sign the INITIAL OPERATIONAL BOILER TEST CERTIFICATE & SIGNED RECEIPT form.

# INITIAL OPERATIONAL BOILER TEST CHECK-OUT CERTIFICATE & SIGNED RECEIPT

Boiler Manufacturer: \_\_\_\_\_

Boiler Identification: \_\_\_\_\_

Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

Measured BTUh input: \_\_\_\_\_ Operational Test Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

- Installation Instructions in the Installation, Operation and Maintenance Manual have been followed.
- Initial Operational Boiler Test Check-Out Procedure has been performed.
- Information on this form is certified to be correct.
- All boiler instructions, wiring diagrams, piping diagrams, and supporting information shipped with this boiler forwarded to owner/maintenance personnel.

Installation Location: \_\_\_\_\_

Customer Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Installer Information

Company/Contractor: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone #: \_\_\_\_\_

Installer's Signature \_\_\_\_\_ Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Installer's Printed Name: \_\_\_\_\_



## Automatic Gas Valve

The Automatic Gas Valve opens or closes according to the heat requirements of the thermostat and temperature limit control. It closes if the pilot goes out. Each individual control must be operating correctly before any gas can pass to the burners. Any one control can hold the gas supply from burner regardless of the demand of any other control.

## Safety Pilot

Safety Pilot prevents the flow of gas to burner if the pilot goes out, or will not ignite.

## Gas Valve Safety Shutdown Test

1. For boilers equipped with continuous pilot, with main burners firing, disconnect the thermocouple from the gas valve. The gas valve should immediately shut off the main burners and the pilot.
2. For boilers equipped with intermittent ignition, with main burners firing, disconnect the ignition cable from the intermittent pilot control box. The gas valve should shut off the main burners.

TURN OFF ELECTRIC POWER to boiler before reconnecting ignition cable, to prevent electric shock.

## Relight

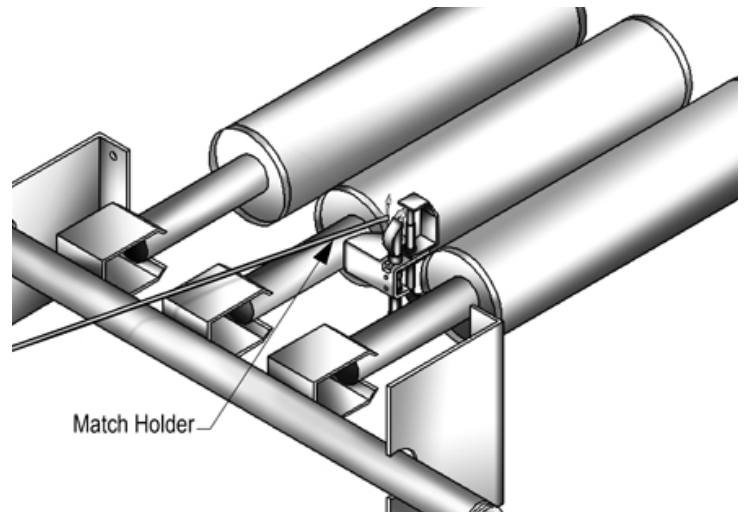
The electric and gas shall be off for 5 minutes before relighting.

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 ANSI Z21.13 - latest revision.

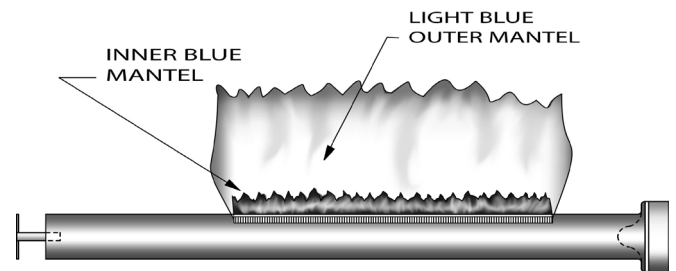
## Thermostat

Keep it set at a desired room temperature. If windows are to be opened or heat is not needed, move thermostat pointer to a lower setting.

**Figure 19- Lighting the Pilot**



**Figure 20- Burner Flame**



## NOTICE

In the event of failure of any component, the system will not operate or will go into safety lockout. The system is completely self-checking. On every call for heat, each component must be functioning properly to permit operation. On safety lockout the system has to be reset by turning the thermostat to the lowest setting for one minute, then back to the normal setting.

## CHECKING AND ADJUSTING

### Adjust Pilot Burner

Pilot flame should surround  $3/8''$  to  $1/2''$  of the pilot sensor, (**Refer to Fig. 21**). If flame needs adjusting, do it as follows:

1. Remove screw cover over pilot adjusting screw on gas valve.
2. Insert small screwdriver and adjust flame as needed. Turn screw counterclockwise to increase flame, clockwise to decrease.
3. Replace screw cover over pilot adjusting screw.

### Main Burner(S)

The main burners do not require primary air adjustment and are not equipped with primary air shutters. Main burner flames should form sharp blue inner cones in a softer blue outer mantel, with no yellow (**Refer to Figure 20**). Puffs of air from blowing on the flame or stamping on the floor will cause the flames to turn orange momentarily. This is not unusual. Remain still when observing the main burner flames. If the flame appearance is not correct, check main burner orifices and the burner throat and flame ports for dust and lint obstruction. It may be necessary to remove the rollout shield to observe the main burner flames. Replace rollout shield after observation.

### Adjust Limit Controls

Instructions for each control are included with the controls. These settings can be changed after you have had some idea how the system works. Example: If your system does not give quite enough heat in very cold weather, you can raise the limit setting to  $220^{\circ}$  F Use the

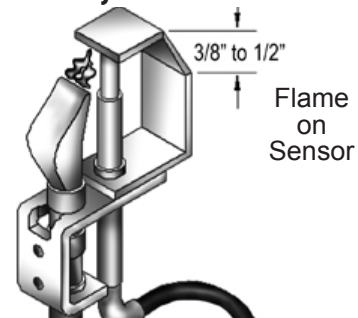
boiler gauge to check your settings. Make the adjustments according to its readings.

Check thermostat operation. When set above temperature indicated on the thermometer, boiler should ignite. Make certain the thermostat turns off the boiler when room temperature reaches the selected setting and starts the boiler operating when room temperature falls a few degrees.

After setting limit control to limit setting, check to see if it shuts off the gas supply to the burners. Turn your thermostat up to call for heat and let your boiler run until the temperature of the water reaches the limit setting. The gas valve should shut off and the circulator keep running until the thermostat is satisfied, or the water cools enough to restart the burners through the limit control.

Finally, set the thermostat for the desired temperature. Special conditions in your home and the location of the thermostat will govern this setting.

**Figure 21 - Pilot Flame Adjustment**



## MAINTAINING YOUR BOILER

### Burners

A visual check of the pilot end main burner flames should be made at least once each year, preferably at the beginning of the heating season.

### Relief Valve

This valve should open automatically if the system pressure exceeds the pressure rating (usually 30 psi) of the relief valve. Should it ever fail to open under this condition, shut down your system. Drain the system until system pressure is reduced below the relief valve pressure rating. If valve discharge occurs, or if valve fails to open as described above, contact an authorized contractor or qualified service technician to replace the relief valve and inspect the heating system to determine the cause, as this may indicate an equipment malfunction.

This valve should be tested every month during periods of boiler operation, and at the beginning and end of any extended non-service period. Prior to testing, make certain discharge pipe is properly connected to valve outlet and arranged so as to contain and safely dispose of boiler discharge. Test at

normal system operating pressure. Hold the trip lever fully open for at least five seconds in order to flush free any sediment that may lodge on the valve seat. Then permit the valve to snap shut.

### Expansion Tank

As previously noted, this tank may become waterlogged, or may receive an excess of air. Frequent automatic opening of the relief valve indicates water logging. A high boiler temperature accompanied by unusually low radiation unit temperature (and "knocking") indicates excess air in tank.

To correct either condition, close the valve between the boiler and the tank. Drain the tank until it is empty. Check all the tank plugs and fittings. Tighten as necessary. Open the valve between the boiler and tank. Water will rise to the normal height in the tank if you have an automatic fill valve (otherwise, manually refill the system).

### Boiler Flue Passages

Under normal operating conditions, with the burners properly adjusted, it should not be necessary to clean the boiler flue gas passages. However, to as-

## MAINTAINING YOUR BOILER

sure trouble-free operation, we recommend that you have the flue passages, burner adjustment, and operation of the controls checked once each year by a competent Service Technician.

Before the start of each season (or whenever system has been shut down for some time) recheck the whole system for leaks and recheck the boiler and vent pipe for leaks. Replace or patch any boiler seals that are faulty.

### Vent Pipe

The venting of this unit is very important and the piping should be checked at least once a season. If the vent piping shows any sign of leaking, replace it immediately.

### Water System

If system is to remain out of service during freezing weather, always drain it completely (water left in to freeze will crack the pipes and/or boiler).

### Cleaning Your Boiler And Burners

Flue passages between sections should be examined yearly and cleaned if necessary. To clean, remove burners, pilot, and vent pipe, Remove top and front jacket panels. Remove the two screws attaching the intermediate front panel to the left and right side jacket panels. Remove the draft diverter and intermediate front panel as a unit. Carefully remove the cerafelt gasket strips. Clean passageways between sections with a flexible handle wire brush.

Remove dirt from bottom of boiler and from between sections by vacuuming. Make sure all flame ports in burners are open and clear. Shake out or blow out all loose dirt in burners. Reseal seams between adjacent sections as necessary with 400° F RTV silicone sealant. Reassemble all parts. Be sure to check tightness of pilot connections and condition of burner flames after reassembly (**see Figures 20 and 21**). Be sure vent pipe connections to chimney are secure and no obstructions are present.

## SEQUENCE OF OPERATION

The Boiler uses an electronic control to maintain water temperature and to monitor the critical water level. There are four (4) LED indicators that will display the mode of operation of the unit.

LOW WATER	RED	Low water condition
TSTAT	GREEN	Thermostat call for heat
HIGH LIMIT	YELLOW	Water temperature at high limit
ACTIVE	GREEN	Active, power to unit is on

There are four adjustable settings on the control. These can be adjusted using a small screw driver or by turning the adjusting post. When power is applied to the unit all LED's will illuminate for a brief moment. The Active LED will remain lit indicating that the control is powered and that the temperature function is active. The display will then cycle through the settings of the control.

CONTROL SETTINGS		
Setting	Range (°F)	Factory setting
HIGH TEMPERATURE LIMIT (HL)	130°-220°	180°
HIGH TEMPERATURE DIFFERENTIAL (H df)	10°-30°	10°
LOW TEMPERATURE DIFFERENTIAL (LL)	10°-30°	10°
LOW TEMPERATURE LIMIT (L df)	OFF or 110°-200°	OFF

### PWXL with Electronic Ignition

Upon a call for heat the room thermostat will close the Green Thermostat LED will illuminate. Power will be applied to the pump circuit enabling the flow of water to the heating space. The automatic vent damper will then begin to open. When the vent damper is completely open the ignition module will start the ignition sequence.

At the start of the ignition sequence the pilot valve will open and the spark controller will light the pilot burner. Upon a successful proven pilot light the main gas valve will open allowing the main burners to light. The burners will continue to fire until the call for heat is satisfied and the thermostat opens or the water temperature in the boiler reaches the High Temperature Limit setting.

When the water temperature reaches the High Temperature Limit setting, while the thermostat is not satisfied, the Yellow LED will illuminate and the circulator pump circuit will remain energized. The gas valve will close, shutting off the main burners. While the thermostat is calling, if the water temperature falls below the High Temperature Limit setting (minus) the High Temperature differential setting, the ignition sequence will start again to maintain the boiler water temperature.

If the Low Temperature Limit is active (not set to OFF) the control will maintain a minimum water temperature allowing for warm start operation enabling the boiler to readily satisfy the heat load.

While the thermostat is NOT calling, the control will allow the burner to fire until the boiler water temperature reaches the Low Temperature Limit setting (minus the Low Limit Differential).

## SEQUENCE OF OPERATION

### CAUTION



Do not set the Low Temperature Limit setting above the High Temperature Limit setting. For example if the High Temperature Limit is set at 190° F with the High Temperature Differential at 20° F then the Low Temperature Limit needs to be set at 170° F or lower. If the settings are overlapped then the control will not operate properly and the burner will switch off at the lower setting.

the control will close the main gas valve within three seconds, shutting off the main burners. The **RED** LED will illuminate indication a low water condition. Once the water level has been restored the **RED** LED will go dark and the control will resume normal operation.

### PWXL with Standing Pilot

Units with a standing pilot do not use an ignition module or a separate pilot valve. Upon a call for heat the control will open the main gas valve and the standing pilot will then light the main burners.

### Low Water Condition

If the water level in the boiler falls below the level of the sensing well,

## TROUBLESHOOTING

### Initial Service Checks

1. Before troubleshooting:
  - A. Make sure that circuit breaker is on or fuse is ok at electrical panel.
  - B. Make sure that service switch is on.
  - C. Make sure that gas is on at the gas meter, and that all appropriate manual shutoff valves and gas control valve are open.
  - D. Make sure that the thermostat is calling for heat.
  - E. Check that wire connectors at the Temperature Limit Control and Transformer are securely plugged in or connected.
2. Troubleshooting tools:
  - A. Voltmeter to check 120Vac and 24Vac.
  - B. Continuity tester.
  - C. U-tube manometer or differential pressure gauge with 0-14" range (0.1" Scale) for measuring inlet and manifold gas pressures.
3. What is the system status?
  - A. For troubleshooting information refer to Hydrolevel Hydrostat Model 3100 ECR Temperature Limit Control Instructions.

## HYDROLEVEL HYDROSTAT MODEL 3100

### Hydrolevel Model 3100 ECR Temperature Limit Control Instructions and Troubleshooting :

*SEE HYDROLEVEL INSTRUCTIONS AND TROUBLESHOOTING GUIDE SUPPLIED IN LITERATURE PACKAGE*

*RECEIVED WITH YOUR BOILER*

## SERVICE HINTS

You may avoid inconvenience and service calls by checking these points before you call for service.

<b>IF YOUR SYSTEM IS NOT HEATING OR NOT GIVING ENOUGH HEAT . . .</b>	
Possible Cause	What to do
Thermostat is not set correctly	Reset thermostat above room temperature
Burner is not operating properly	Check flame. If it is yellow, the burner is not getting enough air. Or, if flame is blue and noisy and seems to lift off the burner, the burner is getting too much air. Contact your service technician.
No electric power to boiler	Check over current protection. Check to be sure electric power supply circuit is "ON".
Controls out of adjustment	Reset according to instructions.
Radiators not heating	Open radiator vents to excess air. Check flow control valve (if used). It may be in closed position.
Circulating pump not running	Check over current protection. Check relay operation
Poor electrical contact	Check all control terminals and wire joints.
Rollout switch blown	Have your service technician check heat exchanged for blockage. Replace rollout switch with exact replacement.
Spill switch blown	Have your service technician check venting system and chimney for blockage, or down draft condition. Reset spill switch.
Vent damper not operating	Consult troubleshooting guide in Effikal manual, packaged with vent damper.
<b>If Burner is Noisy...</b>	
Gas input amount is incorrect	Contact your service Technician.
<b>Relief Valve is Leaking...</b>	
Dirt on valve Seat	Open valve manually. Allow water to run and clear valve seat.
Water-logged expansion tank	Drain tank, see instructions.

### WARNING

#### WHAT TO DO IF YOU SMELL GAS



- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.





