

PurePro®



CAST IRON BOILERS

PC6230-PC12590

INSTALLATION AND OPERATOR'S MANUAL
Keep these instructions with the boiler at all times for
future reference

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Be Aware of Hazard Definitions

Danger: Denotes presence of a hazard which, if ignored, will result in severe personal injury, death or property damage

Warning: Denotes presence of a hazard which, if ignored, could result in severe personal injury, death or substantial property damage.

Caution: Denotes the presence of a hazard which, if ignored, could result in minor personal injury or property damage

Notice: Intended to bring attention to information, but not related to personal injury or property damage.

Warning: This equipment must be installed, adjusted, serviced and started only by a qualified service agency – an individual or agency, licensed and experienced with all codes and ordinances, and who is responsible for the installation and adjustment of the equipment. All aspects of the installation must conform to the authority having jurisdiction, or in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or to the installation of Oil Burning Equipment, NFPA 31.

Read all instructions before proceeding. Follow all instructions completely. Failure to follow these instructions could result in equipment malfunction causing severe personal injury, death or substantial property damage.

Do not alter this boiler in any way. The manufacturer will not be liable for any damage resulting from changes made in the field to the boiler or its components or from improper installation. Failure to comply could result in severe personal injury, death, or substantial property damage.

Your oil fired boiler is designed to burn natural gas, LP gas, No. 1 or No. 2 heating oil only. Never use gasoline or a mixture of gasoline and oil.

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

The area around the boiler should be kept free and clear of combustible materials.

Never burn garbage or refuse in your boiler.

Never try to ignite oil by tossing burning papers or other material into your boiler.

Do not attempt to start the burner when excess oil vapors or gas has accumulated in the boiler.

Do not operate boiler if the heat exchanger is damaged.

Do not jumper, attempt to bypass, or override any of the safety limit controls.

Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and replace any part of the boiler, control system or burner that has been under water.

All installations must conform to the requirements of the authority having jurisdiction. Such applicable requirements take precedence over the general instructions of this manual.

Where required by the authority having jurisdiction, the installation must conform to the American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

Warning: Any Appliance that burns natural gas, propane gas or fuel oil is capable of producing carbon monoxide (CO). Carbon monoxide (CO) is a gas which is odorless, tasteless and colorless but is very toxic.

If your boiler is not vented properly or is not working properly, dangerous levels of CO may accumulate. CO is lighter than air and may travel throughout the building. Brief exposure to high levels of CO or prolonged exposure to lesser amounts of CO may result in carbon monoxide poisoning.

Exposure can be fatal and exposure to high concentrations may result in the sudden onset of symptoms including unconsciousness.

Symptoms of CO poisoning include the following:

Dizziness	Vision Problems	Shortness of Breath
Headaches	Loss of Muscle Control	Unclear Thinking
Nausea	Weakness	Unconsciousness

The symptoms of CO poisoning are often confused with influenza, and the highest incidence of poisoning occurs at the heating season which is during flu season. A victim may not experience all of the listed symptoms. Suspect the presence of CO if the symptoms tend to disappear when you leave your home.

The following sign may indicate the presence of carbon monoxide:

- Hot gasses from the appliance, venting system or chimney escaping into the living area.
- Flames coming out around the appliance.
- Yellow colored flames in the appliance when burning gas.
- Stale or smelly air.
- The presence of soot or carbon in or around the boiler.
- High unexplained humidity inside the building.

If any of these symptoms of CO poisoning occur, or if any of the signs of carbon monoxide are present, leave the premises immediately and contact a qualified service company, the gas company or the fire department.

To reduce the risk of CO poisoning have your heating system, vent system and chimney inspected and serviced before each heating season

Warning If You Smell Gas:

- Close the Gas shut-off valve
- If you hear gas leaking evacuate the affected area immediately
- Open all Windows
- Do not operate any electrical switches or equipment such as phones, power plugs and doorbells
- Extinguish all open flames
- Do smoke
- Do not use lighters
- Warn all occupants of the building, but do not use door bells
- Call your gas utility company and your local heating contractor from outside the building and notify police and fire department

Notice: Concealed Damage - If you discover damage to the burner, boiler or controls during unpacking, notify the carrier at once and file the appropriate claim. When calling or writing about the boiler please have the following information available: the boiler model number and serial number which is located on the upper left front of the unit. Record the model and serial number for future reference in the space provided in this manual.

Table of Contents

Ratings and Data_____	6
Clearances_____	7
Ventilation and Combustion Air_____	7
Boiler Block Assembly _____	8
Boiler Trim Piping_____	11
System Piping_____	12
Jacket Installation_____	12
Venting_____	18
Burner Installation_____	20
Fuel Piping_____	21
Wiring_____	21
Operation_____	23
Burner Settings_____	24
Maintenance _____	25
Warranty_____	27
Installation and Service Check List_____	28

Boiler Components

INSPECT FOR DAMAGE. All equipment is carefully manufactured, inspected, and packaged by experienced workers. Our responsibility ceases upon delivery of the skidded boiler and component boxes to the carrier in good condition. ANY CLAIMS FOR DAMAGE OR SHORTAGES IN SHIPMENT MUST BE FILED IMMEDIATELY against the carrier by the consignee.

The boiler is shipped in multiple packages consisting of the following items:

1. Assembled casting or knocked down casting strapped to a skid.
2. Jacket Carton. See jacket assembly instructions for a complete listing of all items included.
3. Burner/Parts Box – Includes burner, hydrostat, safety relief valve, drain valve and associated trim piping.
- 4.

Installation Clearances

Warning: Boilers in rooms shall be installed with the clearances from combustible materials not less than indicated below. Combustible materials are those made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flame proofed or not, or whether plastered or not.

The boiler must not be installed on combustible flooring. The boiler is approved for installation on non combustible flooring only. The boiler must not be installed on carpeting or vinyl flooring

Minimum clearances to combustible construction are as follows:

TOP - 24 IN.
FRONT - 24 IN.
FLUE CONNECTOR SINGLE WALL VENT PIPING - 18 IN.
REAR - 6 IN.
SIDES - 6 IN.

Consult NFPA-31 for construction techniques where the above minimum clearances cannot be obtained

Minimum recommended clearances for service and access are as follows:

TOP - 24 IN.
FRONT - 24 IN. FROM BURNER
FLUE CONNECTOR - 18 IN.
REAR - 18 IN.
SIDES - 12 IN.

Ventilation and Combustion Air

Warning: This boiler must be supplied with combustion and ventilation air in accordance with ANSI Z223.1/NFPA54 and all applicable local codes. Air openings to combustion area must not be obstructed. Adequate combustion air must be supplied at all times. Ventilation of boiler room must be adequate enough to provide sufficient air for combustion. Never use an exhaust fan in the boiler room. The boiler room must never be under a negative pressure or improper burner operation, flue gas leakage and carbon monoxide emissions may occur.

Opening sizes must comply with state or local codes. In their absence, use the following when the boiler is installed in a confined room:

When a boiler is located in an unconfined space in a building of conventional frame or masonry construction infiltration may provide adequate air for combustion and ventilation. If there is any doubt, install air supply provisions for combustion and ventilation air.

When a boiler is located in a confined space and air for combustion and room ventilation is from inside buildings, the confined space shall be provided with two permanent openings, one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. Each opening shall have a minimum free area of 1 square inch per one thousand (1,000) BTU/HR of the total input rating of all appliances in the enclosed space, but must not be less than one hundred (100) square inches. These openings must freely communicate with the interior areas having adequate infiltration from the outside.

When a boiler is installed in a confined space, or in a building of unusually tight construction, air for combustion and room ventilation must be obtained from the outdoors by means of two permanent openings one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. When air is taken through the outside wall or vertical ducts, at least one square inch of free opening must be provided per 4000 Btu/Hr. When air is taken through horizontal ducts at least one square inch of free opening must be provided per 2000Bth/Hr. The minimum dimensions of rectangular air ducts shall not be less than 3 inches.

In calculating free area using louvers, grills or screens for the above, consideration shall be given to their blocking effect. Screens used shall not be smaller than $\frac{1}{4}$ inch mesh. If free area through a design of louver or grill is known, it should be used in calculating the opening size required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grills will have 60-75% free area.

Louvers and grills shall be fixed in the open position or interlocked with the boiler so that they are opened automatically during boiler operation.

Boiler Location

Warning: Never install the boiler on top of combustible flooring. Never install the boiler in an area where combustible materials, gasoline or any other products containing flammable vapors or liquids are stored.

Locate the boiler in an area that provides good access to the unit. To provide the best possible serviceability the boiler should be installed using the minimum recommended service and accessibility clearances as previously listed. Under no circumstances should the unit be installed next to combustible materials with clearances less than listed in installation clearances above.

The boiler should be installed on a level, flat concrete floor or pad that is structurally sound and will support the combined weight of the boiler when filled with water. This boiler is designed to be installed on noncombustible flooring only.

The boiler should be installed as close to the chimney as possible while still being located centrally to the piping system.

Boiler Block Assembly

Warning: Secure boiler sections during assembly to prevent them from tipping over.

Unassembled blocks are provided as a complete kit. The kit contains the following items:

- | | |
|-----------------------------------|--|
| (1) Rear Section | (12) Stud 12mm x 68mm Supply/Return Flange |
| (1) Cleanout Door | (2) Door Hinge with Lock Nuts |
| (1) Front Section | (2) Burner Door Studs 12mm x 118mm |
| Intermediate Sections as required | (22) Washers 12mm |
| (2) Supply/Return flanges | (28) Nuts 12mm |
| (2) Supply/Return flange gaskets | (2) Cast iron Baffles |
| (1) Lower Front Bushing | Tubes Mastic Sealant Sections |
| (1) Upper Front Bushing | (1) Pipe dope sealant mixture for push nipples |
| (2) Bushing gaskets | |

To assemble the boiler body you will need two clamping units, pry bar and a plastic or wooden mallet. Assemble the blocks as follows:

1. Place the rear boiler element vertical. Clean and inspect the twin-taper nipple seats and the connection surface. Figure 1.
2. Grease the twin-taper nipples and their seats with pipe thread sealant/linseed oil mixture provided.
3. Insert the twin-taper nipples into the upper and lower seats and hit them lightly with the mallet to seat them in place. **The first four bottom twin-taper nipples, starting from the rear element in models with 10-11-12 sections, must be 4-1/8" (104 mm) long with their extension facing towards the front.** Figure 2.
4. Prepare the intermediate element to be added, cleaning its twin-taper seats and checking its connection surfaces.
5. Use the caulking gun to completely fill all of the channels in the rear element with sealant to ensure edge seal between elements. Figure 3.

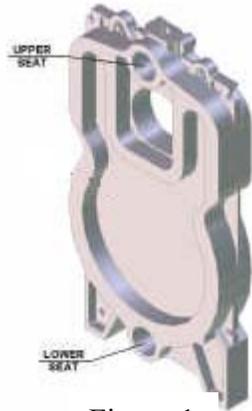


Figure 1

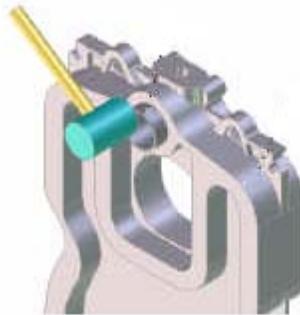


Figure 2



Figure 3

6. Bring the intermediate element to the rear element and place the top twin-taper nipple into the intermediate element. Figure 4.
7. Position the intermediate element until it perfectly centers the lower twin taper nipple, hitting the intermediate element with the mallet.
8. Thread clamp (A) into the hole in the twin-taper nipple and stretch it slightly. Figure 5.
9. Install lower clamp (B) and then join the two parts. **Keep the two faces of the components perfectly parallel when bringing the pieces together. If the section does not remain parallel use pry bar to return to parallel.** Figure 6.



Figure 4

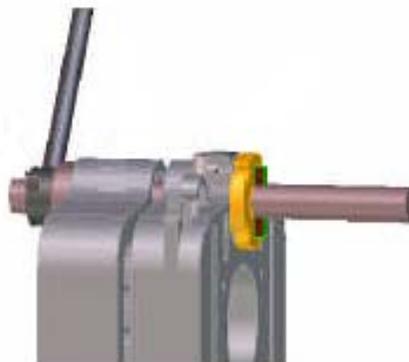


Figure 5



Figure 6

10. Repeat the above procedures until the boiler body is completed. Do not use the tie rods to pull the sections together. The sections must be pulled together through the push nipple ports. Do not remove the assembly tool from the unit until the tie rods are installed.

11. Introduce tie-rods into their seats, placing them as illustrated. The short tie rods are to be installed in the lower positions with the short threaded part towards the front of the boiler. The tie rods in the rear of the boiler will need to be cut so as not to extend more than 2-1/2 inches past the nut so as not to interfere with the jacket installation.
12. Install washers and nuts onto tie-rods from the rear. Clamp the boiler body together, checking and maintaining tie-rod extensions equal. Additional nuts are to be placed on the tie rods for jacket assembly
13. Install lower plug bushing and upper bushing with 1/2" NPT threads using the gaskets provided.
14. Install supply and return flanges using the 12mm x 68mm studs with the shorter tread length into the threaded openings in the casting. Tighten with nuts, washers and gaskets provided.
15. Insert a light into the combustion chamber to check for proper sealant between the sections. If light is visible force sealant with a putty knife from the exterior between the sections.



Figure 7

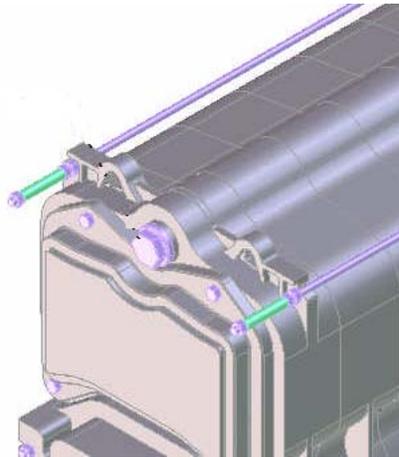


Figure 8

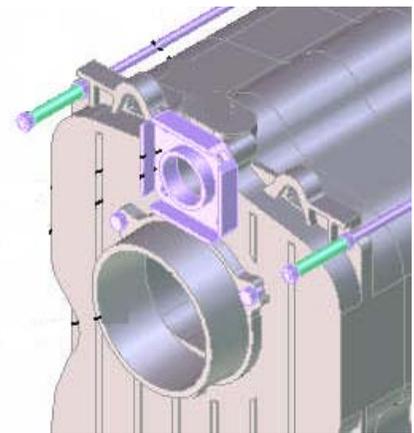


Figure 9

Boilers which were split or field assembled will need to be hydrostatic pressure tested in accordance with Section IV of the ASME Boiler and Pressure Code at a pressure equal to 1-1/2 times the maximum allowable pressure on the boiler nameplate.

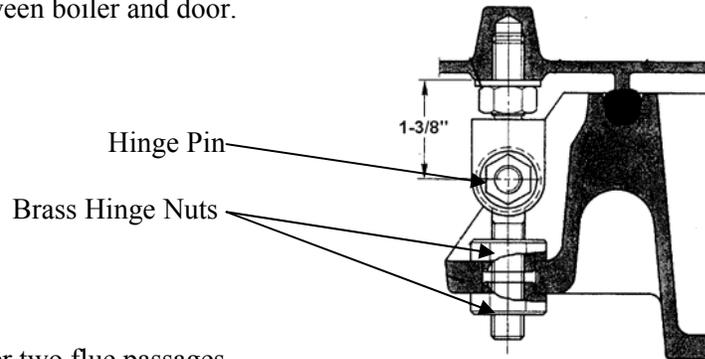
Caution: Do not hydrostatically test the boiler with any controls installed. Damage to controls can occur due to over pressure.

Warning: Do not leave boiler unattended during hydrostatic testing. Cold water fill could expand as it warms causing excessive pressure, resulting in severe injury, death or substantial property damage. Leaks, if found, must be repaired immediately. Failure to do so can damage boiler, resulting in substantial property damage.

Burner Door Assembly

1. Select the direction for the burner door and place the hinges on the appropriate side.
2. Lubricate the threaded stems of the hinges and tighten them into the front section to the dimension indicated. Then lock into position with the nut provided.
3. Place a brass hinge nut on each hinge with the extension facing the door.
4. Place the door over the hinge and use an additional brass hinge nut to lock the door into position
5. Install the 12mm x 118mm studs with the shorter tread length into the threaded openings in the front casting.

6. Tighten the door using the remaining brass hinge nuts provided. Final adjustment of the door on the hinge side is to be made using the brass hinge nuts.
7. Inspect for proper seal between boiler and door.

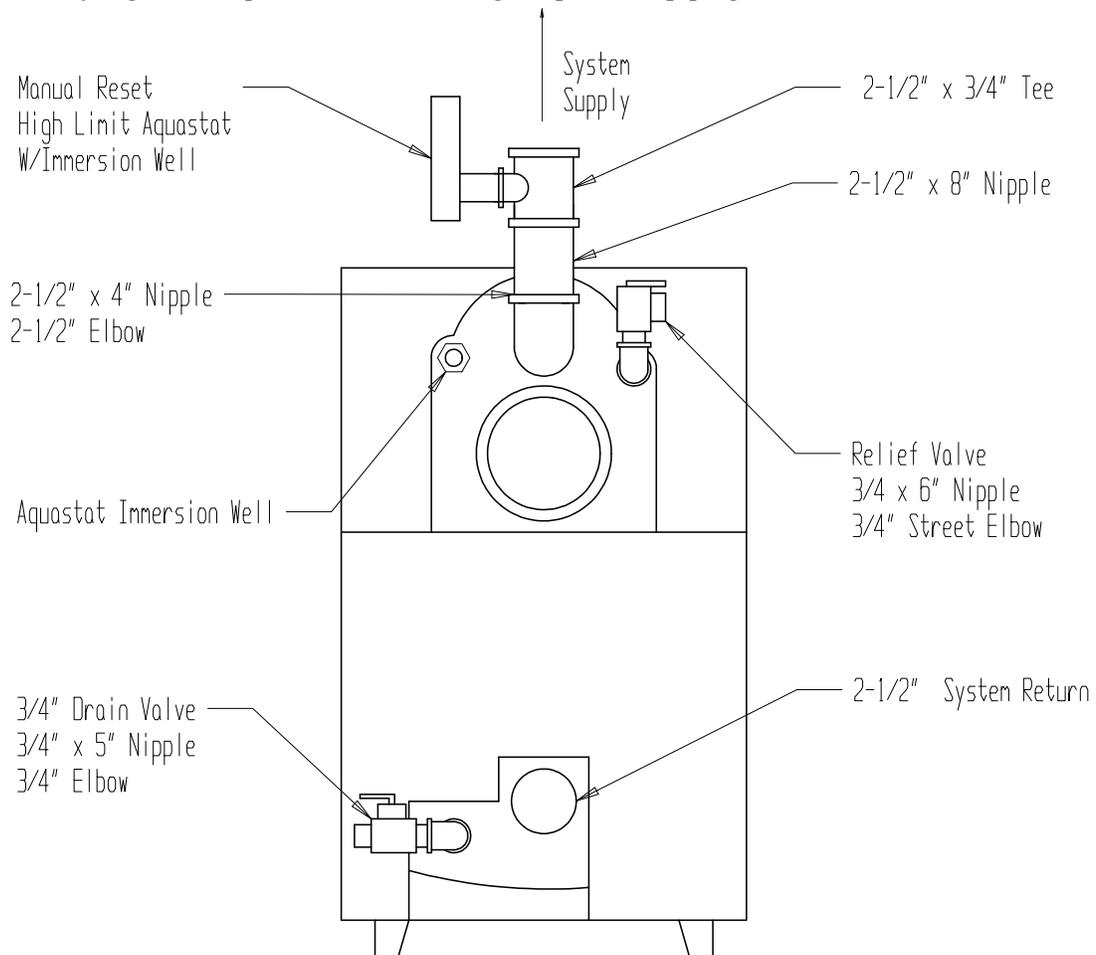


Cleanout Door Assembly

1. Install baffles into the center two flue passages.
2. Install the 12mm x 68mm studs with the shorter thread length into the threaded openings in the casting. Place the cleanout door over the studs and tighten with washers and 12mm nuts provided.

Boiler Trim Piping

1. Install the $\frac{3}{4}$ " Hydrolevel immersion well in upper right side tapping of the rear boiler section. Install the temperature sensor all the way into the well until it hits bottom and fasten in place with the rubber well cap as provided.
2. Pipe in pressure relief valve with $\frac{3}{4}$ " street elbow and with the $\frac{3}{4}$ " x 6" nipple in upper left side of the rear section. Relief valve discharge must be piped to a safe place of discharge.
3. Pipe in boiler drain with $\frac{3}{4}$ " coupling and the $\frac{3}{4}$ " x 6" nipple in the lower left side rear section.
4. Pipe in boiler gauge with $\frac{1}{2}$ " x $\frac{1}{4}$ " reducing bushing in upper front section.
5. Install auxiliary high limit aquastat as shown using the provided piping.



System Piping

Important... INSTALLATION MUST BE PERFORMED BY A TECHNICALLY QUALIFIED SERVICEMEN.

TRIO COMMERCIAL BOILERS HAVE A MAXIMUM OPERATING PRESSURE OF 58PSI

NOTE: If normal operating pressures are greater than 30psi please contact the manufacturer for required trim.

Pipes that are connected to boiler fittings must be supported and placed so that they do not create stresses on the boiler fittings themselves.

The Trio boiler is a highly efficient boiler in which care must be taken to ensure that high volumes of low temperature water are not introduced into the boiler. Operating at return water temperatures below 130°F for extended periods of time will allow for the accumulation of condensation, scale and increased soot formation in the boiler. Corrosion and eventual heat exchanger failure will result.

Low water cut off

A low water cutoff integral to the Hydrolevel 3250 fuel smart hydrostat has been provided with the boiler package. See boiler trim piping for the recommended location. Always follow the manufacturer's recommendations for installation.

Relief Valves

Warning: The discharge of the pressure relief or safety valve must be piped close to the floor to prevent scalding in the event of a discharge. The discharge piping must be sized the same as the valve outlet. Never install any valve between the boiler and the safety valve or in the discharge piping. Failure to comply with this warning can result in an explosion causing property damage, severe personal injury, or death.

Relief valves are to be properly piped in to conform to code standards. Discharge piping from the relief valve must be sufficiently supported so as to avoid strain on the safety valve body.

Discharge piping should terminate 6" above the floor to eliminate damage to the structure or personal injury. It should be piped to a location where it can be inspected for any visible signs of leakage. It must not be piped to a point where freezing may occur.

Jacket Installation

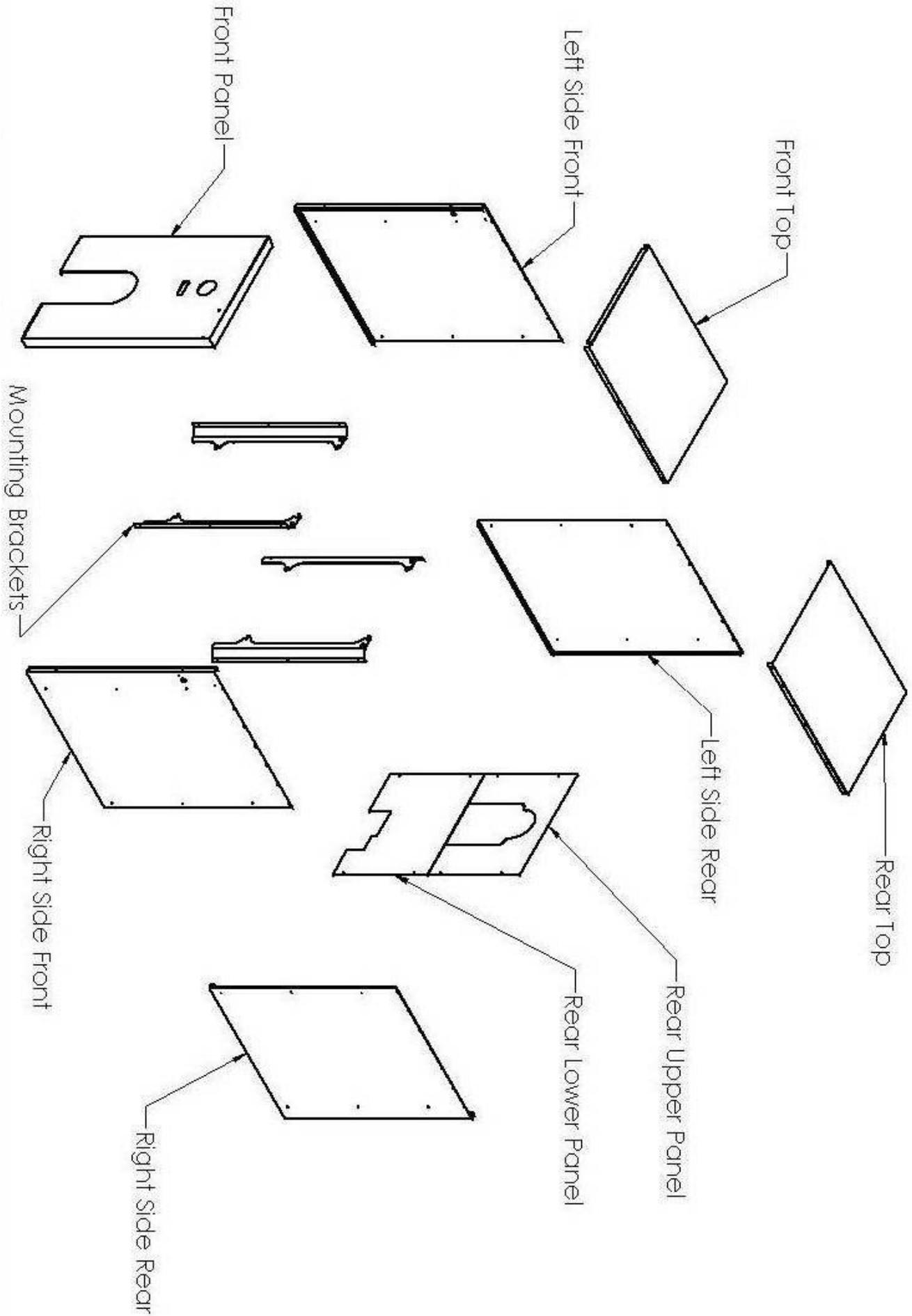
The boiler jacket is designed so that all piping connections can be made before the Jacket is installed.

Jacket Components

- | | |
|-------------------------------|-------------------------------------|
| 2) Mounting Brackets A | (1) Right Front Panel |
| (2) Mounting Brackets B | (1) Right Rear Panel |
| (1) Front Panel | (1) Top Front Panel |
| (1) Upper Rear Panel | (1) Top Rear Panel |
| (1) Lower Rear Panel | (1) Insulation Strip 3" x 48" x 87" |
| (1) Left Front Panel | (1) Insulation Strip 3" x 12" x 87" |
| (1) Left Rear Panel | (1) Insulation Rear Panel |
| (1) Rear Jacket Top Stiffener | (1) Trim Bag |

Trim Bag Components

- | | |
|---|--|
| (10) #8 x 1/2" Hex Washer Head Self Drilling Screws | (3) Lengths Plastic Strapping – 11 Ft. |
| (60) #10 x 3/4" Hex Washer Sheet Metal Screws | (3) Strapping Clips |
| (6) #10 x 5/8" Phillips Flat Head Screws | (6) Feet Foil Tape |
| | (4) SB875-11 Anti Short Bushings |



Mounting Bracket Installation

Attach four jacket mounting brackets to the boiler. Note there are two different jacket brackets which end up on opposite corners facing outward. Slide the slots in the mounting brackets over the boiler tie rods between the two 12 x 1.75 mm nuts located on each end of the tire rods. Tighten the outer nuts to secure the brackets into position. Place two of the SB875-11 anti short bushings into holes in jacket brackets on the same side of the boiler as the aquastat immersion well.

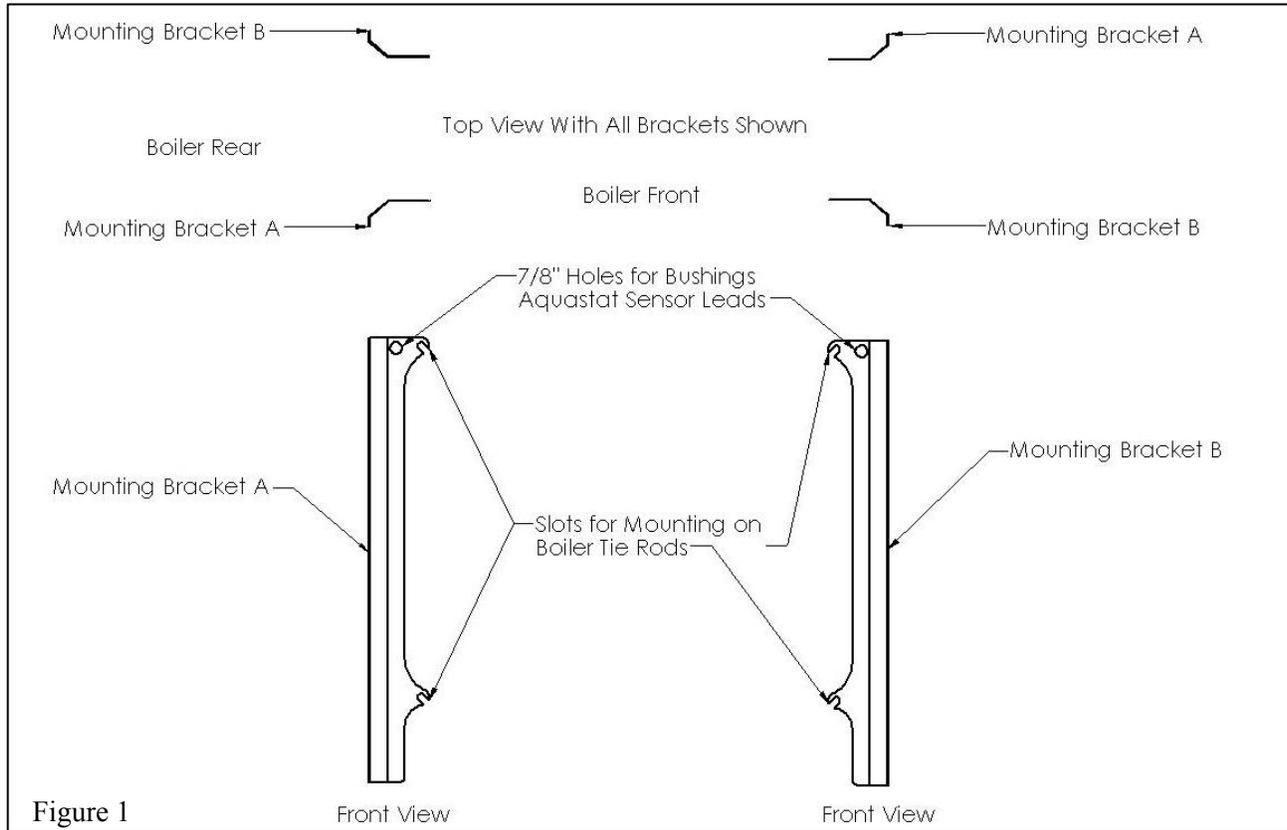


Figure 1

Insulation Installation

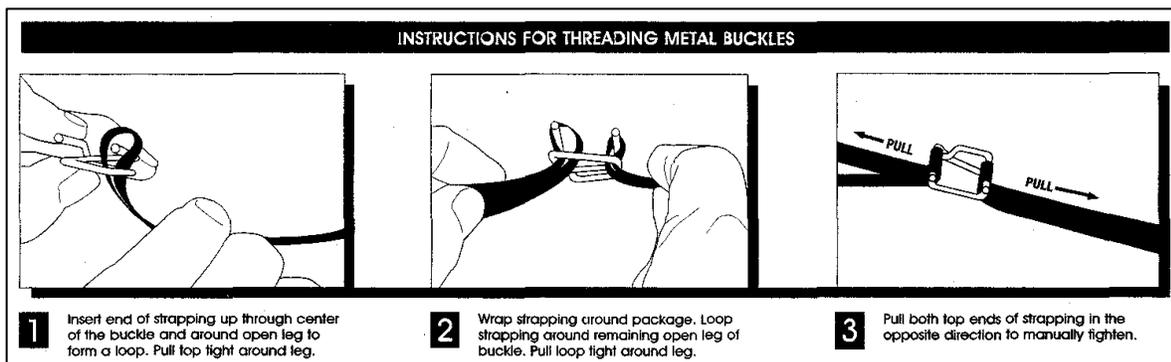
Cut the 3" x 48" x 87" insulation to the appropriate widths as listed below.

- | | |
|-----------------------------|------------------------------|
| 6-Section.....25-1/4" x 87" | 10-Section.....44-1/4" x 87" |
| 7-Section30" x 87" | 11-Section.....36-7/8" x 87" |
| 8-Section.....34-1/4" x 87" | 12-Section.....41-5/8" x 87" |
| 9-Section.....39-1/2" x 87" | |

Tape the 3" x 12" x 87" insulation strip to the 3" x 36 7/8" x 87" piece to make the wrapper for the 11 section boiler or to the 3" x 41 5/8" x 87" piece to make the wrapper for the 12 section boiler using the foil tape.

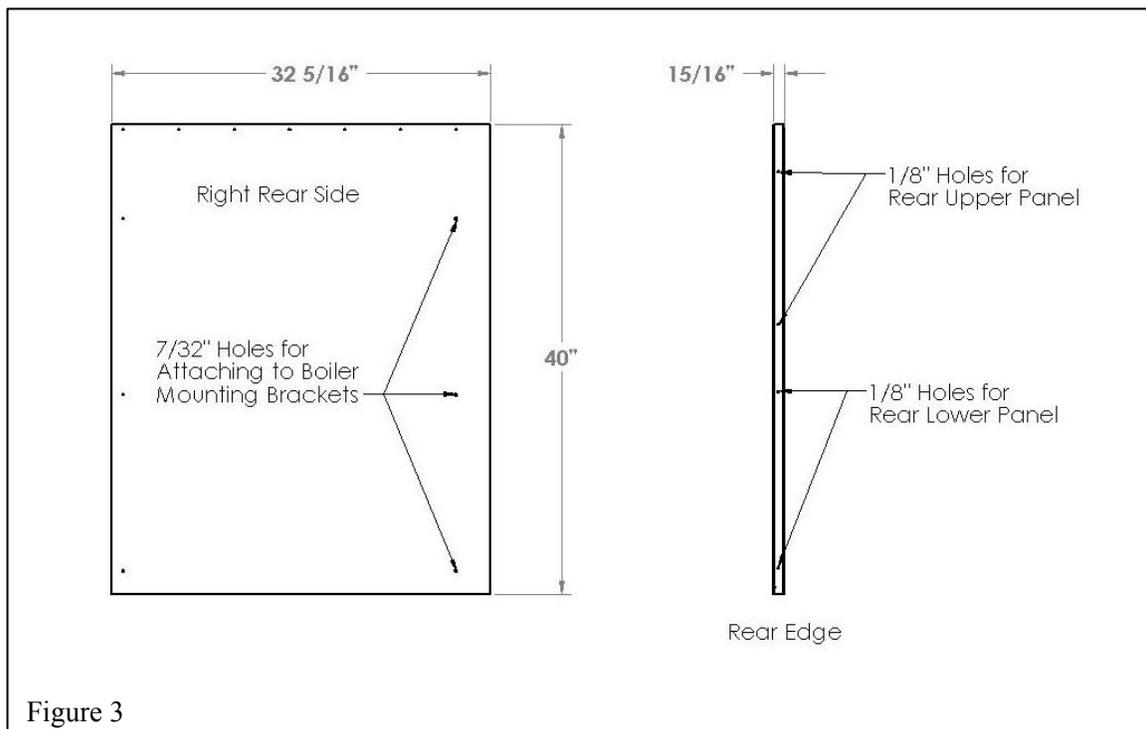
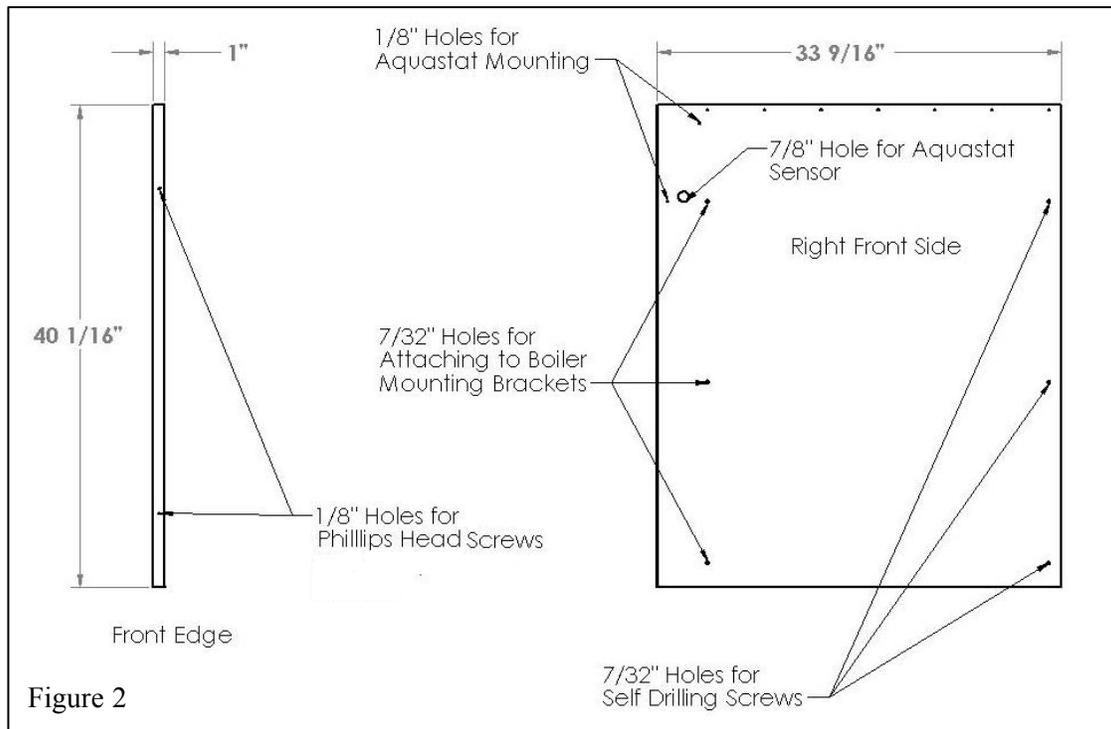
Drape the insulation over the boiler with the foil side facing out.

Fasten the insulation to the boiler using the three supplied plastic straps and buckles.



Assemble Side Panels

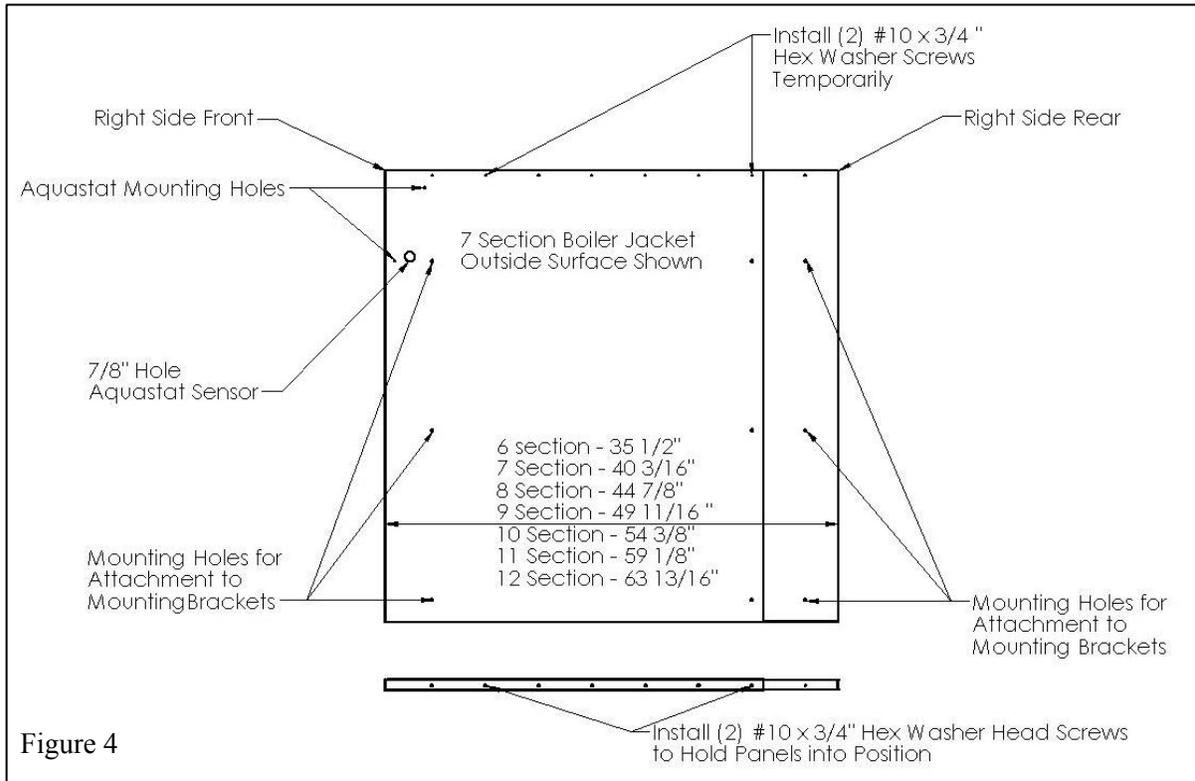
The boiler side panels are designed to telescope to the appropriate length in order to fit any size boiler. See Figure 2 below for front side and Figure 3 for rear side jacket panels.



On a flat surface place the rear side upside down with the bottom channel facing up. Place the bottom channel of the front panel over the channel of the rear panel and adjust the overall length of the side panel as shown in Figure 4 below.

Place two #10 x 3/4" hex washer sheet metal screws into the bottom channel to lock the overall length of the assembled side to the proper length as shown in the figure below.

Install two #10 x 3/4" hex washer sheet metal screws along the top to hold the two halves together temporarily.



Repeat the above procedure for the left side jacket assembly.

Assemble Side Jacket Assemblies to Boiler

Align the six holes as indicated in Figure 4 with those located in the boiler mounting brackets. Fasten the sides to the brackets using six #10 x 3/4" hex washer sheet metal screws.

Install three #8 x 1/2" hex washer head self drilling screws in the holes as indicated in Figure 4 to further attach the sides together.

Remove the two #10 x 3/4" hex washer sheet metal screws which were installed temporarily along the top of the jacket side assemblies.

Install two #10 x 5/8" Phillips flat head screws into the 1/8" holes on the front edge of both the left and right side panel as shown in Figure 2

Rear Jacket Panels

Place rear panel insulation on back section of boiler with the foil facing outward.

Install the lower rear jacket panel to the side panels using four #10 x 3/4" hex washer sheet metal screws. See Figures 3 and 5.

Install the upper rear jacket panel to the side panels using four #10 x 3/4" hex washer sheet metal screws. See Figures 3 and 5.

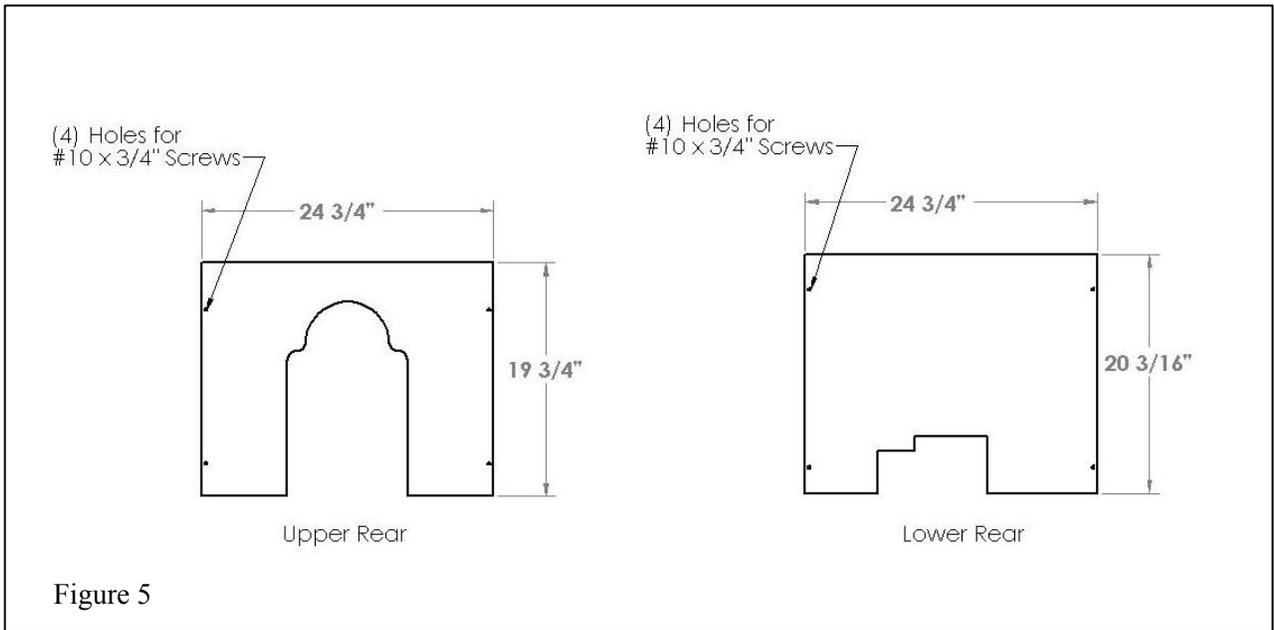


Figure 5

Temperature Sensor Installation

1. Install (2) SB875-11 black anti short bushings into the upper holes in the mounting brackets along the right hand side of the boiler.
2. Install (1) SB875-11 black anti short bushing into the 7/8" hole in the right front jacket panel.
3. Run the sensor through the mounting brackets and the jacket side panel.

Install Top Panels

Install stiffener onto bottom side of rear top panel using double faced tape as per figure 7. Place rear top panel over the side and rear panels. Place the front top panel over the sides. Fasten the top panels using #10 x 3/4" hex washer sheet metal screws starting from the front and rear side and working into the middle. See Figure 6 and Figure 7 for top panel drawings.

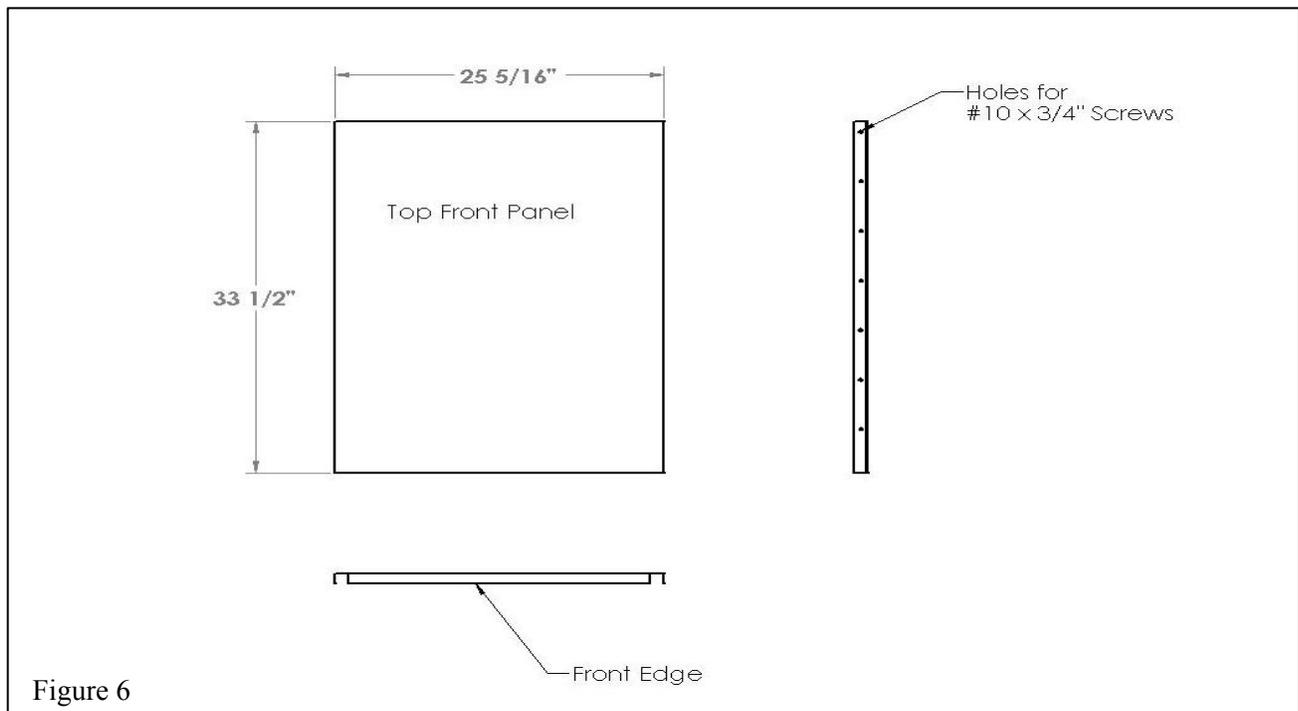


Figure 6

material that will withstand flue gas temperatures up to 1000°F is required.

Masonry and metal chimneys shall be constructed in accordance with applicable building code requirements. Masonry chimneys shall be lined with an approved clay tile liner or a listed chimney lining system installed in accordance with manufacturers' instructions.

Prior to installation of the boiler, the chimney or venting system shall be examined by the installer and determined to be in good condition. All joints of the chimney must be tightly sealed. The inside of the chimney should be free of all obstruction, such as loose brick, broken pieces of tile, or corroded metal. If chimney flues are divided or there are multiple flues within one chimney, make sure there are no openings in the partition separating the divided or individual flues. When a new appliance is connected to an existing chimney, that chimney shall be brought up to current requirements. Chimneys which are relined shall be done so with an approved liner that will resist corrosion, softening, or cracking from the flue gasses.

All chimney clean-out doors and flue connections must fit tightly so they will seal to avoid air leakage.

The inside area of the chimney liner should equal, at a minimum, the area of the vent pipe exiting the furnace. If more than one appliance is installed, the area of both appliances shall be used in determining the required inside area of the chimney.

The flue gas exit of a chimney shall be at least 3 feet above the highest point where it passes through the roof of a building and at least 2 feet higher than any portion of a building within 10 feet of such chimney.

The chimney height will also be determined by the height of the surrounding trees, buildings and terrain. Chimney downdraft conditions cause faulty operation that creates a hazard, corrective steps must be taken.

Chimney Relining

A tile lined masonry chimney serving an oil fired boiler should comply with applicable building codes such as NFPA-211. An additional listed lining may be required to reduce transient low draft during startup and acid water condensation during cyclical operation. This is particularly true for high mass masonry chimneys serving oil fired furnaces of higher efficiency. For masonry chimneys, local experience can indicate how well the construction has withstood the lower temperatures produced by higher efficiency furnaces.

Evidence of potential or existing chimney damage should be determined by visual inspection of the chimney and liner. Exterior indicators such as missing or loose mortar/bricks, white deposits on the brick or water stains on the interior building walls should be investigated further. The operational flue temperatures for boilers range from 350°F to 450°F at the outlet of the boiler. These temperatures are further reduced before reaching the chimney due to heat loss through the vent connector and dilution from the draft regulator. The resulting flue gas temperatures may become low enough to form condensation on the chimney liner walls.

To prevent condensation, it is necessary that the internal chimney wall temperature always be kept above the dew point of the flue gasses. If the chimney is a masonry type, it may have to be lined with a flue liner, if the temperature loss is too great for the boiler. A liner will act as an insulator and reduce the flue gas temperature loss. Insulation may be added around the liner for further temperature stability. Refer to NFPA-31 for recommended liner sizing tables as developed by the Oil Heat Vent Analysis Program.

Chimney Connector

The chimney connector pipe between the boiler and chimney shall be equal in diameter to the flue outlet of the boiler. Refer to boiler specifications in this manual for proper size flue pipe for your model boiler. Any reduction in size required for the chimney must be made at the chimney connector. The vent connector pipe must be made of 24 gauge (or thicker) corrosion-resistant steel. The vent connector pipe should be as short as possible and installed so that it has a continuous rise from the boiler to the chimney. Long horizontal vent runs can result in the possibility of condensation in the flue pipe or the chimney. All horizontal runs of vent connector pipe should be pitched upward a minimum of 1/4 inch per foot of run. The horizontal length of the vent pipe connector shall not exceed 10 feet. The chimney connector shall be installed so as to minimize the number of elbows and to avoid sharp turns or other construction features that would create excessive resistance to the flow of flue gasses. Tees may be used in a straight section in conjunction with a barometric draft regulator; however, they must not be used for a 90° turn. No device that will obstruct the free flow of flue gasses shall be installed in the chimney connector. This does not exclude the use of devices specifically

designed for the use in chimney connectors such as automatic dampers. The vent pipe should be joined with metal screws and supported by straps. A thimble should be used to connect the vent connector pipe to the chimney so the pipe may be readily removed in case of inspection or replacement.

No chimney connector shall pass through any floor or ceiling. The vent connector pipe must not pass through a combustible wall or partition unless they are guarded at the point of passage by a ventilated metal thimble not less than 12 inches larger in diameter than the connector, on metal or fireclay thimbles adequate protection is provided at the passageway. An acceptable passageway could be either an approved, ventilated metal thimble which is at least 12 inches larger in diameter than the vent connector pipe, or brick work which is at least 8 inches thick constructed into the wall and surrounding the vent connector

Clearances from combustible materials shall be in accordance with the clearances given. The vent connector pipe should extend only to (and not beyond) the inside wall of the chimney. A thimble should be used to connect the vent connector pipe to the chimney so that the vent connector pipe may be readily removed in case of inspection or replacement.

Connection to the chimney must be made above the bottom of the chimney to avoid blockage. Vent piping should extend just into the chimney far enough to expel flue gasses. Inserting the vent piping too far into the chimney will cause undue obstruction. Use a thimble or a slip joint where the vent pipe enters the chimney to allow easy removal for cleaning.

If a draft regulator is required in the vent piping, it should be located at least 24 inches from the boiler if possible in either a horizontal or vertical section of the vent pipe. The draft regulator must be installed in the same room as the boiler and in such a manner that there is no difference in pressure between the air in the vicinity to the regulator and the combustion air supply. Ensure that the barometric damper is accessible for adjustment.

With the burner operating, use a draft gauge to adjust the regulator to the proper setting (see instructions enclosed with draft gauge to adjust the regulator to the proper setting). When the burner air supply and draft are properly adjusted, the draft in the flue should be a negative .02" W.C. to negative .04" W.C.

Two or more oil burning appliances each equipped with a safety control may be permitted to be connected to one common chimney if sufficient draft is available for the safe simultaneous removal of all products of combustion.

If two or more openings are provided into one chimney, they shall be at different levels on the same story of the building, with the smaller appliance entering at the highest possible level consistent with clearances to combustible materials.

Two or more connectors shall not be joined together unless the common connector, manifold and chimney are properly sized. Adequate draft must be available to safely remove all products of combustion simultaneously without leakage, or back flow.

Burner Installation

Warning: The burner must be installed and adjusted in accordance with the burner manufacturer's instructions.

Follow the burner manufacturer's installation instructions for proper installation, fuel piping, wiring, burner adjustment and servicing.

The burner is mounted to the door with (4) 8mm studs, nuts and washers (located in the burner trim bag). Thread the (4) studs in to the (4) M8 holes threaded to permit connection to the burner. Thread the shorter length of stud into cast door.

The refractory opening in on the door may need to be trimmed for proper burner insertion. Do not force the burner through the door.

Check that there is a complete seal between the door and the burner flange after installing ceramic fiber seal furnished with the burner.

Note: A high temperature stainless floor liner is provided with Riello oil burners. This should be installed on the floor of the combustion chamber tight to the front section.

Burner Swing Door

Opening the Door

1. Turn off power to boiler. More than one disconnect may be required.
2. Allow boiler to cool down.
3. Lift the front jacket panel up and off the boiler. Disconnect fuel lines as required.
4. Remove the two brass nuts on the right hand side of the door using a 15/16" wrench.
5. Swing open burner door.

Closing the Door

1. Swing burner door as far as possible to the right.
2. Install the brass nuts onto studs making sure the shoulders on the nuts are facing inward.
3. Eliminate any combustion gas leaks by inspecting and replacing door seals and gaskets as required.
4. Tighten the nuts evenly until a complete seal is made. Check to ensure a proper seal between the door and the boiler has been made.
5. Reattach fuel lines as required.

Fuel Piping

Warning: Do not use compression or soldered fittings on oil piping. No safe repair can be made. Failure to comply with this warning can cause severe personal injury, death or substantial property damage can occur.

Warning: Never use an open flame to test for gas leaks. Always use an approved leak detection method. Failure to comply with this warning can cause severe personal injury, death or substantial property damage.

Install all piping in compliance with local, state or national codes and the separate burner manual provided with the burner.

Use only a pipe joint compound which is suitable for the fuel type being used.

Whenever the gas supply piping is pressure tested the burner gas controls must be protected. See burner manual for proper test procedure.

Whenever oil piping is run be sure to use flare fittings only. Do not use compression fittings.

Electrical Wiring

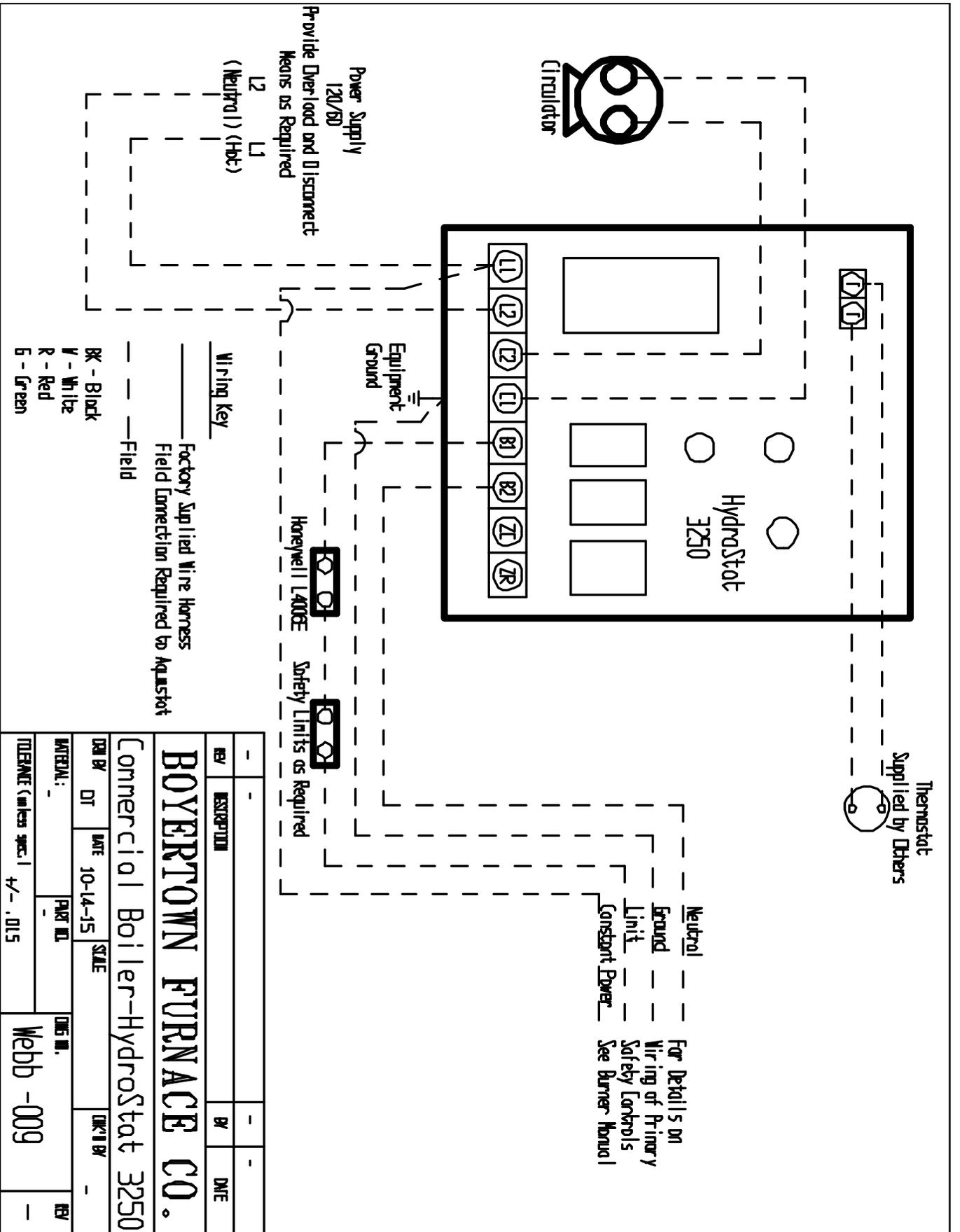
Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation of all safety devices after servicing.

The electrical connections to this boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code ANSI/NFPA – 70. Install a separate circuit properly rated for the boiler. A shut off switch should be located at the boiler.

The boiler must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code ANSI/NFPA – 70. Improper grounding can result in improper burner control function.

Use properly sized copper conductors only.

Refer to wiring diagrams in rear of manual for electrical connections. The boiler should be connected by a separate, permanently live electrical supply line.. Use copper wires rated for at least 90° C. Install a separate fused disconnect switch near the boiler so power can be shut off for servicing.



Operation

Warning: Before proceeding read and fully understand the instructions contained in this manual. Do not attempt to operate this boiler if it has not been installed in accordance with the guidelines as set forth in this manual.

Never attempt to start the boiler if the combustion chamber contains excess oil, gas, or when the boiler is full of vapors.

Failure to comply can result in an explosion causing extensive property damage, severe personal injury or death.

Start-Up Equipment

THE FOLLOWING PROPER COMBUSTION INSTRUMENTS ARE REQUIRED TO DETERMINE PROPER AIR ADJUSTMENTS AND DRAFT WHEN SETTING UP OR SERVICING THE OIL BURNER.

1. CO₂ Analyzer
2. CO Analyzer
3. Draft gauge
4. Fuel pressure gauges
5. Vacuum gauge
6. Stack thermometer
7. Smoke tester

Do not attempt to make any adjustments or start the boiler without the proper equipment.

Start-Up Procedure

1. Fill the boiler and all of the radiation with water to the required system pressure. Please consult the factory for proper trim if the system pressure exceeds 30 PSI. The Trio boiler has a maximum working pressure of 58PSI
2. Check that all safety devices are in place and operational.
3. Check that the inside of the boiler is free of any fuel residue or foreign materials and that the ceramic fiber insulation on the burner door has not been damaged.
4. Check oil burner nozzle or gas burner orifice to ensure that the right size and type is properly installed. See preliminary settings for proper nozzle size and type.
5. Check electrode/flame rod settings, as they may have been jarred out of position during transportation. See burner instructions electrode/flame rod settings.
7. Check that the Burner mounting bolts are tight.
8. Set aquastat high limit between 180°F and 200°F and the auxiliary manual reset high limit aquastat to between 220°F and 240°F.
9. Read and understand all burner start up information included with the burner manual.
10. Turn service switch on.

Burner Adjustments

Warning: Before proceeding read and fully understand the instructions contained in the burner manual. Failure to comply can result in an explosion causing extensive property damage, severe personal injury, or death.

Preliminary Oil Burner Settings

Boiler	Burner	Nozzle	Pump Press	CO ₂	Smoke
PC6230	Riello F10	2.00 x 60B	150 PSI	11.0%	#0
PC7290	Riello F15	2.25 x 60B	175 PSI	11.0%	#0
PC8350	Riello F15	2.50 x 60B	175 PSI	11.0%	#0
PC9410	Riello F15	3.00 x 60B	175 PSI	11.0%	#0
PC10470	Riello F15	3.50 x 60B	175 PSI	11.0%	#0
PC11530	Riello F20	4.00 x 60B	175 PSI	11.0%	#0
PC12590	Riello F20	4.50 x 60B	175 PSI	11.0%	#0

Preliminary Gas Burner Settings - Beckett

Boiler	Burner	Gas Type	Input Btu/Hr	Gas Inlet	Low Fire Pressure	High Fire Pressure	Head	Air Shutter	Air Band	CO ₂
PC6230	Beckett CG10.1	Nat	322,000	1"	1.0"	2.4"	1	3	0	9.0%
		LP ⁽¹⁾	322,000	1"	1.0" ⁽¹⁾	2.4" ⁽¹⁾	1	3	0	11.0%
PC7290	Beckett CG10.1	Nat	406,000	1"	1.0"	3.5"	1	9	0	9.0%
		LP ⁽¹⁾	406,000	1"	1.0" ⁽¹⁾	3.5" ⁽¹⁾	1	9	0	11.0%
PC8350	Beckett CG10.3	Nat	490,000	1"	1.0"	2.5"	3	5	0	9.0%
		LP ⁽¹⁾	490,000	1"	1.0" ⁽¹⁾	2.5" ⁽¹⁾	3	5	0	11.0%
PC9410	Beckett CG10.3	Nat	574,000	1"	1.0" ⁽¹⁾	3.5"	3	10	0	9.0%
		LP ⁽¹⁾	574,000	1"	1.0"	3.5" ⁽¹⁾	3	10	0	11.0%
PC10470	Beckett CG10.4	Nat	658,000	1"	0.8" ⁽¹⁾	1.8"	4	10	2	9.0%
		LP ⁽¹⁾	658,000	1"	0.8"	1.8" ⁽¹⁾	4	10	2	11.0%
PC11530	Beckett CG10.4	Nat	742,000	1"	0.8" ⁽¹⁾	2.2"	5	10	2	9.0%
		LP ⁽¹⁾	742,000	1"	0.8"	2.2" ⁽¹⁾	5	10	2	11.0%
PC12590	Beckett CG10.5	Nat	826,000	1"	0.8" ⁽¹⁾	2.1"	6	10	2	9.0%
		LP ⁽¹⁾	826,000	1"	0.8"	2.1" ⁽¹⁾	6	10	2	11.0%

Note 1: Requires Beckett Propane Restrictor Conversion Kit Included with Burner

Preliminary Gas Burner Settings - Carlin

Boiler	Burner	Gas Type	Input Btu/Hr	Gas Inlet	Manifold Pressure	Orifice	Air Setting	Diffuser /Head	Air Shutter	CO ₂
PC6230	Carlin 201 Gas	Nat	322,000	1"	3.8"	5/8"	85%	D	None	9.0%
		LP	322,000	1"	3.5"	15/32"	85%	D	None	11.0%
PC7290	Carlin 301 Gas	Nat	406,000	1"	3.5"	7/16"	35%	S	Full	9.0%
		LP	406,000	1"	3.3"	23/64"	35%	S	Full	11.0%
PC8350	Carlin 301 Gas	Nat	490,000	1"	3.0"	1/2"	50%	S	Full	9.0%
		LP	490,000	1"	3.4"	13/32"	50%	S	Full	11.0%
PC9410	Carlin 301 Gas	Nat	574,000	1"	3.0"	35/64"	45%	B	Partial	9.0%
		LP	574,000	1"	3.2"	7/16"	45%	B	Partial	11.0%
PC10470	Carlin 301 Gas	Nat	658,000	1"	3.5"	19/32	65%	B	Partial	9.0%
		LP	658,000	1"	3.3"	15/32"	65%	B	Partial	11.0%
PC11530	Carlin 301 Gas	Nat	742,000	1"	3.4"	5/8"	90%	B	Partial	9.0%
		LP	742,000	1"	3.5"	31/64"	90%	B	Partial	11.0%
PC12590	Carlin 301 Gas	Nat	826,000	1"	3.5"	11/16"	60%	B	None	9.0%
		LP	826,000	1"	3.5"	17/32"	60%	B	None	11.0%

Preliminary Gas Burner Settings Riello

Boiler	Burner	Gas Type	Input Btu/Hr	Gas Inlet	Orifice	Air Gate	Combustion Head	Manifold Pressure	CO ₂
PC6230	Riello G400	Nat	322,000	1"	C4	2.5	3	3.7	9.0%
		LP	322,000	1"	C14	2.5	3	3.7	11.0%
PC7290	Riello G900	Nat	406,000	1"	N/A	2.5	1	1.6	9.0%
		LP	406,000	1"	N/A	2.5	1	1.8	11.0%
PC8350	Riello G900	Nat	490,000	1"	N/A	3.0	2	1.5	9.0%
		LP	490,000	1"	N/A	3.0	2	2.3	11.0%
PC9410	Riello G900	Nat	574,000	1"	N/A	3.5	2	1.9	9.0%
		LP	574,000	1"	N/A	3.5	2	3.0	11.0%
PC10470	Riello G900	Nat	658,000	1"	N/A	4.3	3	2.0	9.0%
		LP	658,000	1"	N/A	4.3	3	3.2	11.0%
PC11530	Riello G900	Nat	742,000	1"	N/A	5.2	4	2.5	9.0%
		LP	742,000	1"	N/A	5.2	4	4.2	11.0%
PC12590	Riello G900	Nat	826,000	1"	N/A	8.5	5	2.9	9.0%
		LP	826,000	1"	N/A	8.5	5	4.4	11.0%

Final adjustment of the burner should be made using proper test equipment and following the burner manufacturer's instructions.

Control Circuit Safety Checks

Check the safety controls on the boiler after completing the oil burner adjustments. A safety control check for satisfactory performance must be performed.

1. High limit control - Remove the temperature control cover as needed and note temperature setting. With the burner running, reduce the high limit setting until the burner shuts off. Return the high limit to its original setting.
2. Auxiliary high limit control - Remove the temperature control cover as needed and note temperature setting. With the burner running, reduce the high limit setting until the burner shuts off. Return the high limit to its original setting.
3. Primary control and flame sensors – Refer to the oil or gas burner manual supplied with the burner.
4. Low Water cutoff - Follow manufacturer's recommendations for testing of the low water cut off.

Maintenance

Warning: Servicing, inspection and adjustment of the boiler and venting system must be done in accordance with all applicable local and national codes. Improper servicing can result in property damage, severe personal injury, or death.

Boiler Cleaning

At the beginning of each heating season, the boiler flue passages and the oil burner should be checked for cleanliness and, if necessary, they should be cleaned. The following procedure is required for inspection and cleaning the boiler flue passages:

1. Turn off all electrical power to the boiler before inspecting and cleaning.
2. Remove the boiler front jacket panel by lifting vertically.
3. Disconnect the Molex plug at burner.
4. Remove the front upper cleanout cover plate. Inspect door gasket materials. Repair or replace as needed.
5. Remove combustion baffles in the final pass by sliding out the front.
6. Open the swing door following previously described procedure.
7. Remove any scale or soot deposits with a flexible flue brush. Vacuum all deposits from flue passages and chamber area. Be careful not to damage the door insulation.
8. Reinstall combustion baffles.

9. Install the front upper cleanout cover plate.
10. Close swing door following previously described procedure. Check to ensure a proper seal between the door and the boiler has been made.
11. Install jacket front panel.
12. Connect Molex plug for burner power.

Burner

Consult oil burner manufacturer's instructions for additional maintenance requirements.

Vent System

Chimney Vent- Inspect the chimney to ensure its cleanliness, proper sizing, and condition. Remove any accumulation that may have occurred at the clean out door. Inspect and clean all vent piping, replacing as necessary.

Safety Valve

Consult safety valve manufacturer's instructions for additional maintenance requirements. Never try to clean or repair the safety relief valve

Hydronic Controls

Consult aquastat and low water cut off manufacturer's instructions for maintenance and testing requirements.

Limited Warranty Trio Commercial Cast Iron Water Boilers

First Year Through Tenth Year – Warranty for Trio Series Commercial Hot water boilers: Boyertown Furnace warrants that its cast iron boiler and casing are free from defects in material and workmanship for ten (10) years from the date of installation at the original installation site to the original owner. If the boiler is found to be defective within this period, Boyertown Furnace will replace the boiler block or casting.

Eleventh through twentieth year – Warranty for the cast iron boiler blocks of the Trio Series Commercial Boilers: Boyertown Furnace warrants that the cast iron sections of the Trio boilers are free from defects in material and workmanship for the life of the original owner. If the Trio series boiler is then found to be defective, Boyertown Furnace will replace the defective section of the cast iron boiler block.

This warranty is subject to the condition that a heating contractor whose principal occupation is the sales and installation of the heating equipment must have installed the boiler. In addition the boiler must be installed in accordance with the boiler manual supplied by Boyertown Furnace with every boiler. Parts, which are covered, consist of materials supplied by Boyertown Furnace. Other parts supplied in the trim kit or in the burner box carry their own manufacturer's warranty and each manufacturer has responsibility for their own products.

NOTE: Any part, which is replaced under warranty, carries only the unexpired portion of the original warranty.

Note: If the heat exchanger involved is no longer available due to product obsolescence or redesign, the value used to establish the retail price will be the published price as set forth in Boyertown Furnace Parts pricing where the heat exchanger last appeared or the current retail price of the then nearest equivalent heat exchanger, whichever is greater.

Owner responsibility

1. Provide for proper installation, which includes pressure relief and pressure reducing valves and high limit safety controls on closed systems.
2. Provide qualified periodic service to prolong proper operation and service.
3. Insure that the boiler is installed with approved burner and that installation conforms to all codes and ordinances.
4. This warranty does not apply to boilers, which are subject to misuse, abuse, neglect, alterations, accident, excessive temperature, freezing, excessive pressure or corrosive water or atmosphere.
5. Owner will be responsible for return of faulty components to Boyertown Pa. freight pre-paid.

Boyertown Furnace will not be responsible for:

1. Components Manufactured by others: Components that are part of the heating system but were not manufactured by Boyertown Furnace as part of the Commercial boiler system will be subject to the manufacturer's warranty if any.
2. The workmanship of the installers of the Trio Commercial Boiler. Furthermore this warranty does

not assume any liability of unsatisfactory performance caused by improper installation.

3. Any cost for labor to remove or replace the faulty component.
4. Improper burner application or adjustments, control settings, care or maintenance.
5. Any boiler that is used or operated over its rated capacity or with insufficient water, is operated in flood conditions or is operated with water or fuel additives that cause deposits or corrosion.
6. Any boiler that is operated with non-approved anti - freeze agents.
7. Any damage associated with the corrosion or leakage due to the use of " Non Oxygen Barrier" plastic pipe in the heating system.
8. Any installation where the boiler is connected to any under floor radiant heating system that allows oxygen penetration of the system.
9. Any damage to the boiler and/ or property due to installation or operation of the boiler that is not in accordance with the boiler installation and operating instruction manual.
10. Any damage or failure of the boiler resulting from hard water, scale buildup or corrosion of the heat exchanger.

THIS WARRANTY DOES NOT EXTEND TO ANYONE EXCEPT THE FIRST PURCHASER AT RETAIL AND ONLY WHEN THE BOILER IS IN THE ORIGINAL INSTALLATION SITE. IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THE EXPRESSED WARRANTY. BOYERTOWN FURNACE EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EPRESSED OR IMPLIED WARRANTY.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.

For prompt warranty service, notify the installer, who, in turn will notify the distributor from whom he purchased the boiler. If this does not result in corrective action, contact Boyertown Furnace Company with details in support of the warranty claim. All claims must be processed through proper trade channels.

Boyertown Furnace Company
PO Box 100
156 Holly Road
Boyertown, Pa. 19512
Phone - 610-369-1450

Effective 10/1/2015

Installation and Service Check List

Boiler Model: _____ Serial No.: _____

Installation Date: _____

Installer Name: _____ Phone No.: _____

Boiler Installation

- Boiler level and in solid contact with floor?
- Boiler and burner wired per wiring diagram and National Electric Code? 120VAC wiring
Type _____ Size _____ AWG
- Burner sealed to boiler? Mounting nuts tight?
- Space is large enough to provide required clearances?
- Installation complies to ANSI Z2231.1/NFPA 54?
- Local, state and national codes, laws, regulations and ordinances followed?

Vent System

- Existing chimney and vent system inspected to NFPA 211 and in good condition?
- New vent pipe installed and properly sealed?
- Vent size checked against furnace manual and codes?

Burner Operation

- Oil Burner Model: _____ Nozzle: _____ GPH _____ Deg. _____ Type _____
- Burner Pump Pressure: _____
- Gas Burner Model: _____
- Fuel filter and fuel lines installed and inspected as per burner manual?
- Air bled from oil piping? Piping checked for leaks?
- Burner started, adjusted and tested per burner manual?

Boiler Operation

- Limit control tested for proper operation?
- Auxiliary high limit tested for proper operation?
- Low water cutoff tested for proper operation?
- Boiler observed going through several operational cycles for proper operation?

Post Installation

- Reviewed owners' information in this manual with owner or maintenance personnel and instructed to keep for future reference?
- Properly filled in and returned warranty registration card to Boyertown Furnace Co.
- Inserted burner manual and control instructions with boiler manual for future use.

 -----Cut and Return This Form or register online at www.boyertownfurnace.com-----

Warranty Registration

Boyertown Furnace Co.
P.O. Box 100
Boyertown, PA 19512

Date Installed: _____

Boiler Model No. _____

Serial Number: _____

Name of Purchaser: _____

Purchaser's Address: _____

Dealer's Name: _____

Dealer's Address: _____