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

<table>
<thead>
<tr>
<th>Boiler Model Number</th>
<th>Boiler Serial Number</th>
<th>Installation Date</th>
<th>Heating Contractor</th>
<th>Phone Number</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New Yorker
RESIDENTIAL HEATING BOILERS

Price - $3.00
All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made. In all cases, reference should be made to the following Standards:

A. All wiring on boilers shall be made in accordance with the National Electrical Code and/or Local Regulations.

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

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

**CAUTION**
Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury or property damage.

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

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

**NOTICE**
This boiler has a limited warranty, a copy of which is printed on the back of this manual. It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is complete. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.
DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Failure to follow all instructions in the proper order can cause personal injury or death. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the appliance before installing, starting-up, operating, maintaining or servicing this appliance. Keep this manual and literature in legible condition and posted near appliance for reference by owner and service technician.

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual. Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency. All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler. It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is completed. Installation is not complete unless a pressure relief valve is installed into the tapping located on top of appliance - See Section III of this manual for details.

This boiler is not suitable for installation on combustible flooring, unless installed with a combustible floor shield constructed in accordance with NFPA 31. Concrete over wood joists is considered combustible flooring.

Do not install boiler on carpeting.

When boiler is installed on concrete which is over a material that is subject to melting (PVC, PEX radiant tubing, etc.) a combustible floor shield must be used.

A concrete pad is not sufficient to protect combustible flooring.

Do not operate on masonry floors, which may contain moisture.

Do not tamper with or alter the boiler or controls. Retain your contractor or a competent serviceman to assure that the unit is properly adjusted and maintained.

Have Firetubes cleaned at least once a year - preferably at the start of the heating season to remove soot and scale. The inside of combustion chamber should also be cleaned and inspected at the same time.

Have Oil Burner and Controls checked at least once a year or as may be necessitated.

Do not operate unit with jumpered or absent controls or safety devices.

Do not operate unit if any control, switch, component, or device has been subject to water.

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the boiler.

This boiler is designed to burn No. 2 fuel oil only. Do not use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. Do not convert to any solid fuel (i.e. wood, coal). Do not convert to any gaseous fuel (i.e. natural gas, LP). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.
**WARNING**

This boiler contains very hot water under high pressures. Do not unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. Do not touch any components unless they are cool.

This appliance must be properly vented and connected to an approved vent system in good condition. Serious property damage could result if the boiler is connected to an unapproved vent system.

This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.

The interior of the venting and air intake systems must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. Clean and unobstructed venting and air intake systems are necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

This boiler is supplied with controls which may cause the boiler to shut down and not re-start without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.
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Figure 1: FR Packaged Boiler

<table>
<thead>
<tr>
<th>BOILER MODEL</th>
<th>Dimensions - Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>FR-HGSII</td>
<td>31-7/8</td>
</tr>
<tr>
<td>FR-265/305</td>
<td>51-1/8</td>
</tr>
</tbody>
</table>
I. Pre-Installation

A. INSPECT SHIPMENT carefully for any signs of damage.
   1. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of the crated boiler to the carrier in good condition.
   2. ANY CLAIMS for damage or shortage of shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.

B. LOCATE BOILER in front of final position before removing crate.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not drop boiler. Do not bump boiler jacket against floor.</td>
</tr>
</tbody>
</table>

   1. LOCATE so that smoke pipe connection to chimney will be short and direct. BOILER IS NOT SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOOR. DO NOT install on carpeting.

   2. FOR BASEMENT INSTALLATION, provide a solid base, such as concrete, if floor is not level, or if water may be encountered on floor around boiler.

   3. PROVIDE SERVICE CLEARANCE of at least 48" from the front of the jacket for servicing of burner and removal of tankless heater.

   For minimum clearances to combustible materials. See Figure 2.

---

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not support boiler by placing blocks at the four (4) corners of the boiler. Boiler base must be evenly supported under entire base.</td>
</tr>
</tbody>
</table>

Concrete over wood joists is considered combustible flooring. Do not operate on masonry floors, which may contain moisture.

---

Figure 2: Minimum Clearances to Combustible Materials

2. FR™ boilers may be installed in rooms with clearances from combustible material as listed above. Listed clearances may not be reduced for alcove or closet installations.
3. For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 standard.
C. PROVIDE COMBUSTION AND VENTILATION AIR. Local code provisions may apply and should be referenced.

WARNING
Adequate combustion and ventilation air must be provided to assure proper combustion and to maintain safe ambient air temperatures.

Do not install boiler where gasoline or other flammable vapors or liquids, or sources of hydrocarbons (i.e. bleaches, fabric softeners, etc.) are used or stored.

1. Determine volume of space (boiler room). Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the space.
   Volume(ft³) = Length(ft) x Width(ft) x Height(ft)

2. Determine total input of all appliances in the space. Add inputs of all appliances in the space and round the result to the nearest 1000 BTU per hour.

3. Determine type of space. Divide Volume by total input of all appliances in space. If the result is greater than or equal to 50 ft³/1000 BTU per hour, then it is considered an unconfined space. If the result is less than 50 ft³/1000 BTU per hour then the space is considered a confined space.

4. For boiler located in an unconfined space of a conventionally constructed building, the fresh air infiltration through cracks around windows and doors normally provides adequate air for combustion and ventilation.

5. For boiler located in a confined space or an unconfined space in a building of unusually tight construction, provide outdoor air with the use of two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space. Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:
   a. Direct communication with outdoors. Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space.
   b. Vertical ducts. Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
   c. Horizontal ducts. Minimum free area of 1 square inch per 2,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.

Alternate method for boiler located within confined space. Use indoor air if two permanent openings communicate directly with additional space(s) of sufficient volume such that combined volume of all spaces meet criteria for unconfined space. Size each opening for minimum free area of 1 square inch per 1,000 BTU per hour input of all equipment in spaces, but not less than 100 square inches.

6. Louvers and Grilles of Ventilation Ducts
   a. All outside openings should be screened and louvered. Screens used should not be smaller than 1/4 inch mesh. Louvers will prevent the entrance of rain and snow.
   b. Free area requirements need to consider the blocking effect of louvers, grilles, or screens protecting the openings. If the free area of the louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.
   c. Louvers and grilles must be fixed in the open position, or interlocked with the equipment to open automatically during equipment operation.
II. Knock-Down Boiler Assembly

A. REMOVAL OF BOILER.
   1. Remove all boiler-to-skid hold down fasteners.
   2. FR-HGS thru FR-232: Carefully walk boiler to the edge of skid. Tilt the boiler back, allowing an edge to rest on the floor, and remove the skid.
   FR-265 thru FR-462: A mechanical lifting device may be required to safely remove boiler from skid.

B. TEST HEAT EXCHANGER FOR LEAKS before proceeding with jacket assembly.
   1. Install pressure relief valve supplied, a hose to the city water and a valve in the supply tapping. Plug remainder of tappings.
   2. Fill boiler with water and apply a pressure of at least 10 psig but no more than 30 psig.

   WARNING
   Do not apply more than 30 psig to boiler.

   CAUTION
   If front flue box or rear smoke box fasteners are removed, tighten them to 26 ft/lbs when replacing them.

C. INSTALLING THE JACKET
   1. Attach lower rear jacket panel to left side and right side jacket panels with the screws provided so that the assembled components make a “U” shape and can stand alone (see Figure 19).
   2. Approaching the boiler from the rear, place the assembled jacket pieces from Step 1 around the boiler so that the lower rear panel passes below the rear smokebox.
   3. Attach the lower front panel, upper front panel, and upper rear panel. Make sure the jacket clearance holes line up properly with the appropriate boiler extensions and tappings.
   4. Attach the top panel assembly (left and right pieces).

D. INSTALLATION OF BOILER CONTROLS
   1. Install provided pressure/temperature gauge into ¼” NPT coupling located on front or top of the boiler. Tighten so not to have any water leaks.
   2. Mount the limit control. Thread the provided immersion well into the ¾” NPT tapping located on the front or top of boiler. Place the aquastat control with sensing bulb on well so that bulb is inserted fully into well.
   3. Mount burner to front fire door and wire according to instructions provided with the burner. Refer to Figure 3.
Figure 3: Burner Mounting
III. Water Piping and Trim

**WARNING**

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

**NOTICE**

Oxygen contamination of boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. New Yorker’s Standard Warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

A. DESIGN A PIPING SYSTEM and install boiler which will prevent oxygen contamination of boiler water and frequent water additions.

1. There are many possible causes of oxygen contamination such as:
   a. Addition of excessive make-up water as a result of system leaks.
   b. Absorption through open tanks and fittings.
   c. Oxygen permeable materials in the distribution system.

2. In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:
   a. Repairing system leaks to eliminate the need for addition of make-up water.
   b. Eliminating open tanks from the system.
   c. Eliminating and/or repairing fittings which allow oxygen absorption.
   d. Use of non-permeable materials in the distribution system.
   e. Isolating the boiler from the system water by installing a heat exchanger.

**NOTICE**

System supply and return piping must be connected to correct boiler pipe.

New Yorker recommends sizing the system circulator to supply sufficient flow (GPM) to allow a 20°F temperature differential in the system. When sizing the system circulator, the pressure drop of all radiators, baseboard and radiant tubing and all connecting piping must be considered.

3. Connect System supply and return piping to boiler. See Figures 5 and 6. Also, consult I=B=R Installation and Piping Guides. Maintain minimum ½ inch clearance from hot water piping to combustible materials.

---

**Figure 4: Recommended Piping for Combination Heating and Cooling (Refrigeration) System**

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

c. If boiler is used with an Indirect-Fired Domestic Hot Water Heater, install the Indirect-Fired Domestic Hot Water Heater as a separate heating zone. Refer to the Indirect-Fired Domestic Hot Water Heater Installation, Operating, and Service Instructions for additional information.

d. Use a system bypass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperatures may be encountered (i.e. converted gravity circulation system, etc.) The bypass
should be the same size as the supply and return lines with valves located in Figure 5 and 6 in order to regulate water flow for maintenance of higher boiler water temperature. Set the bypass and return valves to a half throttle position to start. Operate boiler until the system water temperature reaches its normal operating range. Adjust the valves to maintain 180°F to 200°F boiler water temperature and greater the 120°F return temperature. Adjust both valves simultaneously. Closing the boiler return valve while opening the bypass valve will raise the boiler return temperature. Opening the boiler return valve while closing the by-pass valve will lower the boiler return temperature.

e. A water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.

B. INSTALL SAFETY RELIEF VALVE. See Figures 5 and 6. Safety Relief Valve must be installed with spindle in the vertical position. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.

C. INSTALL DRAIN VALVE IN RETURN PIPING. See Figures 5 and 6.

D. OIL, GREASE, AND OTHER FOREIGN MATERIALS which accumulate in new hot water and a new or reworked system should be boiled out, and then thoroughly flushed. A qualified water treatment chemical specialist should be consulted for recommendations regarding appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

E. AFTER THE BOILER AND SYSTEM HAVE BEEN CLEANED AND FLUSHED, and before refilling the entire system add appropriate water treatment chemicals, if necessary, to bring the pH between 7 and 11.

WARNING

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

C. INSTALL DRAIN VALVE IN RETURN PIPING. See Figures 5 and 6.

D. OIL, GREASE, AND OTHER FOREIGN MATERIALS which accumulate in new hot water and a new or reworked system should be boiled out, and then thoroughly flushed. A qualified water treatment chemical specialist should be consulted for recommendations regarding appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

E. AFTER THE BOILER AND SYSTEM HAVE BEEN CLEANED AND FLUSHED, and before refilling the entire system add appropriate water treatment chemicals, if necessary, to bring the pH between 7 and 11.

WARNING

Installation is not complete unless a safety relief valve is installed as shown in Figure 1.
Figure 5: Recommended Water Piping for Circulator Zoned Heating Systems
Figure 6: Recommended Water Piping for Zone Valve Zoned Heating Systems
F. CONNECT TANKLESS HEATER PIPING AS SHOWN IN FIGURE 7.

**WARNING**

Install automatic mixing valve at tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Adjust and maintain the mixing valve in accordance with the manufacturer's instructions. Do not operate tankless heater without mixing valve.

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN PIPING THE TANKLESS HEATER:

1. **FLOW REGULATION** — If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a flow regulator matching the heater rating should be installed in the cold water line to the heater. The flow regulator should preferably be located below the inlet to the heater and a minimum of 3' away from the inlet so that the regulator is not subjected to excess temperatures that may occur during “off” periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.

2. **TEMPERING OF HOT WATER** — Installation of an automatic mixing valve will lengthen the delivery of the available hot water by mixing some cold water with the hot. This prevents the possibility of scalding hot water at the fixtures. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking a water temperature. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. The mixing valve should be “trapped” by installing it below the cold water inlet to heater to prevent lime formation in the valve. Refer to Figure 7.

3. **FLUSHING OF HEATER** — All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.

4. **HARD WATER** — A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer’s recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

![Figure 7: Schematic Tankless Heater Piping](image-url)
IV. Venting

A. GENERAL GUIDELINES

1. Vent system installation must be in accordance with these instructions and applicable provisions of local building codes. Contact local building or fire officials about restrictions and installation inspection in your area.

2. The FR™ Series is designed to be vented into a fireclay tile-lined masonry chimney or chimney constructed from type-L vent or a factory built chimney that complies with the type HT requirements of UL103. The chimney or vent pipe shall have a sufficient draft at all times, to assure safe proper operation of the boiler. See Figure 8 for recommended installation.

a. Install a draft regulator (supplied by installer) following the instructions furnished with the regulator. See Figure 9 for alternate regulator locations.

b. With any new or replacement installation the chimney has to be considered. Chimneys that have a high heat loss become less suitable as the heat loss of the home goes down and the efficiency of the boiler goes up. Most homes have a chimney appropriate for the fuel and the era in which the home was built. That may have been a coal fired or an inefficient oil fired boiler built into a home without insulation or storm windows. With increasing fuel prices that home probably has been insulated and fitted with storm windows so that the heat loss of the home has been reduced. This requires less fuel to be burned and sends less heat up the chimney. A new boiler probably has a higher efficiency than the boiler being replaced. That probably means that the stack temperature from the new boiler will be lower than that from the old boiler and with less room air being drawn up the chimney to dilute the stack gases. The combination of a large uninsulated chimney, reduced firing rate, reduced firing time, lower stack temperature and less dilution air can, in some cases, contribute to the condensing of small amounts of water vapor in the chimney. Such condensation, when it occurs, can cause chimney deterioration. In extreme cases, the chimney may have to be lined to insulate the chimney and thus prevent the condensation. The addition of dilution air into the chimney may assist in drying the chimney interior surfaces.

A massive chimney on a cold, or exposed outside wall may have produced adequate draft when it was fired with a higher input and greater volumes of heated gases. With reduced input and volume, the draft may be severely affected. In one instance our research showed a new chimney of adequate sizing produced only -.035" W.C. after 30 minutes of continuous firing at 13.0% CO₂. Outside wall chimneys take longer to heat up and can have .00" W.C. draft at burner start-up. You may have to consider a special alloy chimney flue liner with insulation around it and stabilizing draft cap or even a draft inducing fan in severe cases.

c. For the same reasons as in (2.) above, heat extractors mounted into the breeching are not recommended.

3. For minimum clearances to combustible materials refer to Figure 2.

Figure 8: Recommended Smoke Pipe Arrangement and Chimney Requirements
V. Electrical

**DANGER**

Positively assure all electrical connections are unpowered before attempting installation or service of electrical components or connections of the boiler or building. Lock out all electrical boxes with padlock once power is turned off.

**WARNING**

Failure to properly wire electrical connections to the boiler may result in serious physical harm.

Electrical power may be from more than one source. Make sure all power is off before attempting any electrical work.

Each boiler must be protected with a properly sized fused disconnect.

Never jump out or make inoperative any safety or operating controls.

The wiring diagrams contained in this manual are for reference purposes only. Refer to the wiring diagram of any controls used with the boiler. Read, understand and follow all wiring instructions supplied with the controls.

A. GENERAL

1. Install wiring and electrically ground boiler in accordance with requirements of the authority having jurisdiction, or in absence of such requirements the National Electrical Code, ANSI/NFPA 70, and/or the CSA C22.1 Electric Code.
2. A separate electrical circuit should be run from the main electrical service with a fused disconnect switch in the circuit.
3. Wiring should conform to Figures on pages 17 and 18 of this manual.

B. SYSTEM CONTROLS AND WIRING

1. Refer to National Electric Code or Local Electric Codes for proper size and type of wire required. Follow Code.
2. Use anti-short bushings on all wiring passing through boiler jacket, junction boxes and/or control boxes.
3. Use armored cable (BX) over all exposed line voltage wiring.

4. If an Indirect-Fired Domestic Hot Water Heater is used, use priority zoning. Do not use priority zoning for Hydro-Air Systems.

5. Single Zone Water System – Refer to Figures 10 and 11 for electrical diagram. Connect the system circulator wire leads to the proper locations on the Aquastat control, L7224A/L7248A. See Figure 10 or 11. Connect the thermostat to the ‘T-T’ terminals on the L7224A/L7248A control. Set thermostat heat anticipator setting to 0.50 amps.
VI. Oil Piping

A. GENERAL

1. Use flexible oil line(s) so that burner door can be opened, or burner can be removed, without disconnecting the oil supply.

2. A supply line fuel oil filter is recommended as a minimum for all firing rates but a pleated paper fuel oil filter is recommended for the lowest firing rate applications to prevent nozzle fouling.

3. Use Flared fittings only. Do not use compression fittings.

4. Use of a high efficiency micron filter (Garber or equivalent) in addition to the conventional filter is highly recommended.

B. SINGLE-PIPE OIL LINES

1. Standard burners are provided with single-stage 3450 rpm fuel units with the bypass plug removed for single-pipe installations.

2. The single-stage fuel unit may be installed single-pipe with gravity feed or lift. Maximum allowable lift is 8 feet. See Figure 14.

NOTICE

Oil piping must be absolutely airtight or leaks or loss of prime may result. Bleed line and fuel unit completely.

Figure 14: Single-Pipe Installation
TABLE 1: SINGLE STAGE UNITS (3450 RPM) TWO PIPE SYSTEMS

<table>
<thead>
<tr>
<th>Lift &quot;H&quot; (See Figure)</th>
<th>Maximum Length of Tubing &quot;H&quot; + &quot;R&quot; (See Figure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/8&quot; OD Tubing (3 GPH)</td>
</tr>
<tr>
<td>0'</td>
<td>84'</td>
</tr>
<tr>
<td>1'</td>
<td>78'</td>
</tr>
<tr>
<td>2'</td>
<td>73'</td>
</tr>
<tr>
<td>3'</td>
<td>68'</td>
</tr>
<tr>
<td>4'</td>
<td>63'</td>
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<tr>
<td>5'</td>
<td>57'</td>
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<tr>
<td>6'</td>
<td>52'</td>
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<tr>
<td>7'</td>
<td>47'</td>
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<td>8'</td>
<td>42'</td>
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<td>9'</td>
<td>36'</td>
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<td>10'</td>
<td>31'</td>
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<td>11'</td>
<td>26'</td>
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<td>12'</td>
<td>21'</td>
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<tr>
<td>13'</td>
<td>--</td>
</tr>
<tr>
<td>14'</td>
<td>--</td>
</tr>
</tbody>
</table>

TABLE 2: TWO-STAGE UNITS (3450 RPM) TWO PIPE SYSTEMS

<table>
<thead>
<tr>
<th>Lift &quot;H&quot; (See Figure)</th>
<th>Maximum Length of Tubing &quot;H&quot; + &quot;R&quot; (See Figure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/8&quot; OD Tubing</td>
</tr>
<tr>
<td>0'</td>
<td>93'</td>
</tr>
<tr>
<td>2'</td>
<td>85'</td>
</tr>
<tr>
<td>4'</td>
<td>77'</td>
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<td>6'</td>
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<td>60'</td>
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<td>44'</td>
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<td>36'</td>
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<tr>
<td>16'</td>
<td>27'</td>
</tr>
<tr>
<td>18'</td>
<td>--</td>
</tr>
</tbody>
</table>

C. TWO-PIPE OIL LINES

1. For two-piped systems, where more lift is required, the two-stage fuel unit is recommended. Table 1 (single-stage) and Table 2 (two-stage) show allowable lift and lengths of 3/8 inch and 1/2 inch OD tubing for both suction and return lines. Refer to Figure 15.

OUTSIDE TANK FUEL PUMP ABOVE BOTTOM OF TANK

FLEXIBLE OIL PIPING RECOMMENDED NEAR BURNER SWING DOOR

Figure 15: Two-Pipe Installation
VII. System Start-Up

A. VERIFY that the venting, water piping, oil piping, and electrical system are installed properly. Refer to installation instructions contained in this manual.

B. CONFIRM all electrical, water and oil supplies are turned off at the source and that the vent is clear from obstructions.

**WARNING**
Completely read, understand and follow all instructions in this manual before attempting start up.

C. FILL ENTIRE HEATING SYSTEM WITH WATER and vent air from system. See Figures 5 & 6 and follow steps below:

1. Close isolation valve in boiler supply piping.
2. Isolate all circuits by closing zone valves or balancing valves.
3. Attach a hose to hose bib located just before isolation valve in boiler supply piping. See Figures 5 and 6. (Note - Terminate hose at a suitable floor drain or outdoor area).
4. Starting with one circuit at a time, open zone valve or valve.
5. Open hose bib.
6. Open fill valve (Make-up water line should be located directly after isolation valve in boiler supply piping between air scoop and expansion tank).
7. Allow water to flow into drain until discharge from hose is bubble free for 30 seconds.
8. When zone is completely purged of air, close zone valve or balancing valve. Open the zone valve for the next zone to be purged. Repeat this step until all zones have been purged. At completion, open all zone valves or valves.

**WARNING**
The maximum operating pressure of this boiler is 30 psig. Never exceed this pressure. Do not plug or change pressure relief valve.

9. Close hose bib, continue filling the system until the pressure gauge reads 12 psig. Close fill valve. (Note - If make-up water line is equipped with pressure reducing valve, system will automatically fill to 12 psig).
10. Open isolation valve in boiler supply piping.
11. Remove hose from hose bib.

D. CONFIRM that the boiler and system have no water leaks.

E. CHECK CONTROLS, WIRING AND BURNER to be sure that all connections are tight and burner is rigid. Verify that all electrical connections have been completed, fuses installed, that the oil tank is filled and oil lines have been tested.

F. LUBRICATION. Follow instruction on burner and circulator label to lubricate, if oil lubricated. Most motors currently used on residential type burners employ permanently lubricated bearings and thus do not require any field lubrication. Water lubricated circulators do not need field lubrication.

G. ADJUST CONTROL SETTINGS with burner service switch turned “ON” and room thermostat set 10° below room temperature.

1. **Adjustment and display modes** of the L7248/ L7224 Oil Electronic Aquastat Controller:
   a. On the L7248/L7224, the overall range of the High Limit is from 180°F to 240°F (82°C to 116°C).
   b. Set the High Limit (designated HL) on the L7248/L7224 Aquastat Control at 180°F. This temperature setting may be varied to suit requirements of installation. Differential is fixed at 15°F.

   i. **Adjusting Settings:**
      To discourage unauthorized changing of Aquastat settings, a procedure to enter the adjustment mode is required. To enter the adjustment mode, press the UP, DOWN, and I buttons (see Figure S1) simultaneously for three (3) seconds. Press the ‘I’ button until the feature requiring adjustment is displayed (press the ‘I’ button again and will display LL (Low Limit on L7224):
      - **High Limit**
      - °F -- °C (Toggle)

   10. Open isolation valve in boiler supply piping.
11. Remove hose from hose bib.

Figure S1: L7248 Circuit Board Layout - Horizontal Mount
Then press the UP and/or DOWN buttons to move the set point to the desired value. After 60 seconds without any button inputs, the control will automatically return to the READ mode.

ii. Display:
In the RUN mode, the Aquastat will flash “bt” (boiler temp.) followed by the temperature (i.e., 220), followed by °F or °C.

To read boiler settings, press the ‘I’ key to read the parameter of interest. For example, press I (HL) High Limit is displayed, followed by a three-digit number, i.e., 220, followed by °F or °C.

See Figure S2 for Display Readout Definitions.

<table>
<thead>
<tr>
<th>Text</th>
<th>Description</th>
<th>Shows</th>
</tr>
</thead>
<tbody>
<tr>
<td>bt</td>
<td>Boiler Temperature</td>
<td>bt</td>
</tr>
<tr>
<td>HL</td>
<td>High Limit</td>
<td>HL</td>
</tr>
<tr>
<td>err</td>
<td>Error Code</td>
<td>err</td>
</tr>
<tr>
<td>F</td>
<td>Degrees Fahrenheit</td>
<td>F</td>
</tr>
<tr>
<td>C</td>
<td>Degrees Celsius</td>
<td>C</td>
</tr>
<tr>
<td>LL</td>
<td>Low Limit</td>
<td>LL</td>
</tr>
</tbody>
</table>

**Figure S2: Display Readout Definitions**

After approximately 60 seconds without any key pressed, the display will enter a dim display mode. To return to the bright display mode, simply press any key.

2. Control Operating Characteristics

The L7248/L7224 can be in any three (3) operational states: Normal, High-Limit and Error. The controller moves back and forth from High-Limit to Normal state as part of normal operation.

The controller will enter the Error state when there is an abnormal condition. The operating states are:

a. Normal: Boiler temperature has gone below the high limit setting (minus the differential) and has not exceeded the high limit setting.

b. High-Limit: Boiler temperature has gone above the high limit setting and has not dropped below the high limit setting (minus the differential).

c. Error: The controller has detected an error condition (e.g., open sensor) and has shut down the burner output. The controller continues to monitor the system and automatically restarts if the error condition clears. See Table S1.

d. Low-Limit: Boiler temperature has gone below the low limit setting (minus the low limit differential) and has not gone above the low limit setting.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Cause/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Err1</td>
<td>Sensor fault; check sensor.</td>
</tr>
<tr>
<td>Err2</td>
<td>ECOM fault; check EnviraCOM™ wiring.</td>
</tr>
<tr>
<td>Err3</td>
<td>Hardware fault; replace control.</td>
</tr>
</tbody>
</table>

**Table S1: LED error codes**

<table>
<thead>
<tr>
<th>Action</th>
<th>System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermostat calls for heat</td>
<td>Circulator starts. Boiler temperature is checked. Burner restarts when the water temperature is below high limit setting.</td>
</tr>
<tr>
<td>Boiler exceeds the high limit</td>
<td>Burner is turned off. Burner restarts when the water temperature drops below the high limit setting minus the differential.</td>
</tr>
<tr>
<td>Thermostat is satisfied</td>
<td>Circulator and burner turn off.</td>
</tr>
<tr>
<td>Error condition</td>
<td>If an error condition is detected, all outputs are shut down. Burner is off. Control continues to function and restarts when error is corrected. During the error check sequence, the system checks for drift in the sensor and corrosion in the connections.</td>
</tr>
</tbody>
</table>

The switching action in the L7248/L7224 control has one setting, the high limit, see Figure S3. The switching relay is controlled by the low voltage room thermostat. On a call for heat, the relay contacts make to complete the line voltage circulator circuit and also the burner circuit if the boiler water temperature is below the high limit setting. The high limit switch shuts off the burner if boiler water temperature exceeds the high limit setting. The circulator will continue to operate as long as the thermostat is calling for heat. The high limit automatically resets after the water temperature drops past the setpoint and through the differential.
H. REMOVE GUN ASSEMBLY
1. Check nozzle size, head size, gun setting, and positioning of electrodes. This information is shown in Figures 16 & 17 and Table 3.
2. Reinstall gun assembly.

I. VERIFY OIL BURNER SETTINGS BEFORE STARTING
1. BURNER AIR BAND AND AIR SHUTTER SETTINGS, see Table 3.
2. OPEN ALL OIL LINE VALVES.
3. Attach a plastic hose to fuel pump vent fitting and provide a container to catch the oil.
4. REMOVE GAUGE PORT PLUG from fuel pump and install pressure gauge.

J. START OIL BURNER
1. Open vent fitting on fuel pump.

---

**Table 3: Beckett AFG & SF Burners**

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>Firing Rate (GPH)</th>
<th>Nozzle</th>
<th>Burner Model</th>
<th>Head</th>
<th>Static Plate</th>
<th>Air Shutter</th>
<th>Air Band</th>
<th>Head Bearing</th>
<th>Pump Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-HGS*</td>
<td>0.80</td>
<td>.65 X 60W Delavan</td>
<td>L-1</td>
<td>3-3/8&quot;U</td>
<td>10 0 0 0 100 PSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR-HGS</td>
<td>1.00</td>
<td>.85 X 60B Hago</td>
<td>V-1</td>
<td>2-3/4&quot;U</td>
<td>9 1 2 0 140 PSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR-HGSII</td>
<td>1.30</td>
<td>1.10 X 60W Delavan</td>
<td>V-1</td>
<td>9 9 2 0 140 PSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR-98*</td>
<td>0.85</td>
<td>.75 X 60B Delavan</td>
<td>AFG</td>
<td>10 0 0 0 140 PSI</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR-122</td>
<td>1.10</td>
<td>.90 X 60B Hago</td>
<td>V-1</td>
<td>9 1 2 0 140 PSI</td>
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<td></td>
</tr>
<tr>
<td>FR-147</td>
<td>1.25</td>
<td>1.00 X 60B Hago</td>
<td>V-1</td>
<td>10 0 0 0 140 PSI</td>
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<tr>
<td>FR-173</td>
<td>1.50</td>
<td>1.25 X 60B Hago</td>
<td>V-1</td>
<td>5 3 2 140 PSI</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR-205</td>
<td>1.75</td>
<td>1.50 X 60B Hago</td>
<td>V-1</td>
<td>10 3 3 140 PSI</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>FR-232</td>
<td>2.00</td>
<td>1.65 X 60B Hago</td>
<td>SF</td>
<td>4 4 4 140 PSI</td>
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<tr>
<td>FR-265</td>
<td>2.50</td>
<td>2.50 X 80B Delavan</td>
<td>SF</td>
<td>5 0 0 100 PSI</td>
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<tr>
<td>FR-305</td>
<td>2.75</td>
<td>2.75 X 80B Delavan</td>
<td>SF</td>
<td>5 2 0 100 PSI</td>
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<tr>
<td>FR-350</td>
<td>3.00</td>
<td>3.00 X 80B Delavan</td>
<td>SF</td>
<td>5 3 0 100 PSI</td>
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<td>FR-400</td>
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<td>3.50 X 80B Delavan</td>
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<tr>
<td>FR-462</td>
<td>4.00</td>
<td>4.00 X 80B Delavan</td>
<td>SF</td>
<td>5 2 0 100 PSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Equipped with low firing rate baffle

---

**Figure S3: L7248/L7224 Setpoint and Differential Switching Action**

---

*When water reaches low limit setting, the burner shuts off or the circulator pump starts (when calling for heat).*
ELECTRODE ADJUSTMENT
"LI" OR "V1" HEAD

LOCATON OF HEAD AT "0" POSITION ON ADJUSTING PLATE

"Z" DIMENSION
13/32 " ± 1/32"

"V1" VARIABLE HEAD

HOLD DOWN SCREW

WITNESS MARK

PRIMARY ADJUSTING PLATE

KNURLED NUT

SECONDARY ADJUSTING PLATE

ACORN NUT/LOCK WASHER

HEAD SETTING (AT "0")
"V1" HEAD

Figure 16: “L1” & “V1” Head Electrode Positioning and Gun Setting (Beckett AFG)
2. TURN ‘ON’ BURNER service switch and allow burner to run until oil flows from vent fitting in a SOLID stream without air bubbles for approximately 10 seconds.

3. Close vent fitting and burner flame should start immediately.

4. If the burner does not start immediately, check the manual overload switch on the motor, if so equipped, and the safety switch on the burner primary control.

K. ADJUST OIL PRESSURE
1. Locate oil pressure adjusting screw and turn screw until Pressure Gauge reads the correct pump pressure required for the specific boiler. Refer to Table 3.

2. DO NOT REMOVE PRESSURE GAUGE until later.

L. OTHER ADJUSTMENTS
1. ADJUST THE AIR BAND AND/OR AIR SHUTTER.
   a. Adjust air supply by loosening lock screws and moving the air shutter and if necessary the air band. Refer to Table 3 preliminary settings.

2. ADJUST DRAFT REGULATOR for a draft of -.02” (water gauge) over the fire after chimney has reached operating temperature and while burner is running.

3. READJUST AIR BANDS on burner for a light orange colored flame while draft over the fire is -.02” w.c. Use a smoke test and adjust air for minimum smoke (not to exceed #1) with a minimum of excess air. Make final check using suitable instrumentation to obtain a CO₂ of 11.5 to 12.5% with draft of -.02” w.c. in fire box. These settings will assure a safe and efficient operating condition. If the flame appears stringy instead of a solid flame, try another nozzle of the same type. Flame should be solid and compact. After all adjustments have been made, recheck for a draft of -.02” w.c. over the fire.

4. TURN “OFF” BURNER and remove pressure gauge. Install gauge port plug and tighten. Start burner again.

M. FLAME FAILURE
The FR boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control has tripped, the burner has experienced ignition failure. Before pressing the reset button, call your serviceman immediately.

**WARNING**
Do not attempt to start the burner when excess oil has accumulated, when the unit is full of vapor, or when the combustion chamber is very hot.

N. CHECK FOR CLEAN CUT OFF OF BURNER
1. AIR IN THE OIL LINE between fuel unit and nozzle will compress when burner is on and will expand when burner stops, causing oil to squirt from nozzle at low pressure as burner slows down and causing nozzle to drip after burner stops. Usually cycling the burner operation about 5 to 10 times will rid oil line of this air.

2. IF NOZZLE CONTINUES TO DRIP, repeat step N.1. If this does not stop the dripping, remove cut off valve and seat, and wipe both with a clean cloth until clean. Then replace and readjust oil pressure. If dripping or after burn persist replace fuel pump.

O. HINTS ON COMBUSTION
1. NOZZLES—Although the nozzle is a relatively inexpensive device, its function is critical to the successful operation of the oil burner. The selection of the nozzle supplied with the FR boiler is the
result of extensive testing to obtain the best flame shape and efficient combustion. Other brands of the same spray angle and spray pattern may be used but may not perform at the expected level of CO₂ and smoke. Nozzles are delicate and should be protected from dirt and abuse. Nozzles are mass produced and can vary from sample to sample. For all of those reasons a spare nozzle is a desirable item for a serviceman to carry.

2. FLAME SHAPE — Looking into the combustion chamber through the flame plug hole, the flame should appear straight with no sparklers rolling up toward the top of the chamber. If the flame drags to the right or left, sends sparklers upward or makes wet spots on the combustion chamber, the nozzle should be replaced. If the condition persists look for fuel leaks, air leaks, water or dirt in the fuel as described below.

3. FUEL LEAKS— Any fuel leak between the pump and the nozzle will be detrimental to good combustion results. Look for wet surfaces in the air tube, under the ignitor, and around the air inlet. Any such leaks should be repaired as they may cause erratic burning of the fuel and in the extreme case may become a fire hazard.

4. AIR LEAKS— Any such leaks should be repaired, as they may cause erratic burning of the fuel and in extreme cases may become a fire hazard.

There may be many possible causes of leaks in oil lines such as:
   a. Fitting leaks due to misflared tubing or damaged fitting.
   b. Fuel line leak due to crushed or bent tubing.
   c. Filter connection leaks.
   d. Tank connection leaks.

The following actions can eliminate air leaks:
   a. Bleed pump as detailed in System Start-Up Section of this manual.
   b. Replace flare fittings.
   c. Replace oil supply line.
   d. Repair oil filter leaks
   e. Replace or repair tank fittings.

5. GASKET LEAKS— If 11.5% to 12.5% CO₂ with a #1 smoke cannot be obtained in stack, look for air leaks around the canopy seal. Such air leaks will cause a lower CO₂ reading in the stack. The smaller the firing rate the greater effect an air leak can have on CO₂ readings.

6. DIRT— A fuel filter is a good investment. Accidental accumulation of dirt in the fuel system can clog the nozzle strainer and produce a poor spray pattern from the nozzle.

7. WATER— Water in the fuel, in large amounts, will stall the fuel pump. Water in the fuel pump, in smaller amounts, will cause excessive wear on the pump, but more importantly water does not burn. It chills the flame, causes smoke, and allows unburned fuel to pass through the combustion chamber and clog the flueways of the boiler.

8. COLD OIL— If the oil temperature approaching the fuel pump is 40°F or lower, poor combustion or delayed ignition may result. Cold oil is harder to atomize at the nozzle. Thus, the spray droplets get larger and the flame shape gets longer. An outside fuel tank that is above grade or has fuel lines buried in the ground above the frost line is a good candidate for cold oil. The best solution is to place the tank and oil lines in the ground below the frost line.

9. HIGH ALTITUDE INSTALLATIONS
   Typically, the rule to use for high altitudes is to increase the air supply by 4% per each 1000 ft. above 2000 ft. altitude from sea level. This means that the air setting will have to be higher than the calibration marks in proportion to the altitude. Use instruments and set for 11.5 to 12.5% CO₂.

10. START-UP NOISE — Late ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.

11. SHUT DOWN NOISE — If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.
P. TEST CONTROLS

1. CHECK THERMOSTAT OPERATION. Raise and lower thermostat setting as required to start and stop burner.

2. VERIFY PRIMARY CONTROL SAFETY FEATURES using procedures outlined in Instructions furnished with control (See back of Control Cover) or Instructions as follows:

   a. Simulate flame failure:
      - Follow the starting procedure to turn on the burner.
      - Close the hand valve in the oil supply line.
      - Control enters recycle mode and tries to restart burner after approximately 60 seconds.
      - Safety switch should lock out in approximately 15 seconds. Ignition and motor should stop.
      - Indicator light will flash ½ second on, ½ second off.
      - Push red reset button to reset safety switch.

   b. Simulate ignition failure:
      - Follow the starting procedure to turn on the burner, but do not open the oil supply hand valve.
      - Safety switch should lock out in approximately 15 seconds. Ignition and motor should stop.
      - Indicator light will flash ½ second on, ½ second off.
      - Push red reset button to reset safety switch.

   c. Simulate power failure:
      - Follow the starting procedure to turn on the burner.
      - With the burner running, turn off the power to the system by tripping the circuit breaker or removing the fuse.

   • Burner should stop.
   • Restore power. Burner should start.

3. VERIFY HIGH LIMIT OPERATION.
   a. Adjust thermostat to highest setting.
   b. Observe temperature gauge. When temperature is indicated, adjust limit to setting below observed temperature. Burner should stop.
   c. Adjust to setting above observed temperature. Burner should start.
   d. Adjust thermostat to lowest setting. Adjust limit to desired setting.

4. CHECK LOW WATER CUTOFF (if so equipped).
   a. Adjust thermostat to highest setting.
   b. With boiler operating, open drain valve and slowly drain boiler.
   c. Burner should stop when water level drops below low water cutoff probe. Verify limit, thermostat or other controls have not shut off boiler.
   d. Adjust thermostat to lowest setting. Refill boiler.

Q. BOILER IS NOW READY TO BE PUT INTO SERVICE.

A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the steel. When this happens the steel in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the steel through from the inside. Since neither of these failure types are the result of a manufacturing defect the warranty does not apply. Clearly it is in everyone’s best interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve this.
A. GENERAL

Inspection service and cleaning should be conducted annually. Turn off electric power and close oil supply valve while conducting service or maintenance.

B. FIRETUBES AND COMBUSTION CHAMBER
(See Figure 18)

I. CLEAN THE FIRETUBES

a. Disconnect electric service to burner.

b. To gain access to the firetubes, remove the front flue box door. For boilers equipped with flue box swingdoor, remove two (2) nuts at top of flue box door and swing door down. For boilers not equipped with swingdoor, remove fasteners around the perimeter of flue box frame and remove door.

c. Remove turbulators.

d. Using a firetube brush clean firetubes. Use care not to damage the insulation on the inside of the flue box.

e. Replace turbulators and flue box door.

Units should be cleaned at least once a year, preferably at the end of each heating season.

It is not necessary to remove burner to clean boiler.

Figure 18: Cleaning of FR Boiler
**Important Product Safety Information**

**Refractory Ceramic Fiber Product**

**Warning:**

This product contains refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. After this product is fired, RCF may, when exposed to extremely high temperature (>1800°F), change into a known human carcinogen. When disturbed as a result of servicing or repair, RCF becomes airborne and, if inhaled, may be hazardous to your health.

_AVOID Breathing Fiber Particulates and Dust_

**Precautionary Measures:**

Do not remove or replace previously fired RCF (combustion chamber insulation, target walls, canopy gasket, flue cover gasket, etc.) or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
2. Long sleeved, loose fitting clothing
3. Gloves
4. Eye Protection

- Take steps to assure adequate ventilation.
- Wash all exposed body areas gently with soap and water after contact.
- Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
- Discard used RCF components by sealing in an air tight plastic bag.

**First Aid Procedures:**

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.
IX. Repair Parts

All FR™ Repair Parts may be obtained through your local New Yorker Wholesale distributor. Should you require assistance in locating a New Yorker distributor in your area, or have questions regarding the availability of New Yorker products or repair parts, please contact New Yorker Boiler Co., Inc. Customer Service at (215) 855-8055 or Fax (215) 855-8229.
Figure 19: Jacket Repair Parts
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Jacket Top Left Panel</td>
<td>FR-HGS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-HGSII</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-98/122</td>
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<td>FR-147/173</td>
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<td>FR-350/400</td>
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<td>Jacket Top Right Panel</td>
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<td>Jacket Upper Front Panel</td>
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<td>FR-350/400/462</td>
</tr>
<tr>
<td></td>
<td>(2) Jacket Lower Left/Right Front Panels &amp; (1) Lower Front Tie Bar</td>
<td>FR-HGS/HGSII</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-98/122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-147/173</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-205/232</td>
</tr>
<tr>
<td></td>
<td>Jacket Lower Front Panel</td>
<td>FR-265/305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-350/400/462</td>
</tr>
<tr>
<td></td>
<td>Jacket Right Side Panel</td>
<td>FR-HGS/HGSII</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-98/122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-147/173</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-205/232</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-265/305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-350/400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-462</td>
</tr>
<tr>
<td></td>
<td>Jacket Left Side Panel</td>
<td>FR-HGS/HGSII</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-98/122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-147/173</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-205/232</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-265/305</td>
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<tr>
<td></td>
<td></td>
<td>FR-350/400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-462</td>
</tr>
<tr>
<td></td>
<td>Jacket Lower Rear Panel</td>
<td>FR-HGS/HGSII</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-98/122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-147 thru FR-305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-350/400/462</td>
</tr>
<tr>
<td></td>
<td>Jacket Upper Rear Panel</td>
<td>FR-98/122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-147 thru FR-232</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-265/305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FR-350/400/462</td>
</tr>
<tr>
<td>9</td>
<td>ASME Data Cover Plate</td>
<td>FR-147 thru FR-462</td>
</tr>
</tbody>
</table>

Notes:
1. Jacket Lower front panels on FR boilers equipped with burner swingdoor are constructed of three individual pieces.
2. Jacket sets for special builds may have unique panels not listed here. For special build parts contact New Yorker Boiler Co., Inc. Customer Service.
Figure 20: FR Bare Boiler Repair Parts
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front Flue Box Assembly (See next page for Insulation Kits)</td>
<td>FR-HGS/98/122, FR-HGSll, FR-147/173/205/232, FR-265/305, FR-350/400/462</td>
</tr>
<tr>
<td>N/A</td>
<td>Front Fluebox Door Insulation (See next page for Insulation Kits)</td>
<td>FR-HGS/98/122, FR-HGSll, FR-147/173/205/232, FR-265/305, FR-350/400/462</td>
</tr>
<tr>
<td>2</td>
<td>Flanged Hex Nut, 3/8-16</td>
<td>All Models</td>
</tr>
<tr>
<td>4</td>
<td>Burner Door Insulation (See next page for Insulation Kits)</td>
<td>FR-HGS/HGSll, FR-98/122, FR-147 thru FR-305, FR-350/400/462</td>
</tr>
<tr>
<td>5</td>
<td>Floor Insulation (See next page for Insulation Kits)</td>
<td>FR-HGS/HGSll, FR-98/122, FR-147/173, FR-205/232/265/305, FR-350/400, FR-462</td>
</tr>
<tr>
<td>7</td>
<td>Braided Fiberglass Rope Gasket, 3/16&quot;</td>
<td>All Models (Except FR-265/305)</td>
</tr>
<tr>
<td>8</td>
<td>Braided Fiberglass Rope Gasket, 3/8&quot;</td>
<td>FR-265/305</td>
</tr>
<tr>
<td>9</td>
<td>Boiler Shell Assembly</td>
<td>All Sizes</td>
</tr>
<tr>
<td>10</td>
<td>Observation Door</td>
<td>All Models</td>
</tr>
<tr>
<td>11</td>
<td>Heater Coil/Cover Plate Gasket</td>
<td>All Models</td>
</tr>
<tr>
<td>12</td>
<td>Blank Heater Cover Plate</td>
<td>All Less Heater Models</td>
</tr>
<tr>
<td>13</td>
<td>Tankless Heater Coil</td>
<td>S-4, S-5, S-6</td>
</tr>
<tr>
<td>14</td>
<td>Hex Head Cap Screw, 3/8-16 x 1-1/4 LG</td>
<td>FR-147/173</td>
</tr>
<tr>
<td>15</td>
<td>Heavy Hex Nut, 3/8-16</td>
<td>FR-147 thru FR-462</td>
</tr>
<tr>
<td>16</td>
<td>Sheet Metal Screw, #12 x 3/4 LG</td>
<td>FR-147 thru FR-462</td>
</tr>
<tr>
<td>17</td>
<td>Hex Head Cap Screw, 3/8-16 x 3/4 LG</td>
<td>FR-147 thru FR-462</td>
</tr>
<tr>
<td>18</td>
<td>Cerafelt Insulation, 1/2&quot; x 1&quot;</td>
<td>All Sizes</td>
</tr>
</tbody>
</table>

Notes:
1. Bare boiler parts for special builds may be different than those listed here. Contact New Yorker Boiler Co., Inc. Customer Service for special build boiler parts.
INSULATION REPLACEMENT KITS

Combustion Chamber Insulation Replacement Kits

Combustion Chamber Insulation Replacement Kits provide the floor insulation and the burner door insulation.

<table>
<thead>
<tr>
<th>FR Model(s)</th>
<th>Kit Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-HGS/HGSII/98/122</td>
<td>62072001</td>
</tr>
<tr>
<td>FR-147/173</td>
<td>62072002</td>
</tr>
<tr>
<td>FR-205/232/265/305</td>
<td>62072003</td>
</tr>
<tr>
<td>FR-350/400</td>
<td>62072004</td>
</tr>
<tr>
<td>FR-462</td>
<td>62072005</td>
</tr>
</tbody>
</table>

Flue Box Insulation Replacement Kits

Flue Box Insulation Replacement Kits provide the flue box door insulation, flue box frame top/bottom insulation pieces and flue box frame side insulation pieces.

<table>
<thead>
<tr>
<th>FR Model(s)</th>
<th>Kit Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR-HGS/98/122</td>
<td>62072006</td>
</tr>
<tr>
<td>FR-HGSII</td>
<td>62072007</td>
</tr>
<tr>
<td>FR-147/173/205/232</td>
<td>62072008</td>
</tr>
<tr>
<td>FR-265/305</td>
<td>62072009</td>
</tr>
<tr>
<td>FR-350/400/462</td>
<td>62072010</td>
</tr>
</tbody>
</table>
NOTE: When ordering parts always give the serial and model numbers shown on the boiler and burner. Also, provide the name of the part(s).

Ordering Information for Quality Replacement Parts

Figure 21: BECKETT AFG MODEL BURNER
BECKETT BURNER PARTS LIST FOR FR SERIES STEEL BOILERS

FOR REPLACEMENT OIL BURNER PARTS, CONTACT YOUR WHOLESALER OR THE BURNER MANUFACTURER:

R. W. BECKETT CORP.
P. O. BOX 1289
ELYRIA, OHIO 44036
1-800-645-2876

Figure 22: BECKETT AF and SF MODEL BURNERS

1  Air Band
2  Air Shutter
6  Blower
7  Bulkhead Fitting
8  Bulkhead Fitting Locknut
9  Connector Tube Assembly
10 Coupling
11 Electrode Clamp
12 Electrode Insulator Assembly
15 Spider Spacer Assembly
16 Escutcheon Plate
18 Flange and Air Tube Assembly
19 Head
20 Housing Assembly w/Inlet Bell
21 Motor
22 Nozzle Adapter
23 Nozzle Line Electrode Assembly
24 Pump
25 Static Plate
27 Ignitor
28 Ignitor Holding Screw
29 Ignitor Hinge Screw
30 Ignitor Gasket Kit
31 Wire Guard
X. Low Water Cut Off (LWCO)

**WARNING**

DO NOT ATTEMPT to cut factory wires to install an aftermarket Low Water Cut Off (LWCO).

Only use connections specifically identified for Low Water Cut Off.

In all cases, follow the Low Water Cut Off (LWCO) manufacturer's instructions.

---

**When**

A low water cutoff is required to protect a hot water boiler when any connected heat distributor (radiation) is installed below the top of the hot water boiler (i.e. baseboard on the same floor level as the boiler). In addition, some jurisdictions require the use of a LWCO with a hot water boiler.

**Where**

The universal location for a LWCO on both gas and oil hot water boilers is above the boiler, in either the supply or return piping. The minimum safe water level of a water boiler is at the uppermost top of the boiler; that is, it must be full of water to operate safely.

**What Kind**

Typically, in residential applications, a probe type LWCO is used instead of a float type, due to their relative costs and the simplicity of piping for a probe LWCO.

**How to Pipe**

A “tee” is commonly used to connect the probe LWCO to the supply or return piping, as shown below.

**LWCO Location**

Select the appropriate size tee using the LWCO manufacturer’s instructions. Often, the branch connection must have a **minimum** diameter to prevent bridging between the probe and the tee. Also, the run of the tee must have a minimum diameter to prevent the end of the probe from touching or being located too close to the inside wall of the run of the tee. Ideally, manual shutoff valves should be located above the LWCO and the boiler to allow for servicing. This will allow probe removal for inspection without draining the heating system. Many probe LWCO manufacturers recommend an annual inspection of the probe.

**How to Wire**

LWCO’s are available in either 120 VAC or 24 VAC configurations. The 120 VAC configuration can be universally applied to both gas and oil boilers by wiring it in the line voltage service to the boiler (after the service switch, if so equipped).

The presence of water in a properly installed LWCO will cause the normally open contact of the LWCO to close, thus providing continuity of the 120 VAC service to the boiler.

It is recommended to supply power to the probe LWCO with the same line voltage boiler service as shown below.

**Wiring of Typical LWCO**

A 24 VAC LWCO is used primarily for gas fired boilers where a 24 volt control circuit exists within the boiler. However, a 24 VAC LWCO can only be used if the boiler manufacturer has provided piping and wiring connections and instructions to allow for this application.

**How to Test**

Shut off fuel supply. Lower water level until water level is **BELOW** the LWCO. Generate a boiler demand by turning up thermostat. Boiler should not attempt to operate. Increase the water level by filling the system. The boiler should attempt to operate once the water level is above the LWCO.
NEW YORKER BOILER CO., INC.

Limited Warranties

For Residential Cast Iron and Steel Water Boilers

By this Warranty Statement New Yorker Boiler Co., Inc. ("New Yorker"), issues limited warranties subject to the terms and conditions stated below. These limited warranties apply to residential cast iron and steel water boilers labeled with the New Yorker® brand which are sold on or after March 1, 2004.

ONE YEAR LIMITED WARRANTY

One Year Limited Warranty for Residential Water Boilers. New Yorker warrants to the original consumer purchaser at the original installation address that its residential cast iron and steel water boilers will be free from defects in material and workmanship under normal usage for a period of one year from the date of original installation. In the event that any defect in material or workmanship is found during the one year period following the date of installation, New Yorker will, at its option, repair the defective part or provide a replacement free of charge, F.O.B. its factory.

FIVE YEAR LIMITED WARRANTY

Five Year Pressure Vessel Limited Warranty for WC™ Residential Water Boilers. New Yorker warrants to the original consumer purchaser at the original installation address that the pressure vessel of the boiler will be free of defects in material and workmanship under normal usage for a period of five years following the date of installation. In the event that any defect in material or workmanship is found during the five year period following the date of installation, New Yorker will, at its option, repair the defective pressure vessel or provide a replacement free of charge, F.O.B. its factory.

LIFETIME LIMITED WARRANTY

Lifetime Pressure Vessel Limited Warranty for AP-F™, FRM, S-AP™, microTEK3™, microTEKDV™, CL-DM™, CG-CT™, and PVC™ Residential Water Boilers. New Yorker warrants to the original consumer purchaser at the original installation address that the pressure vessel component of the boiler will be free of defects in material and workmanship under normal usage for the lifetime of the original consumer purchaser. In the event that any defect in material or workmanship is found during the ten year period following the date of installation, New Yorker will, at its option, repair the defective pressure vessel or provide a replacement free of charge, F.O.B. its factory.

In the event that any defect in material or workmanship is found after the tenth year following the date of installation, New Yorker will provide a replacement pressure vessel upon payment by the original consumer purchaser of an amount equal to a percentage of the then current retail price of the model boiler involved (or, in the event that such model is not then in production, the most comparable model then in production), as follows:

<table>
<thead>
<tr>
<th>Years In Service</th>
<th>11th</th>
<th>12th</th>
<th>13th</th>
<th>14th</th>
<th>15th</th>
<th>16th</th>
<th>17th</th>
<th>18th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Purchaser Pays</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
<td>40%</td>
</tr>
</tbody>
</table>

In the event of any breach of these warranties, the original consumer purchaser agrees to make all reasonable efforts to settle any disagreement arising in connection with any warranty claim before resorting to the courts. If the original consumer purchaser fails to settle such a claim within sixty (60) days after written notice by New Yorker to the original consumer purchaser, New Yorker shall have the right to have the claim determined by an independent arbitrator designated by New Yorker. The costs and expenses of such arbitration and any judgment or decision rendered shall be borne equally by New Yorker and the original consumer purchaser.

EXCEPTIONS AND EXCLUSIONS

1. Components Manufactured by Others. Following the expiration of the foregoing one year limited warranty, all component parts of a boiler which are manufactured by others (such as burners, burner controls, circulating, tankless water heater, and New Yorker Link) shall be subject only to the manufacturer's warranty, if any.

2. Removal and Replacement Costs. These warranties do not cover costs of removal or reinstallation. The consumer purchaser will be responsible for the cost of removing and replacing any defective part and all labor and related materials connected therewith. Replacement parts will be invoiced to the distributor in the usual manner and will be subject to adjustment upon proof of defect.

3. Proper Installation. These warranties are conditioned upon the installation of the boiler in strict compliance with New Yorker's Installation, Operating and Service Instructions. New Yorker specifically disclaims any liability of any kind which arises from or relates to improper installation.

4. Improper Use or Maintenance. These warranties will not be applicable if the boiler is used or operated over its rated capacity, is installed for uses other than home heating, or is not maintained in accordance with New Yorker's Installation, Operating and Service Instructions and hydronics industry standards.

5. Improper Operation. These warranties will not be applicable if the boiler has been damaged as a result of being improperly serviced or operated, including but not limited to the following: operated with insufficient water; allowed to freeze; subjected to flood conditions; or operated with water conditions and/or fuels or additives which cause unusual deposits or corrosion in or on the pressure vessel or associated controls.

6. Geographic Limitations. These warranties apply only to boilers installed within the 48 contiguous United States.

7. Installation Requirements. In order for these warranties to be effective:

   a. The boiler must be installed in a single or two-family residential dwelling. This warranty does not apply to boilers installed in apartments or for commercial or industrial applications.

   b. The boiler must be installed in strict compliance with New Yorker's Installation, Operating and Service Instructions by an installer regularly engaged in boiler installations.

   c. Boiler sections must not have been damaged during shipment or installation.

   d. The boiler must be vented in accordance with chimney recommendations set forth in New Yorker's Installation, Operating and Service Instructions.

8. Exclusive Remedy. New Yorker's liability in the event of any breach of these warranties is expressly limited to the repair or replacement of any part found to be defective under conditions of normal use.

9. Limitation of Damages. Under no circumstances will New Yorker be liable for incidental, indirect, special or consequential damages of any kind under these warranties, including, without limitation, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. New Yorker's liability under these warranties shall under no circumstances exceed the purchase price paid for the boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

10. Limitation of Warranty. These limited warranties are given in lieu of all other express warranties and set forth the entire obligation of New Yorker with respect to any defect in a residential water boiler. New Yorker shall have no express obligations, responsibilities or liabilities of any kind, other than those set forth herein.

    ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR, EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE PRESSURE VESSEL OF A RESIDENTIAL WATER BOILER SHALL BE LIMITED IN DURATION TO THE LESSER OF THE DURATION OF SUCH IMPLIED WARRANTY OR A PERIOD EQUAL TO THE TERM OF THE APPLICABLE EXPRESS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

PROCEDURE FOR OBTAINING WARRANTY SERVICE

Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the original consumer purchaser should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the original consumer purchaser should write to New Yorker Boiler Co., Inc. at P.O. Box 10, Hatfield, PA 19440-0010, giving full particulars in support of the claim.

The original consumer purchaser is required to make available for inspection by New Yorker or its representative the parts claimed to be defective and, if requested by New Yorker, to ship those parts prepaid to New Yorker at the above address for inspection or repair. In addition, the original consumer purchaser agrees to make all reasonable efforts to settle any disagreement arising in connection with any warranty claim before resorting to legal remedies in the courts.

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

02/04