INSTALLATION GUIDE

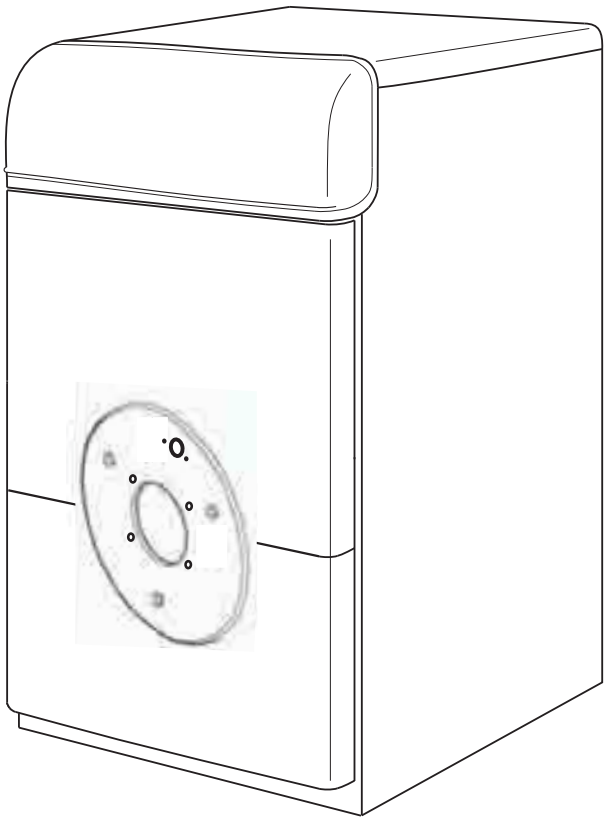
ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

IMPORTANT—This Document is **customer property** and is to remain with this unit. Please return to service information pack upon completion of work.

*PFWF071A93ABA
*PFWF099A94ABA
*PFWF132A95ABA
*PFWF164A96ABA
*PFWF201A97ABA
*PFWF242A98ABA
*PFWF286A99ABA

* May be “A” or “T”

Oil Fired Water Boiler
with Three Pass Cast Iron Heat Exchanger



CERTIFIED

ENERGY STAR

C US

18-CG03D1-4

1.0 Safety Considerations

IMPORTANT: Read this entire manual before beginning installation procedures.

Read this manual carefully before attempting to install, operate, or perform maintenance on this unit. Installation, service, and maintenance should be performed by qualified technicians only.

NOTE: "Warnings" and "Cautions" appear at appropriate places in this manual. Read these carefully. Your personal safety and the proper operation of this heating product require that you follow them carefully. The manufacturer assumes no liability for installations or service performed by independant dealers.

Safety signal words are used to designate a degree or level of seriousness associated with a particular hazard. The signal words for safety markings are WARNING and CAUTION.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

1.1 WARNINGS

⚠ WARNING

THE INFORMATION IN THIS GUIDE IS FOR USE BY INDIVIDUALS HAVING ADEQUATE BACKGROUND OF ELECTRICAL AND MECHANICAL EXPERIENCE. ANY ATTEMPTS AT PLUMBING, INSTALLING OR REPAIRING A BOILER MAY RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE. THE MANUFACTURER OR SELLER CANNOT BE RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR CAN IT ASSUME ANY LIABILITY IN CONNECTION WITH ITS USE.

⚠ WARNING

ELECTRICAL HAZARD

DISCONNECT POWER BEFORE INSTALLING OR SERVICING. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

BURN HAZARD

ALLOW BOILER TO COOL DOWN PRIOR TO SERVICING OR PERFORMING MAINTENANCE. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

SAFETY HAZARD

DO NOT BYPASS SAFETY CONTROLS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

FOLLOW THE INSTALLATION AND OPERATION INSTRUCTIONS FOR THE VENTING SYSTEM OPERATION. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

FIRE HAZARD

DO NOT INSTALL THIS BOILER DIRECTLY ON CARPETING. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

NOTE: This product is approved for installation on combustible flooring materials except for carpet.

⚠ WARNING

FIRE HAZARD

DO NOT INSTALL THIS BOILER WHERE FLAMMABLE LIQUIDS ARE STORED OR WHERE FLAMMABLE VAPORS ARE PRESENT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

HEAVY OBJECT HAZARD

A BOILER IS A HEAVY OBJECT. DO NOT HANDLE OR WORK UNDER A BOILER WITHOUT PROPERLY SECURING IT THROUGH SHORING, BLOCKING OR CRIBBING. FOLLOW ALL STATE AND FEDERAL CODES AND OSHA REGULATIONS AND GUIDELINES FOR HANDLING THE BOILER DURING INSTALLATION AND SERVICING. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

SAFETY HAZARD

THESE BOILERS ARE NOT APPROVED OR INTENDED FOR INSTALLATION IN MANUFACTURED (MOBILE) HOUSING, TRAILERS, OR RECREATIONAL VEHICLES. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

WATER DAMAGE HAZARD

DO NOT USE THIS UNIT IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE BOILER AND TO REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL WHICH HAS BEEN UNDER WATER. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

BURN HAZARD

BEFORE OPENING THE BOILER DOOR, DISCONNECT BURNER CORD AT THE PLUG. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.PR0PERTY DAMAGE.

⚠ WARNING

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

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

— WHAT TO DO IF YOU SMELL GAS

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

— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.

- **U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs.**

— Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CAN/CGA B149 Installation Codes and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54 and/or CAN/CGA B149 Installation Codes.
8. After it has been determined that each appliance connected to the venting system properly vents where tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

⚠ WARNING

EXPOSED FLAME

BEFORE OPENING BOILER DOOR, DISCONNECT ELECTRICAL POWER AND UNPLUG BURNER ELECTICAL CORD. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN INJURY, DEATH OR PROPERTY DAMAGE.

The following warning complies with State of California law, Proposition 65.

⚠ WARNING

HAZARDOUS GASES!
EXPOSURE TO FUEL SUBSTANCES OR BY-PRODUCTS OF INCOMPLETE FUEL COMBUSTION IS BELIEVED BY THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM.

The following warning complies with State of California law, Proposition 65.

⚠ WARNING

This product contains fiberglass wool insulation!

Fiberglass dust and ceramic fibers are believed by the State of California to cause cancer through inhalation. Glasswool fibers may also cause respiratory, skin, or eye irritation.

PRECAUTIONARY MEASURES

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator in these situations.

FIRST AID MEASURES

Eye Contact – Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact – Wash affected areas gently with soap and warm water after handling.

1.2 CAUTIONS

⚠ CAUTION

Do NOT install the boiler in a corrosive or contaminated atmosphere.

⚠ CAUTION

Verify system is leak free at startup. Failure to follow this Caution will result in a continuous flow of make up water leading to premature heat exchanger failure.

1.3 Notes

During routine boiler maintenance check integrity of system to be sure there are no leaks. Minerals will build up inside the heat exchanger sections reducing performance and will cause section failure. The additional oxygen added to the system from make up water speeds corrosion inside the heat exchanger.

The following notes must be followed during the installation, servicing, and operation of this boiler:

1. This device must only be used for the purpose for which it is specially designed. This boiler is designed to heat water to a temperature below 200°F for circulation in a closed hydronic system.
2. The manufacturer of this equipment assumes no liability for any damages resulting from unauthorized modifications made to the boiler, or any components thereof, or improper installation of the boiler in the field. Furthermore, any such field modifications VOID THE WARRANTY and place responsibility for safe and reliable operation of the boiler on those who performed the modification(s).
3. These instructions DO NOT cover all variations in systems or provide for every possible contingency. Should further information be desired or particular problems arise which are not covered sufficiently by this manual, contact your local distributor for assistance.
4. Use only No. 2 fuel oil per the boiler rating plate or No. 2 fuel oil with bio-diesel fuel content no greater than 5% by volume.
5. Install this boiler only in a location and position as specified in these instructions.
6. Provide adequate combustion and ventilation air to the boiler space as specified in “Air for Combustion and Ventilation” (page 18), of these instructions.
7. Combustion products must be discharged outdoors. Connect this boiler to an approved vent system only, as specified in Standard for the Installation of Oil-Burning Equipment, NFPA 31 – (most recent edition).
8. Always install the boiler to operate within the boiler’s temperature operating range and install the specified ASME approved pressure relief valve for the boiler. See the Service Facts that ship with the boiler for relief valve specifications. The part number for the relief valve is included on the functional unit parts list that ships with the boiler.
9. An oil-fired boiler for installation in a residential garage must be installed as specified in “Installation Location” section of these instructions.
10. The boiler may be used for temporary heating of buildings or structures under construction only when the following conditions have been met:
    a. The boiler venting system must be complete and installed per manufacturers instructions.
    b. The boiler is controlled only by a room thermostat (no field jumpers).
    c. The boiler input rate and temperature rise must be verified to be within nameplate marking.
    e. 100% of the boiler combustion air requirement must come from outside the structure.
    f. Clean the boiler upon substantial completion of the construction process, and verify boiler operating conditions including ignition, input rate, supply and return water temperature and venting, according to the manufacturer’s instructions.
    g. Verify system is leak free at startup.
11. Wear appropriate gloves, arm sleeve protectors, safety shoes, and eye equipment when servicing or maintaining this equipment.
12. Maintenance and cleaning should be performed at least once every year.

NOTE: This product must be gas piped by a licensed Plumber or Gas Fitter in the Commonwealth of Massachusetts.

Table of Contents

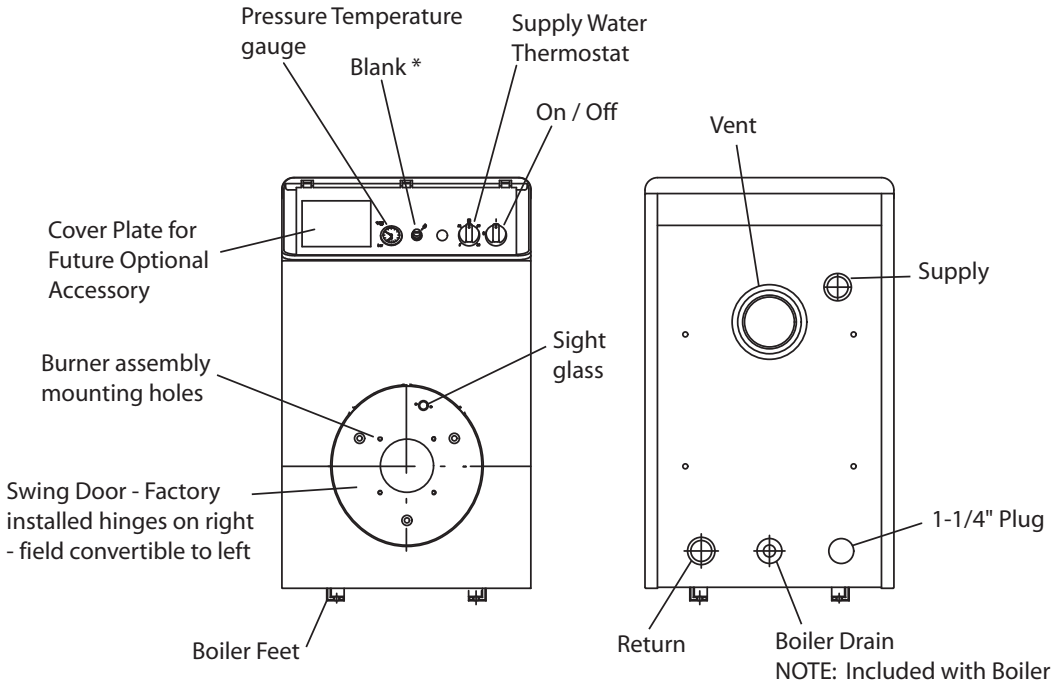


Figure 1

⚠ WARNING

Burn Hazard
Before opening the boiler door, disconnect burner cord plug. Failure to follow this warning could result in injury, death or property damage.

2.0 Pre-Installation Information & Instructions

Material in this shipment has been inspected at the factory and released to the transportation agency without known damage. Inspect exterior of crate for evidence of rough handling in shipment. Unpack carefully after moving equipment to approximate location. If damage to contents is found, report the damage immediately to the delivering agency.

Oil Boiler Packaging

NOTE: Fittings, valves and adapters shipped with the boiler are located in the combustion chamber. Remove them by pulling them out of the combustion chamber through the burner hole in the boiler door.

Oil boilers will ship factory assembled as a package. Certain components like the draft control, pressure relief valve and the boiler drain are included with the boiler. These components require installation. Optional or locally required controls like low water cutoffs, supplied by installer, require field installation. Other hydronic system components like circulating pump(s), air vents, expansion tanks, pressure regulators , hydronic controls, backflow preventers, etc… will be supplied by the installer. Field installation is required.

2.1 Parts Included

a) Oil Fired Boiler with 3 pass cast iron heat exchanger

b) Factory installed High Temperature Limit Switch with auto reset

c) Factory installed Supply Water Thermostat

d) Factory installed On-Off service switch

e) Factory installed Pressure Temperature Gauge

f) 6” Draft Regulator, installation required.

g) ASME 3/4” NPT male, 30psi Relief Valve - installation required

h) 4 Double End Threaded Studs and 4 Locking Washer Hex Head Nuts for burner installation

i) 1-1/4” NPT male x 1-1/2” NPT male x 3/4” NPT female Supply Tee

j) 1-1/4” NPT male x 1-1/2” NPT male Return Nipple

k) Brass Boiler Drain Valve, 1/2” NPT male x 3/4” NH male hose coupling threads (1/4 turn open or close depending on starting position)

l) 1/2” NPT male x 1/2” NPT female boiler drain adapter

m) Ship with literature package - Installer’s Guide, Service Facts, Functional Unit Parts list, and User’s Information Guide

n) Factory installed oil burner Wiring Harness with 7 pin connector

2.2 General Specifications

Table 1 - General Specifications			
Model [1]	***PFWF071A93ABA**	***PFWF099A94ABA**	***PFWF132A95ABA**
Input BTU/hr	71,000	99,000	132,000
DOE Output BTU/hr	61,000	86,000	115,000
I=B=R Net BTU/hr	53,000	75,000	100,000
Efficiency - AFUE	85.5	85.7	85.9
Electrical Power Supply	115 volts / 1 phase / 60 hertz		
Minimum Circuit Ampacity - amps	less than 12.0		
Maximum Overcurrent Protection - amps	15		
Nominal Flue Outlet Dia. - inches (tapered)	5	5	5
No. of Heat Exchanger Passes	3	3	3
No. of Sections	3	4	5
Water Content - Gallons	3.4	4.5	5.5
Supply Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"	1-1/4"
Return Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"	1-1/4"
Maximm Working Pressure - PSIG [5]	60.0	60.0	60.0
Combustion Chamber Pressre Drop - in w.c.	0.02	0.04	0.08
Combustion Chamber Volume - Cubic Feet	0.87	1.12	1.37
Water Pressure Drop 10^0 Td - Ft Head	0.2	0.4	0.7
Water Pressure Drop 20^0 Td - Ft Head	0.1	0.1	0.2
Water Pressure Drop 30^0 Td - Ft Head	-	-	0.1
Riello Non Direct Vent (40 Series) [2,3,4]	BAYRAF03ABURNA	BAYRAF03ABURNA	BAYRAF05ABURNA
Riello Direct Vent (40 Series) [2,3,4]	BAYRBF03ABURNA	BAYRBF03ABURNA	BAYRBF05ABURNA
Crated Dimensions - inches (H x W x D)	40-3/16 x 24-13/16 x 23-5/8	40-3/16 x 28-3/4 x 23-5/8	40-3/16 x 32-11/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	294 / 262	360 / 326	429 / 390

Notes

1. * May be "A" or "T"
2. Oil burner is purchased separately as an accessory. Ships pre-assembled. Burner cord pre-wired with 7 pin plug that connects to boiler
3. BAYRAF03 & BAYRBF03 burners ship with a factory installed nozzle for use with *PFWF071A. An additional nozzle, which requires field installation, is included for use with *PFWF099A
4. BAYRAF05 and BAYRBF05 burners ship with a factory installed nozzle for use with *PFWF132A. Two additional nozzles are included, which require field installation; one each for use with *PFWF164A and *PFWF201A
5. Boiler is shipped with 30 psi ASME Pressure Relief Valve
6. Boiler ships with straight nipples. Nipples are 1-1/4" NPT male x 1-1/2" NPT male and 1-1/4"NPT male x 1-1/2" NPT male x 3/4" NPT female.

Table 1 - General Specifications (Continued)		
Model [1]	***PFWF164A96ABA**	***PFWF201A97ABA**
Input BTU/hr	164,000	201,000
DOE BTU/hr	143,000	176,000
I=B=R Net BTU/hr	125,000	153,000
Efficiency - AFUE	86.1	86.3
Electrical Power Supply	115 volts / 1 phase / 60 hertz	
Minimum Circuit Ampacity - amps	less than 12.0	
Maximum Overcurrent Protection	15	
Nominal Flue Outlet Dia. - inches (tapered)	5	5
No. of Heat Exchanger Passes	3	3
No. of Sections	6	7
Water Content - Gallons	6.7	7.9
Supply Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"
Return Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"
Maximm Working Pressure - PSIG [5]	60.0	60.0
Combustion Chamber Pressre Drop - in w.c.	0.12	0.14
Combustion Chamber Volume - Cubic Feet	1.62	1.87
Water Pressure Drop 10^0 Td - Ft Head	1.1	1.6
Water Pressure Drop 20^0 Td - Ft Head	0.3	0.5
Water Pressure Drop 30^0 Td - Ft Head	0.2	0.2
Riello Non Direct Vent (40 Series) [2,3]	BAYRAF05ABURNA	BAYRAF05ABURNA
Riello Direct Vent (40 Series) [2,3]	BAYRBF05ABURNA	BAYRBF05ABURNA
Crated Dimensions - inches (H x W x D)	40-3/16 x 36-5/8 x 23-5/8	40-3/16 x 40-9/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	497 / 454	565 / 518

Model [1]	***PFWF242A98ABA**	***PFWF286A99ABA**
Input BTU/hr	242,000	286,000
DOE Output BTU/hr	212,000	252,000
I=B=R Net BTU/hr	185,000	219,000
Efficiency - AFUE	86.5	86.7
Electrical Power Supply	115 volts / 1 phase / 60 hertz	
Minimum Circuit Ampacity - amps	less than 12.0	
Maximum Overcurrent Protection	15	
Nominal Flue Outlet Dia. - inches (tapered)	5	5
No. of Heat Exchanger Passes	3	3
No. of Sections	8	9
Water Content - Gallons	9.1	10.3
Supply Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"
Return Water Connection - NPT female (in casting) [6]	1-1/4"	1-1/4"
Maximm Working Pressure - PSIG [5]	60.0	60.0
Combustion Chamber Pressre Drop - in w.c.	0.16	0.20
Combustion Chamber Volume - Cubic Feet	2.12	2.37
Water Pressure Drop 10^0 Td - Ft Head	2.3	3.2
Water Pressure Drop 20^0 Td - Ft Head	0.6	0.9
Water Pressure Drop 30^0 Td - Ft Head	0.3	0.4
Riello Non Direct Vent (40 Series) [2,4]	BAYRAF10ABURNA	BAYRAF10ABURNA
Riello Direct Vent (40 Series) [2,4]	-	-
Crated Dimensions - inches (H x W x D)	40-3/16 x 44-1/2 x 23-5/8	40-3/16 x 48-7/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	632 / 582	698 / 646

Notes

1. * May be "A" or "T"

2. Riello burner purchased separately as an accessory. Ships pre-assembled. Burner cord pre-wired with 7 pin plug that connects to boiler

3. BAYRAF05 and BAYRBF05 ship with a factory installed nozzle for use with *PFWF132A. Two additional nozzles are included which require field installation; one each for use with *PFWF164A and *PFWF201A

4. BAYRAF10 ships with a factory installed nozzle for use with *PFWF242A. An additional nozzle, which requires field installation, is included for use with *PFWF286A

5. Boiler is shipped with 30 psi ASME Pressure Relief Valve

6. Boiler ships with straight nipples. Nipples are 1-1/4" NPT male x 1-1/2" NPT male and 1-1/4"NPT male x 1-1/2" NPT male x 3/4" NPT female.

2.3 Codes & Regulations

The manufacturer assumes no responsibility for equipment installed in violation of any code or regulation.

Installation of this oil-fired boiler must be performed by a qualified installer in accordance with all local codes and authorities having jurisdiction. Codes and local utility requirements governing the installation of boiler equipment, wiring, plumbing and flue connections must be adhered to. In the absence of local governing codes, installation shall conform to these instructions and to the regulations of the National Fire Protection Association's Standard for the Installation of Oil-Burning Equipment, NFPA 31 - (most recent edition), and the National Electrical Code, ANSI/NFPA 70 – (most recent edition)

The most recent edition of the American National Standard NFPA 211, "Chimneys, fire places, vents, and solid fuel burning appliances" for venting requirements and the most recent editions of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers," for assembly and operation of controls and sefety devices.

Reference should be made to the most recent edition of the Canadian Standards Association CSAB139 "Installation Code for Oil Burning Equipment" for recommended installation porcedures in Canada.

A qualified installer, also referred to in this instruction manual as a "qualified heating dealer", **is an individual, or agency, properly licensed and experienced to install and service oil-burning equipment in accordance with all local codes and ordinances.**

It is recommended that Manual J of the Air Conditioning Contractors Association (ACCA) or A.R.I. 230 be followed in estimating heating requirements.

2.4 Locations & Clearances

⚠ WARNING

FIRE HAZARD

DO NOT INSTALL THIS BOILER DIRECTLY ON CARPETING. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

NOTE: THIS PRODUCT IS APPROVED FOR INSTALLATION ON COMBUSTIBLE FLOORING. **DO NOT INSTALL ON CARPET.**

a) Location Considerations

Before the boiler is moved into place, be sure to consider the following requirements:

1. Proximity to the chimney and available venting locations.

2. For a utility room or closet installation, the entrance door must be wide enough to permit the largest part of the boiler to pass through the doorway or allow sufficient clearance to permit the replacement of another appliance, e.g. a water heater, in the room and have enough clearance for service on both sides and rear of the boiler to permit installation and service access.

3. All clearances between the boiler and the enclosure must equal or exceed the minimum stated in the clearance table on the Outline Drawings.

4. Is there sufficient space for servicing the boiler and other equipment? A minimum of 36" front and 36" top must be provided for service access to the boiler. Any access door or panel must permit removal of the largest component.

5. Are the ventilation and combustion air openings large enought and will they remain unobstructed? If outside air is used, are the openings set above the highest snow accumulation level? (See Combustion and Ventilation section)

6. Ensure the floor structure will support the weight of the boiler. Ensure any stairs, pedastles, and floors will support the weight of the boiler, dolly, moving equipment and any personnel moving the boiler.

7. Locate the boiler so that all system components are protected from water damage during operation or service.

8. In some applications, boilers may need to be raised above the floor level to reduce the risk of water damage.

9. If the boiler is installed in a residential garage, it must be installed so the burner is located higher than 18 inches above the floor. Also, the boiler must be located or protected to avoid physical damage from impacts by vehicles.

10. Boilers must rest installed on sturdy, stable, and level surfaces.

11. All boilers installed above the level of heat emitters must have a low water cut-off device installed. Refer to National, State or Local codes for guidance.

MINIMUM CLEARANCES

Minimum clearances to combustible materials are mandatory to assure protection from fire hazard during boiler operation. (Refer to the Standard for the Installation of Oil-Burning Equipment, NFPA 31 -latest edition, for definitions of combustible and noncombustible materials.)

Service clearances, which are typically greater, may exceed fire protection clearances. See Table 2.

The minimum clearances from boiler casing surfaces to combustible materials are:

Table 2

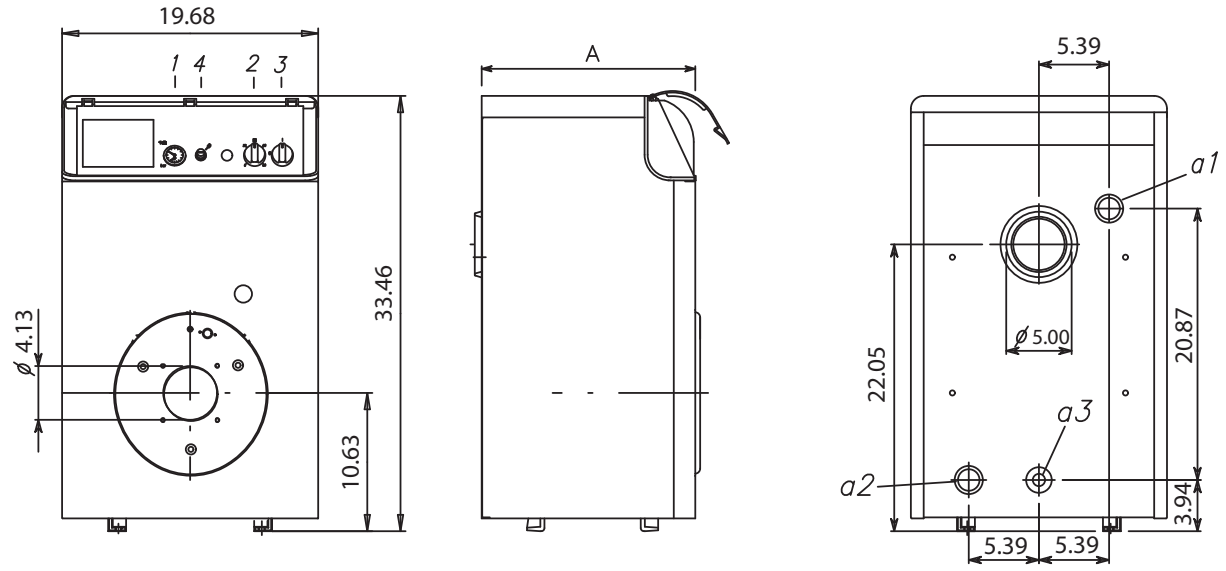
	Minimum Clearances for Combustion	Minimum Clearances for Service
Top	6”	36”
Right Side	6”	24” (a)
Left Side	6”	6” (a)
Front	18”	30” (b)
Back	6”	24” (b)

(a) Leave at least 24” on one side of the boiler and 6” on the opposite side

(b) Though these are approved clearances for these boilers, space must be provided at the front (18 inches minimum, 24-30 inches recommended) and at the rear of the boiler for access, service, and replacement of the oil burner and other hydronic system components.

2.5 Outline Drawings

Figure 2 - Dimensions and Connections



All dimensions are in inches

Table 3

Model	A	a1	a2	a3
	in.	in.	in.	in.
*PFWF071A93ABA	17.0	1 1/4	1 1/4	1/2
*PFWF099A94ABA	20.9	1 1/4	1 1/4	1/2
*PFWF132A95ABA	24.9	1 1/4	1 1/4	1/2
*PFWF164A96ABA	28.8	1 1/4	1 1/4	1/2
*PFWF201A97ABA	32.8	1 1/4	1 1/4	1/2
*PFWF242A98ABA	36.7	1 1/4	1 1/4	1/2
*PFWF286A99ABA	40.6	1 1/4	1 1/4	1/2
* May be “A” or “T”				
a1, a2, a3 are all NPT male				

3.0 Installation Instructions

3.1 Moving Boiler to Installation Location

⚠ WARNING

SAFETY HAZARD

WHEN MOVING THE BOILER TO THE INSTALLATION LOCATION, ENSURE THE STRUCTURE (I.E. FLOORS, STAIRS, PEDESTALS) CAN SUPPORT THE WEIGHT OF THE BOILER, DOLLY AND OTHER MOVING EQUIPMENT AND THE PERSONNEL MOVING THE BOILER. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

SAFETY CAUTION

Use caution when inserting and removing safety blocks. Make sure boiler will not fall off safety blocks.

Failure to obey caution could result in minor or moderate injury.

1. Move crated boiler as close as possible to the location to be installed.
2. If the boiler can not be moved with crate assembled, uncrate the boiler first (see section 3.3) and use an appliance dolly capable of handling the boiler weight to move the boiler to the selected location.
3. If required, the boiler jacket may be removed to simplify handling. To remove the boiler jacket, follow the steps below.

   a. Remove the upper and lower front access panels (See Figure 5).

   b. Remove the top access panel. See Fig. 7.

   c. The control panel is lowered by removing two phillips screws that hold the attachment clips to the left and right jacket panels. See Figure 7. The metal control enclosure is removed from the left and right jacket panels by removing two phillips screws on each side.

   d. Remove the left and right boiler jacket panels and the rear boiler boiler jacket panel by removing the phillips screws and/or nuts securing the panels.

   e. Move and set the boiler.

   f. Reassemble the boiler jacket. control panel and access panel. Leave the top panel off until the boiler is leveled.

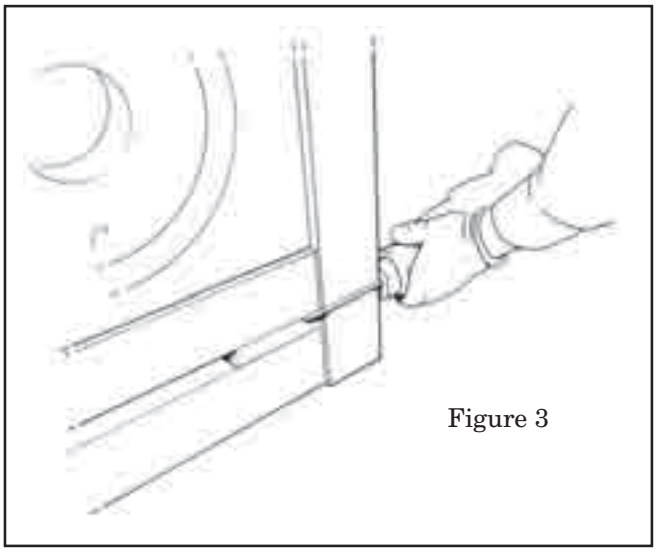


Figure 3

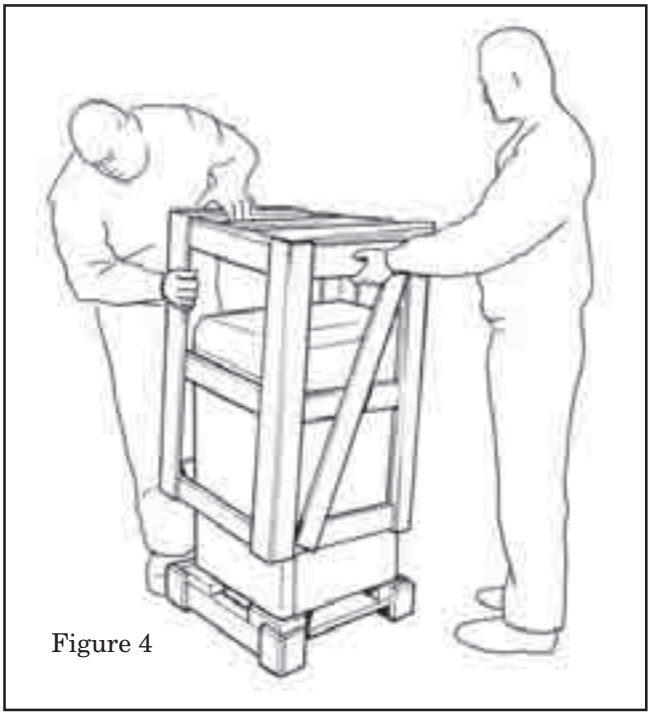


Figure 4

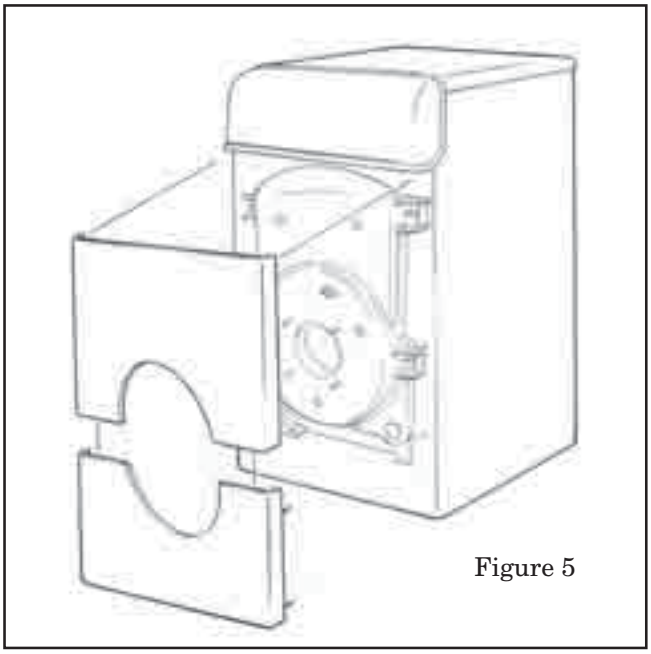


Figure 5

3.2 Setting Boiler

1. Verify the floor structure where the boiler will be set can support the weight of the boiler.
2. Locate the boiler so all components are protected from water damage during operation.
3. As required, raise the boiler above the floor level to reduce the risk of water damage.
4. Consult ANSI Z223.1 for garage applications.
5. Move the boiler to the installation location with an appliance dolly capable of handling the boiler. If required, the boiler jacket may be removed to simplify handling.

3.3 Uncrating Boiler

1. Cut the four corners of the crate as shown in Figure 3.
2. Lift the crate off of the boiler. See Figure 4.
3. Remove the front bottom access panel. See Figure 5. Locate and remove the four bolts holding the boiler to the wooden shipping base.

3.4 Leveling the Boiler

1. Place level on boiler. Adjust level of boiler by placing shims under cast iron boiler as needed.

3.5 Water Connections and Piping Systems

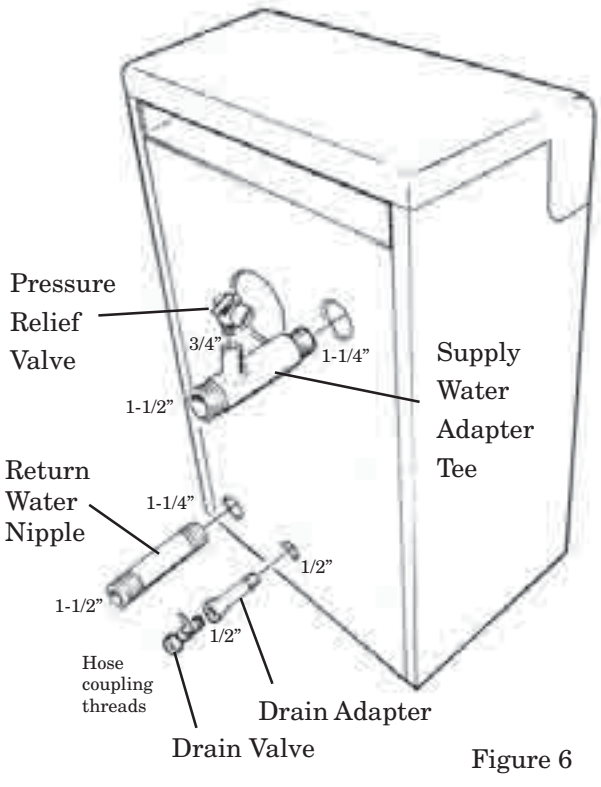


Figure 6

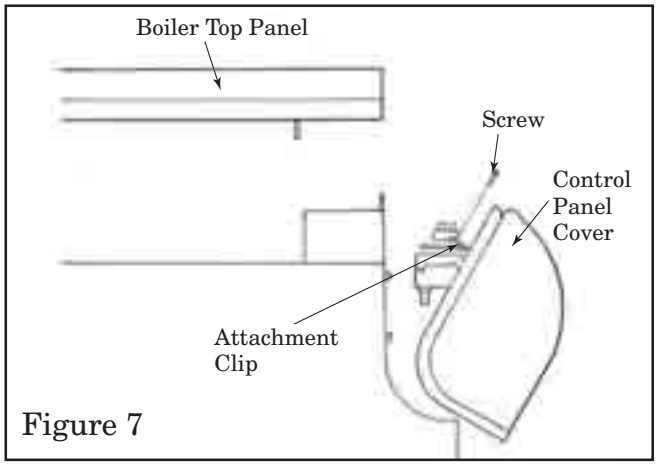


Figure 7

⚠ WARNING

CONTAMINATION HAZARD.

AIR IN BOILER PIPING SYSTEM LEADS TO OXYGEN CONTAMINATING THE SYSTEM. OXYGEN CONTAMINATION LEADS TO CORROSION AND PREMATURE BOILER FAILURE. THE BOILER STANDARD LIMITED WARRANTY DOES NOT COVER OXYGEN CONTAMINATION OF BOILER OR SCALE DEPOSITS CAUSED BY MAKE UP WATER ADDED TO THE SYSTEM. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

If the boiler is left operational and unattended for any extended periods of time, provisions must be taken periodically to ensure the system operation. This is especially important in below freezing weather. If for any reason your boiler should fail to operate, damage could result, such as frozen water pipes.

NOTE: Do NOT use the water system pipes to ground electrical appliances.

NOTE: Ensure the hydronic system is properly supported so that no stress is applied to the boiler connections.

General Guidelines

1) For good operation and long life of the boiler, the piping system must be designed properly.

2) Install air vents at any points in the supply and return pipes where air pockets could form. Also, install a discharge device at the lowest point in the system to allow complete draining of the system.

3) If the boiler is installed at the lowest level point of a single loop system or hydronic coils are used upstream of air conditioning coils, a flow check valve should be installed to prevent the natural migration of hot water through the system in the curculator's off cycle.

4) The installer of the boiler is required to provide a low water cutoff switch when installing the boiler above the distribution system. Consult local codes which may require a low water cutoff for all installations regardless of boiler location. The low water cut off switch should discontinue burner operation until proper water level is achieved.

5) The return water temperature to the boiler must be above 110° F. The cases where this boiler is installed on systems with large volumes of water (for example - retro fitted gravity system or low temperature systems such as radiant floor systems), the installer is required to use one of the methods of boiler protection described in this manual under "System Piping Diagrams" to protect the system.

Pipe Connections

a) The threads in the heat exchanger casting are 1-1/4" NPT female. Supply and Return nipples that ship with the boiler are 1-1/2" NPT male x 1-1/4" NPT male. See Figure 2 and Figure 6.

b) Boiler drain requires installation. See Fig. 6.

6) Install factory provided piping items as shown in Figure 6. These include the supply water adapter tee, the pressure relief valve, the return water nipple, the drain adapter, and the drain valve.

⚠ WARNING

SAFETY HAZARD.

PRESSURE RELIEF VALVE OUTLET MUST BE ROUTED TO WITHIN 6" OF A FLOOR DRAIN OR OTHER AREA SAFE FOR DISCHARGE OF HOT WATER AND SAFE FROM FREEZING. THIS PIPE MUST BE FULLY 3/4" IN SIZE THE ENTIRE LENGTH AND IT MUST NOT CONTAIN ANY RESTRICTIONS, TRAPS, VALVES, PLUGS, OR CAPS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

7) A 3/4" pipe must be routed from the outlet of the pressure relief valve to the nearest suitable drain. This pipe is not provided with the boiler.

8) Before connecting the boiler to the hydronic system, carefully flush all the pipes of the system with water to remove residues or impurities that could affect the unit's performance.

9) Supply and return water connections are located on the back of the boiler. The installation of piping shall be in accordance with National, State and local codes.

It is advisable to install on-off valves between the boiler and heating system and on the inlet and outlet side of all hydronic system components for service. This allows the boiler or components to be isolated from the system if necessary.

Characteristics of the water system

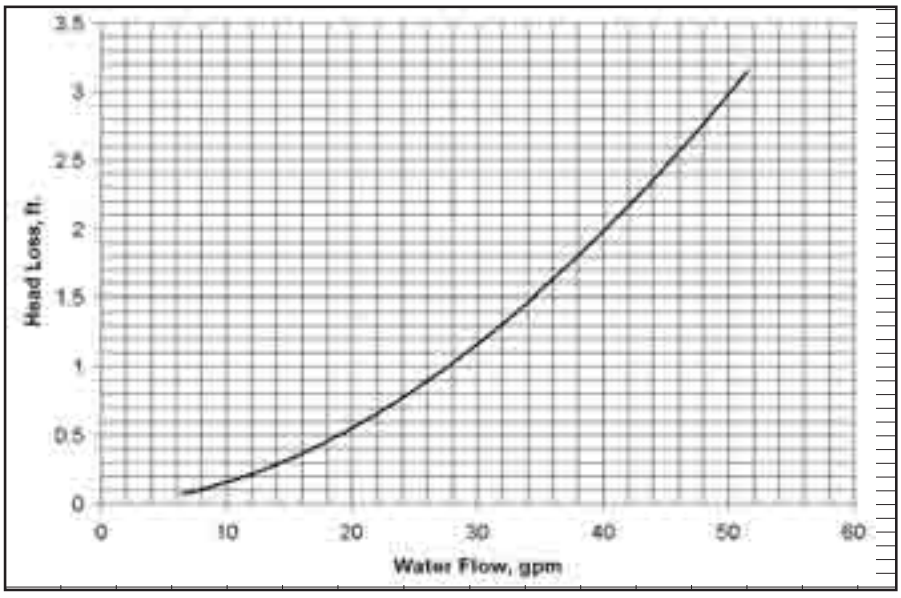
In the presence of water harder than 14 grains per gallon, we recommend the use of suitably conditioned water in order to avoid possible scaling in the boiler, caused by hard water, or corrosion produced by aggressive water. It should be remembered that, because of its low thermal conductivity, even scaling of just a few mm thick causes significant overheating of the boiler walls with consequent serious problems.

Water treatment is indispensable in the case of very large systems (containing large amounts of water) or with frequent introduction of replenishing water in the system. If partial or total emptying of the system becomes necessary under these conditions, it is advisable to refill it with treated water.

Proper boiler operating pressures

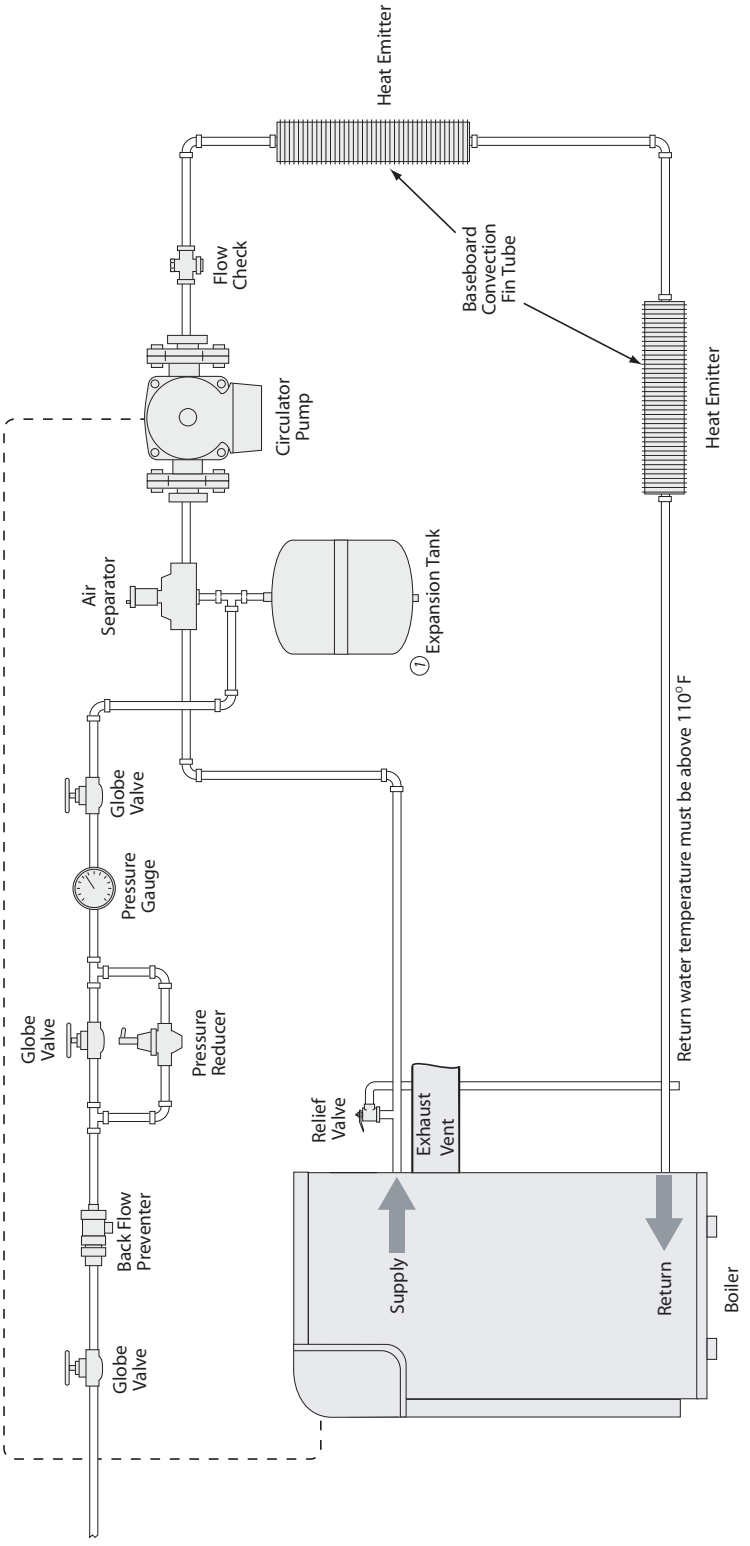
The system pressure when cold should be about 12psi. For correct operation of the boiler, when hot, its pressure should be about 18-24 psi.

Head Loss vs. Flow Chart for All *PFWF Models



I. Typical System Piping Diagrams

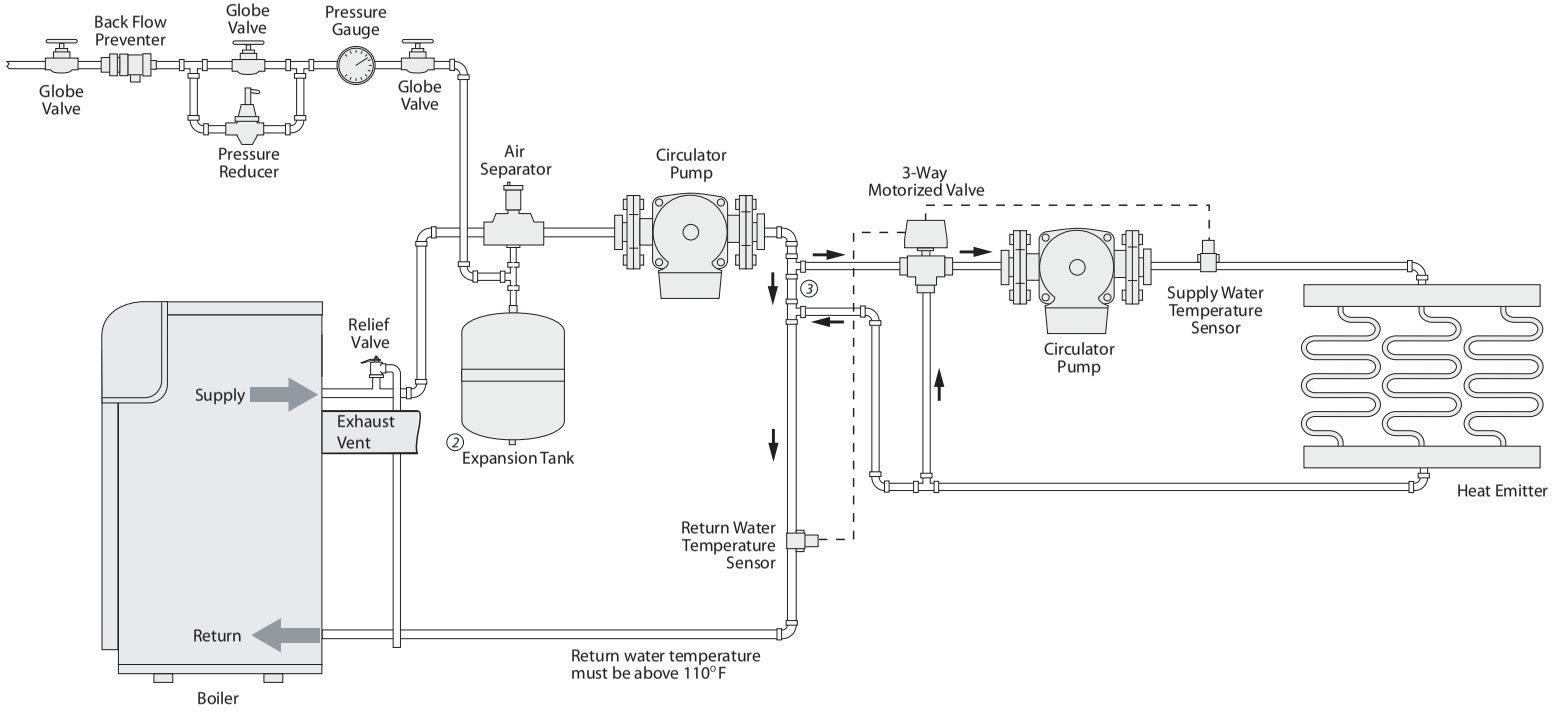
Typical System Piping Diagram
Single Zone System - High Temperature with Low Mass Heat Emitters



NOTES:
① Locate the circulator inlet close to the connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump inlet and the expansion tank to reduce the possibility of pump noise and facilitate air removal.

Typical System Piping Diagram

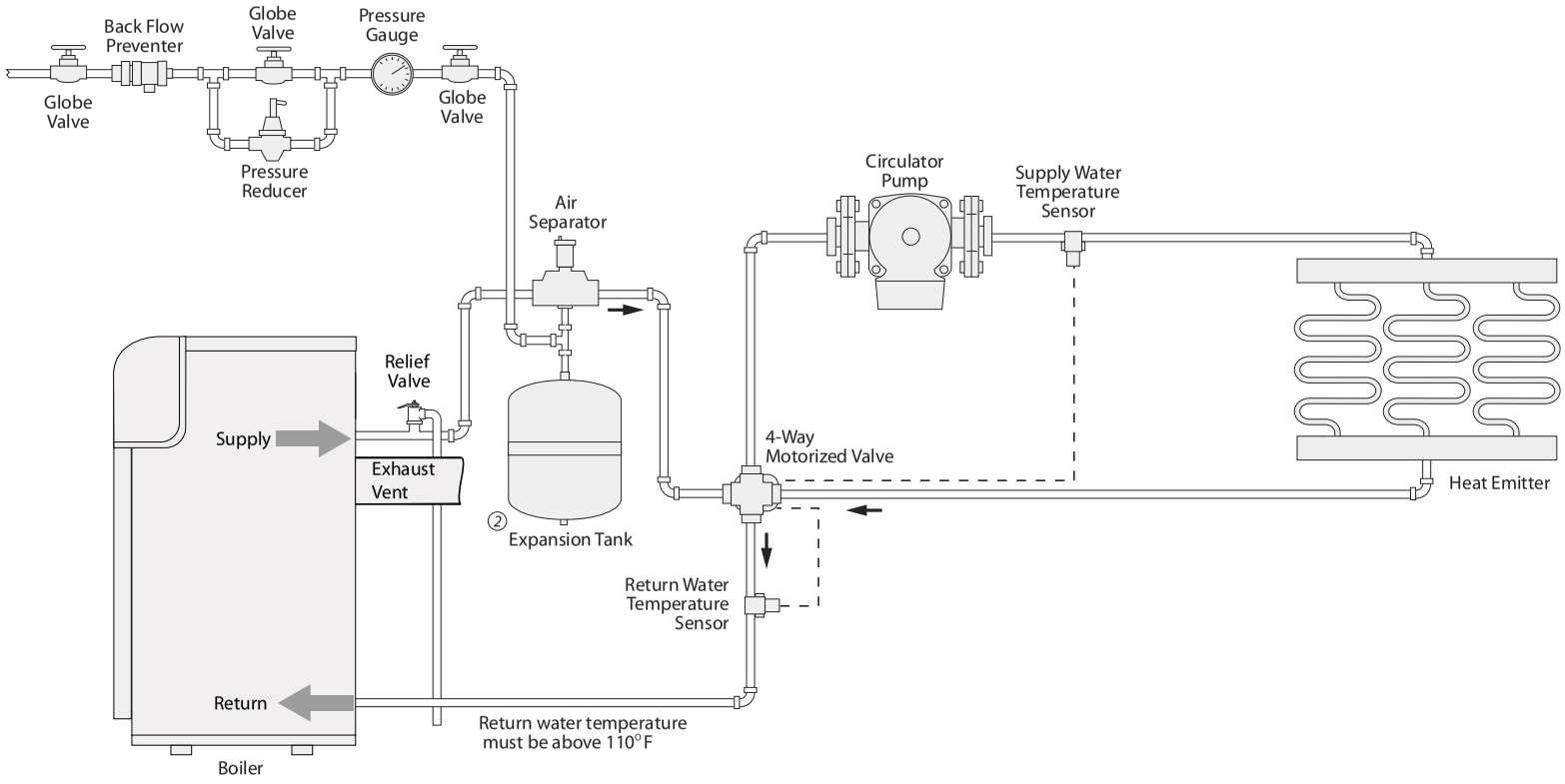
① Primary Secondary Loop with 3-way Motorized Valve
Low Temperature with Low Mass Heat Emitters
or High Temperature with High or Low Mass Heat Emitters



NOTES:
① Protects boiler from too low return water temperature and condensation.
② Locate the circulator inlet close to the connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump inlet and the expansion tank to reduce the possibility of pump noise and facilitate air removal.
③ Close coupled Tees

Typical System Piping Diagram

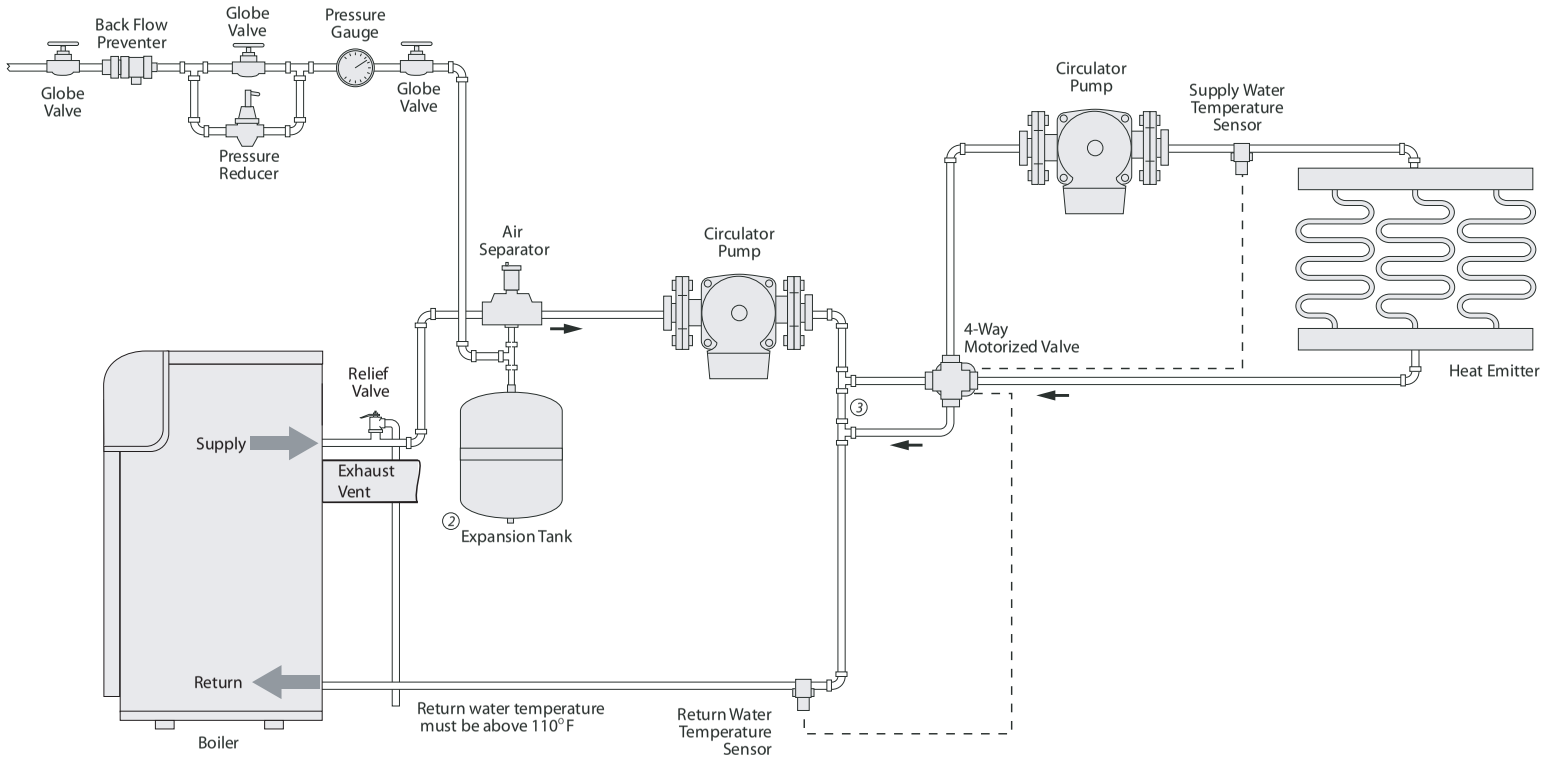
① Primary Secondary Loop with 4-way Motorized Valve with Circulator in Secondary Loop Only
Low Temperarure with Low Mass Heat Emitters
or High Temperature with High or Low Mass Heat Emitters



NOTES:
① Protects boiler from too low return water temperature and condensation.
② Locate the circulator inlet close to the connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump inlet and the expansion tank to reduce the possibility of pump noise and facilitate air removal.

Typical System Piping Diagram

① Primary Secondary Loop with 4-way Motorized Valve with Circulators in Primary and Secondary Loops Low Temperarure with Low Mass Heat Emitters or High Temperature with High or Low Mass Heat Emitters



NOTES:

① Protects boiler from too low return water temperature and condensation.

② Locate the circulator inlet close to the connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump inlet and the expansion tank to reduce the possibility of pump noise and facilitate air removal.

③ Close coupled Tees

3.6 Combustion Air and Ventilation

⚠ WARNING

CARBON MONOXIDE POISIONING HAZARD!
VENTILATION REQUIRED!
OIL BOILER/BURNER COMBUSTION AIR OPENING MUST NOT BE OBSTRUCTED OR BLOCKED. THESE OPENINGS SUPPLY COMBUSTION AND VENTILATION AIR TO THE BOILER.
FAILURE TO FOLLOW THIS WARNING COULD RESULT IN CARBON MONOXIDE POISONING OR DEATH.

Important: All aspects of the installation of this boiler, including materials, methods of providing combustion air and methods of venting products of combustion to the outdoors must comply with all local codes and the following national standards:
1) CSA B139 (most recent edition) - Installation Code for Oil Burning Equipment (Canada)
2) NFPA 31 (most recent edition) - Standard for the Installation of Oil Burning Equipment (US)
3) NFPA 211 (most recent edition) - Standard for Chimneys, Fireplaces, Vents, and Soild Fuel Burning Appliances

Chloride, fluoride, iodide, and bromide bearing compounds when present, even in low concentrations, in air supplied for combustion to the boiler, can result in accelerated and severe corrosion of the heat exchanger and/or the venting system. Often, household chemicals contain chloride-bearing compounds. There are many compounds representative of this classification of chemicals. A few common examples are:
- Cleaning solvents
- Varnish and paint removers
- Bleaches
- Fabric softeners
- Water softener salt

Avoid storing or using these chemicals within close proximity to the boiler. In addition, avoid storing or using any chemicals, of an unknown and possibly flammable nature, in close proximity to the boiler. If it is necessary to store or use chemicals in the same space as the boiler, the area should be well-ventilated and all containers should be sealed when not in use. If possible, keep chemicals in a separate, well ventilated, room closed off from the boiler.
The boiler shall be installed in a location within the building that permits a satisfactory supply of air for combustion, ventilation, and proper operation of the venting system. While all forms of building construction cannot be covered in detail in this installer's guide, this requirement may usually be met by application of one of the following methods in ordinary building construction. However, applicable local

CONFINED SPACE

LESS THAN 50 CU. FT. PER 1000 BTU/HR. INPUT ALL EQUIP. INSTALLED

Figure 8

Figure 9

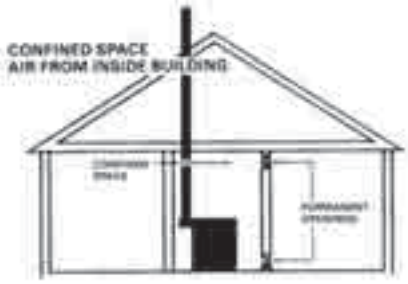
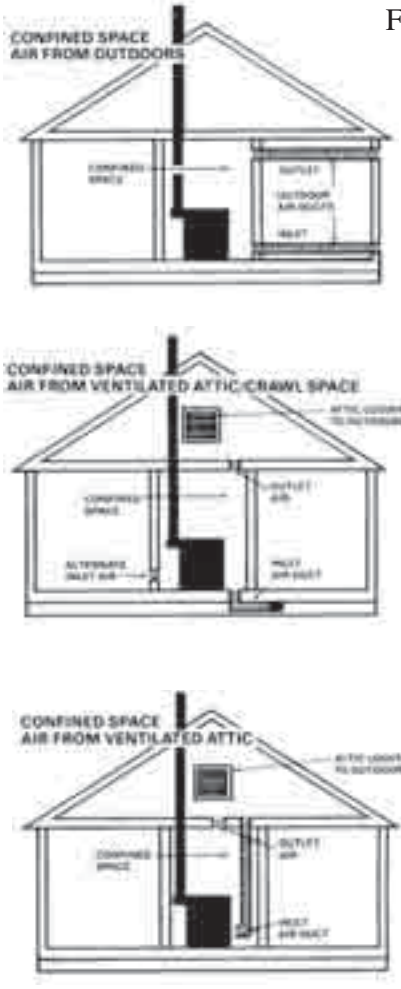


Figure 10



installation codes always take precedence and shall be followed.
The content of certain pertinent passages of NFPA 31, (most recent edition) methods to obtain and ensure adequate combustion airflow to the boiler has been excerpted and, in some cases, paraphrased below for reference purposes. Consult the Standard for the Installation of Oil-Burning Equipment, NFPA 31- (most recent edition) and Installation Code for Oil Burning Equipment (Canada) CSA B139 (most recent edition), for special cases and further details.
Boiler locations may be in "confined space" or "unconfined space." However, if the boiler is installed in a "confined space," combustion air must be provided by a means conforming to local or national codes. some example methods are described herein.

Confined Space

Confined spaces, as shown in Figure 8, are installations with less than 50 cubic feet of space per 1000 BTU/hr input from all appliances installed in the space. Air for combustion and ventilation requirements can be supplied from inside the buildings in figure 9 or from the outdoors as in Figure 10.

Utility Room (example of a confined space):

a. In buildings of conventional construction with normal air infiltration, two (2) permanent openings connecting to a well-ventilated crawl space, attic, or another large, well-ventilated internal area shall be provided. Each opening shall have a minimum free area of one (1) square inch per 1000 BTUH of total input rate (sum of the individual appliance input rates) of all appliances to be installed in the utility room. One opening should be located near, or in, the ceiling of the room and the other should be located near, or in, the floor.

b. In buildings of unusually tight construction (e.g. those having continuous water vapor barriers; tightly-fitting, or weather-stripped, doors and windows; and gasketed, caulked, or sealed outer wall joints and penetrations), wherein infiltration and air exchange with the outdoors is very limited (0.35 air changes per hour, or less), provision must be made to provide sufficient air for combustion. The following method will usually be adequate to ensure sufficient airflow into the space:

Provide two (2) permanent openings, one (1) located within 12 inches of the floor and one (1) within 12 inches of the ceiling, or roof, of the room. These openings shall allow for direct exchange of air between the room and outdoors. If required, ducting between the room and the outdoors shall be provided.

- For horizontally -oriented ducts, each opening shall have a minimum free area of one (1) square inch per 2000 BTUH of the total input rate (sum of the individual appliance input rates) of all appliances to be installed in the room.
- For vertically -oriented ducts, the minimum free area may be reduced to one (1) square inch per 4000 BTUH of the total input rate (sum of the individual appliance input rates) of all appliances to be installed in the room.
- The minimum dimension of any air opening shall not be less than 3-inches.
- When an opening in the outside wall must be provided, it should be furnished with properly screened metal sleeves.

UNCONFINED SPACE

50 CU. FT. OR MORE
PER 1000 BTU/HR. INPUT
ALL EQUIP. INSTALLED

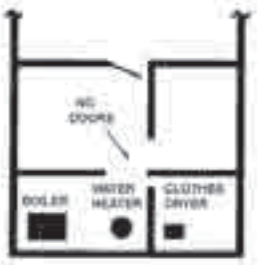


Figure 11

Table 4

Boiler Maximum BTUH Input Rating	With 8 Ft. Ceiling Minimum Area in Square Feet of Unconfined Space
80,000	500
100,000	625
140,000	875
170,000	1,063
180,000	1,125
210,000	1,313
250,000	1,563
290,000	1,813

Unconfined Space

Unconfined spaces are defined in Figure 11 and Table 4. These spaces may have adequate air to provide for combustion, ventilation, and dilution of flue gases from infiltration. Buildings with tight construction (for example, weather stripping, heavy insulated, caulked, with vapor barrier, etc. may need additional air provided as described for confined space. An unconfined space is any space where the volume is equal to or greater than 50 cubic foot per 1000 BTU/hr or the aggregate input rating of all appliances installed therein.

Full Basement (example of an unconfined space):

a. Where a boiler is installed in a full basement, in a building of conventional construction with normal air infiltration, infiltration is normally adequate to provide air for combustion and ventilation.

b. In buildings of unusually tight construction (such as those where weather stripping and storm sash windows are used, and where basement windows are also weather-stripped), one (1) permanent opening connecting to a well-ventilated attic, or with the outdoors shall be provided, using a duct, if necessary. This opening shall have a minimum free area of one (1) square inch per 5000 BTUH of total input rate (sum of the individual appliance input rates) of all appliances to be installed in the basement.

When an opening in the outside wall must be provided, it should be furnished with properly screened metal sleeves.

If an exhaust fan, additional air consuming machines (e.g. an air compressor), or a return air grill is present in the boiler room, there should be increased concern about providing adequate airflow to the boiler. Additional efforts may be required to assure an adequate supply of combustion and ventilation air is available to the boiler under all conditions.

Procedure to Determine if Space is Confined:
NOTE: Rooms without doors are considered part of space.

1. Calculate volume of space.
2. Add input BTU/hr from all appliances in space.
3. Divide the total space volume by the total input of all appliances.

   Total Cubic Feet of Space / Total Appliance Input BTU/hr

4. If the result is greater than or equal to 50 cubic foot of space per 1000 BTU/hr, the space is considered unconfined.
5. If the result is less that 50 cubic feet of space per 1000 BTU/hr, the construction is considered confined.
6. Oil fired boilers located in an unconfined space of a building with traditional construction (loose), typically have enough infiltration air for combustion and ventilation.
7. Outdoor air may also be provided by combining the following *PFWF boilers and direct vent oil burners designed to duct outdoor air directly to the burner:
   a. *PFWF071 and BAYRBF03ABURNA
   b. *PFWF099 and BAYRBF03ABURNA
   c. *PFWF132 and BAYRBF05ABURNA
   d. *PFWF164 and BAYRBF05ABURNA
   e. *PFWF201 and BAYRBF05ABURNA

(See Direct Vent Instructions section)

If an exhaust fan, additional air consuming machines (e.g. an air compressor), or a return air grill is present in the boiler room, there should be increased concern about providing adequate airflow to the boiler. Additional efforts may be required to assure an adequate supply of combustion and ventilation air is available to the boiler under all conditions.

3.7 Flue/Vent/Chimney/Vent Connector

⚠ WARNING

CARBON MONOXIDE HAZARD
IN THIS APPLICATION, THE FLUE GAS VENT PIPE IS AT A POSITIVE PRESSURE. THE VENT SYSTEM MANUFACTURER'S INSTALLATION INSTRUCTIONS MUST BE FOLLOWED PRECISELY. THE COMBUSTION AIR INLET PIPE AND FLUE GAS VENT PIPE MUST BE PROPERLY SEALED. FAILURE TO DO THIS COULD ALLOW PRODUCTS OF COMBUSTION INTO THE HOME, RESULTING IN PERSONAL INJURY OR LOSS OF LIFE.

⚠ WARNING

FIRE HAZARD
DO NOT ENCLOSE THE FLUE GAS VENT PIPE. IF AIR CIRCULATION IS BLOCKED AROUND THE FLUE GAS VENT PIPE, IT COULD OVERHEAT AND A FIRE MAY RESULT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

PROPER VENTING REQUIRED!
DO NOT install a manual damper in the chimney or vent connector.
Thermally- activated type vent dampers are NOT ALLOWED for use on these boilers.

Venting systems in the United States must comply with NFPA 31, and in Canada, with CSA B139 for of oil burning equipment

Use of Existing/Masonary Chimneys

Do not use an existing chimney unless properly relined using UL Listed and CSA Certified components installed in accordance with local and national codes including NFPA 211.

Chimney Inspection

The chimney, vent, or any passageway for the stack gases to flow to the outdoor atmosphere is a very important part of the heating system. No boiler, regardless of the efficiency of the design, can perform satisfactorily when the chimney to which it is connected is inadequate or in poor condition.

Any of the following symptoms may indicate a chimney has severe structural damage and is unsuitable for use:

- Chimney appears to be leaning to the side.
- Chimney appears to have structural damage, i.e. loose or missing blocks or bricks, or excessive deterioration at mortar joints.
- Tile liner damaged or missing.
- Flue gas leakage along the length of the chimney between the chimney connector and discharge termination.
- Excessive corrosion at the cleanout port or at the chimney connector entrance into the chimney.
- Structural debris, i.e. mortar or tile liner flakes, in base of the flue way.

A qualified person shall inspect the chimney to confirm it is correctly sized for the application, properly constructed, and in sound condition. Refer to the Standard for the Installation of Oil-Burning Equipment, NFPA 31-(most recent edition), for details on proper chimney sizing and construction. If needed, the chimney should be cleaned before installing the boiler. Any accumulation of dirt or debris at the bottom of the flue should be removed.

Chimney Sizing:

The boiler must be connected to an adequate chimney or an approved vent in accordance with these instructions. An adequate chimney is one that is sealed and lined with the capability of producing a (-).04" WC flue draft and having the capacity to handle the amount of stack gases that are introduced into it. A chimney with an internal construction of corrosion resistant tile, stainless steel, or some other material that will withstand flue gas temperatures up to 900°F is required.

The following are common chimney requirements necessary for the boiler to operate correctly:

A masonry chimney serving an oil fired boiler must comply with local codes and NFPA Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances (NFPA211-1996 or latest edition).

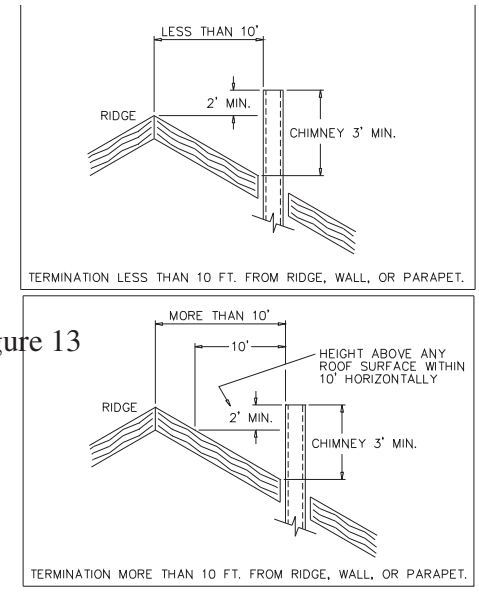
All installations and services must be performed by qualified service personnel.

The inside area of the chimney liner should equal, at minimum, the area of the vent pipe exiting the boiler-

EXAMPLE: π x r^2 = Area of Pipe (sq. in.)
r = radius of pipe
π = 3.1417
Flue Pipe Diameter = 6" [pipe Radius = ½
diameter of pipe = ½ ((6 in.) = 3in.]
π x 3^2 = 28 sq. in.

NOTE: This formula calculates the minimum inside area of the chimney. If more than one appliance vent connector pipe is connected to the chimney, the minimum inside area of the chimney should be equal to the area of the largest vent pipe plus one half the area of any additional vent pipes. If the chimney is too large or condensation has been a problem in the past refer to the NFPA Standard for the Installation of Oil Burning Equipment (NFPA31-most current edition) Appendix E for proper liner sizing.

Figure 13



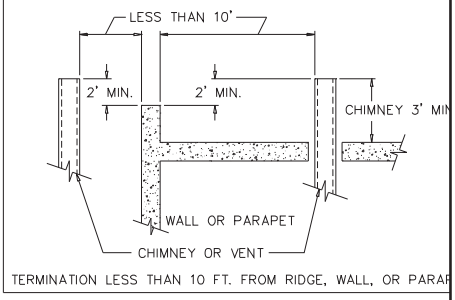
Proper chimney termination height for pitched roofs

Chimney Height:

The chimney shall terminate 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 a horizontal distance of 10 feet. (See Fig. 13).

If the chimney penetrates a roof more than 10 feet from a ridge, wall or parapet, a minimum of 3 feet above roof or exit point must be maintained. See Figure 13.
If the roof is flat rather than the normal residential Pitched roof, refer to Figure 14 for proper clearances.

Figure 14



Proper chimney termination height for f

It is desirable to install the shortest vent connector (also referred to as a flue or chimney connector) possible with the fewest number of fittings, i.e. transitions and elbows.
Generally, 24 Ga. or heavier, single wall, lock seam-type, galvanized steel vent pipe of the proper diameter (see boiler general product specifications) and fittings are satisfactory materials for the fabrication of a vent connector. However, always consult local codes and authorities for specific minimum requirements.

All horizontal sections of the vent connector must slope upward not less than ¼ inch per foot from the boiler to the chimney. Long horizontal sections of the venting system must be supported at least every five (5) feet with metal straps to prevent sagging of the vent piping.
Secure all joints in the vent connector with sheet metal screws or equivalent fasteners.

The vent connector pipe should extend only to (and not beyond) the inside wall of the chimney (See Fig. 15).

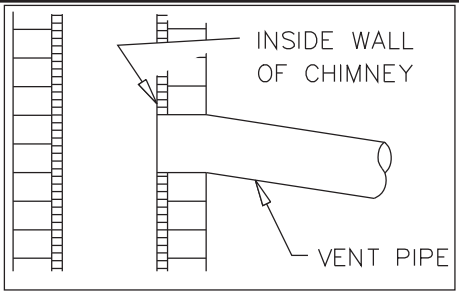


Figure 15

Proper insertion of the vent connector in 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.
In cases where the chimney extends to the basement floor, the draft can usually be improved by filling the base of the chimney with sand to within 12 inches of the vent connector pipe after relocating the clean-out door. (See Fig. 16).

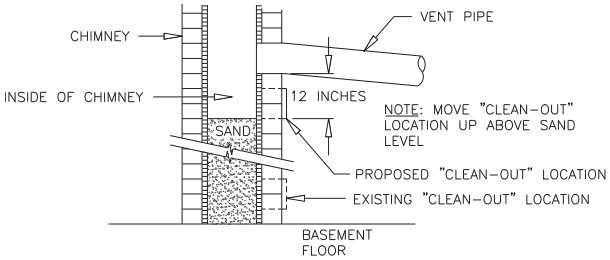


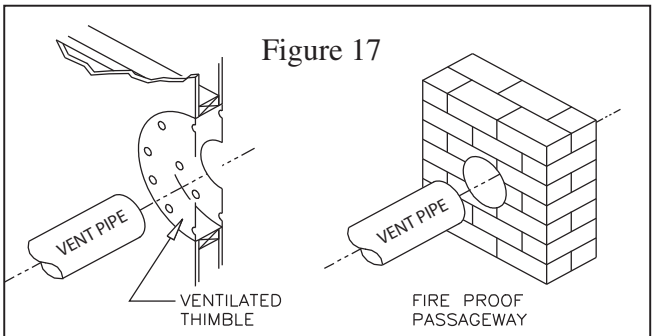
Figure 16 **Suggested method to improve chimney draft.**

All joints of the chimney must be tightly sealed. The inside of the chimney should be free of any obstructions, such as loose brick, broken pieces of tile, or corroded metal.
All chimney clean-out doors and flue connections must fit tightly so they will seal to avoid air leaks.

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.

The vent connector pipe must not pass through a combustible wall or partition unless 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 pipe. (See Fig. 17).

Figure 17



Suggested method to acommodate vent connector passage through a wall composed of combustible material.

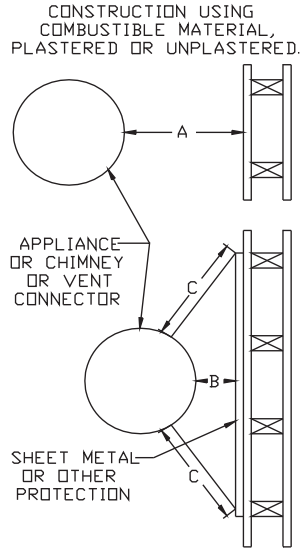
The vent connector pipe between the boiler and chimney shall be of equal diameter as the flue outlet of the boiler.

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. The horizontal length of a connector to a natural draft chimney or vent serving a single appliance shall not be more than 75 percent of the height of the vertical portion of the chimney or vent above the connector. Elbows should be minimized and the pipe should be joined with metal screws and supported by straps. All horizontal runs of vent connector pipe should be pitched upward a minimum of 1/4 inch per foot of run.

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. See Fig. 17.

Figure 18



Alternate construction that allows reduced clearances to combustible materials.

Table 5

Reduction of Clearances with Specified Forms of Protection

Type of Protection	Allowable Clearance with Specified Protection (in.)	
Applied to and covering all surfaces of combustible material within the distance specified as the required clearance with no protection. See Figure 11.	Where the required clearance with no protection from the appliance or chimney connector is: ***9 inches***	
	Above	Sides & Rear
a. 3 -1/2" thick masonry wall without ventilation air space.....	---	6
b. 1/2" insulation board over 1" glass fiber or mineral wool batts.....	6	5
c. 0.024 (24 gauge) sheet metal over 1" glass fiber or mineral wool batts reinforced with wire on rear face with ventilated air space.....	5	3
d. 3 - 1/2" thick masonry wall with ventilation air space.....	---	6
e. 0.024 (24 gauge) sheet metal with ventilated air space.....	5	3
f. /2" insulation board with ventilated air space....	5	3
g. 0.024 (24 gauge) sheet metal with ventilated air space over 0.024 (24 gauge) sheet metal with ventilated air space.....	5	3
h. 1" glass fiber or mineral wool batts sandwiched between two sheets 0.024 (24 gauge) sheet metal with ventilated air space	5	3

A. Equal the required clearance with no protection.
B. Equals the reduced clearance permitted in accordance with the preceeding clearance chart.
C. The protection applied to the construction that covers the combustible material should extend far enough in each direction to make C equal to A.

PREVENTION OF CHIMNEY CONDENSING:

PROPER VENTING REQUIRED!
Improper venting may lead to condensation in the chimney. This may result in property damage, injury, or loss of life. To prevent condensation refer to NFPA 31 Section 6 and Appendix E.

Stack gas may do one of two things as it escapes up the chimney:
A. Remain entirely in a gaseous state if the internal chimney wall temperature is above the dew point, or
B. Condense water vapor on the chimney walls if they are chilled below the dew point.
Condensing will always occur on chimney walls whose temperatures are below the dew point, but the condensate may evaporate when the walls warm above the dew point. If the chimney wall temperature does not exceed the dew point during the heating cycle of the boiler, the moisture may accumulate in large enough quantities to cause problems such as corrosion of a metal chimney (especially plain steel or galvanized steel), erosion and break up of a tile liner in a masonry chimney and, in severe cases, corrosion of the heat exchanger. Condensate also could enter the home through cracks or joints in the chimney in a worse case situation.
Condensation most likely will not occur at the bottom of the chimney because the stack gas heats the chimney walls as it rises and the bottom will be heated first. This heating of the walls will cause the stack gas temperature to drop, which in turn may reduce the stack gas temperature below dew point, causing condensation to appear on the upper part of the chimney first. This condensation may then run down inside the chimney and drip back as far as the flue pipe and heat exchanger, where corrosion may occur, if not treated.
To prevent condensation, it is necessary that the internal chimney wall temperature always be kept above the dew point. If the chimney is a masonry type, it may have to be fitted with a flue liner, when the temperature loss is too great for the boiler. If the chimney is a metal type, then an “all fuel” chimney must be used, such as a Class “A” triple wall or insulated metal chimney. A liner will act as an insulator and reduce the stack gas temperature loss. Insulation may be added around the liner for further temperature stability. If the chimney is on the home’s exterior or passes through a sizable, unheated area of the building, such as a porch, high ceiling attic, etc., and condensing occurs, the chimney must be insulated around its exterior to help the flue hold its temperature. Also, check to see if the chimney is too large for the boiler and other appliances connected to it. If so, reduce to proper size (see Appendix E of NFPA31) by lining.
Be sure to use stainless steel liners, such as stainless types 430, 304, or for the toughest corrosion problems, type 316. If the chimney is the correct size for the unit and condensing still occurs, then insulating the vent connector and/or reducing the efficiency of the boiler may have to be done to raise the chimney temperature.
More detailed information may be obtained from the latest edition of the ASHRAE HVAC Systems and Equipment Handbook.
Should the previous recommendations and information obtained from the ASHRAE Handbook fail to resolve a condensate problem, another alternative to consider is power side wall venting..

DRAFT REGULATORA - required when using BAYRAF burners

A 6” barometric-type, draft regulator is supplied with the boiler. This 6” draft regulator is approved for use with the 5” vent system required for this boiler when using BAYRAF model oil burners. The draft regulator includes an adjustable collar capable of fitting 5” 6” or 7” vent pipe. The draft regulator is calibrated to allow for easy adjustment to the boiler manufacturer’s specifications. Designed for settings from .02” to .08”. Instrumentation should be used when adjusting the unit during installation. Installation or operating conditions that produce excess amounts of draft can reduce the heating efficiency of the boiler. The purpose of the regulator is to adjust and control the flow of flue gases from the boiler by stabilizing the amount of chimney draft to which the boiler is subjected.

Install the barometric draft regulator in the vent connector as close as possible to the flue outlet collar of the boiler. However, always refer to the draft regulator manufacturer’s installation instructions for application specific recommendations.

POWER (SIDE-WALL) VENTING

⚠ CAUTION

Manufacturer will NOT assume responsibility for damage to, and deterioration of, exterior building materials, e.g. brick, siding, clapboards, and etc., in close proximity to the vent terminal due to operation of a power vented, oil boiler. This policy is applicable regardless of the cause of sooting.

Two (2) problems typically arise when power venting any oil
fired appliance:

1) Soot buildup may occur at an accelerated rate on critical components of the boiler oil burner, e.g. the primary control flame sensor ("cad cell"), the burner head, and oil nozzle.
2) Severe damage may occur to external surfaces of the structure in the event the boiler continually produces a high level of smoke in the flue gases.

Excess smoke and soot can be produced for many reasons, some of which cannot be successfully controlled by the installer and the appliance manufacturer.

NOTE: Manufacturer recommends the use of a chimney to vent residential oil boilers. If a power venter must be used, it is the responsibility of the installer and power venter manufacturer to design, assemble, and demonstrate proper operation of the power venting system with the boiler.

CHIMNEY EXHAUST VENT WITH OUTSIDE COMBUSTION AIR USING A MODEL BAYRBF BURNER

A) Use a UL and CSA approved outside air intake hood and pipe, such as Z-Vent #2FAIGAL04 and a 4" fresh air pipe system, installed and sealed in accordance with local and national codes. 4" flex-aluminum pipe with gear clamps may be used. Schedule 40 PVC pipe and fittings or a UL or CSA approved type B vent system may also be used.
B) Use adapter BAYDVK10AADPTA to connect to the BAYRBF burner air intake.
C) Always keep intake air run to the minumum.
D) Maximum intake air run for 4 inch diameter, flexible or rigid type of venting = 100 equivalent feet.
E) Reduce intake air length by 10 feet for every 90° elbow used and 5 feet for every 45° elbow used.
F) It is suggested that metallic air intake venting be insulated with R7 (min) foil lined insulation a minimum of 10 feet from air intake source. (This prevents condensation or corrosion of intake air venting)
G) Use a UL and CSA approved type of intake air vacuum breaker. This is to be installed in the same room as the burner in the case of the air intake being blocked. This device should be tested to prove that the vacuum breaker balancer is set correctly and can provide sufficient air for combustion for the burner in the event the intake air source is blocked. If the room in which the burner is installed into cannot provide enough air, or air quality is a concern, an additional air inlet source must be provided to this room.

SIDEWALL DIRECT VENT (BALANCED FLUE) COMBINATION FRESH AIR AND FLUE VENT APPLICATIONS USING A BAYRBF OIL BURNER

Use only UL and CSA approved components for side wall balanced flue, direct vent applications. These components are shown in Table 5A and are available from the boiler manufacturer.

See installation and maintenance instructions in Appendix A at the end of this document for installing balanced flue, direct vent components.

Notes:
1. Maximum balanced flue direct vent length is 20 feet.
2. Use 4" fresh air intake pipe.
3. For flue exhaust, use dual wall insulated 4" ID, 5" OD pipe.
4. Minimum 1" clearance is required from flue gas vent pipe to combustible material.
5. Zero-clearance is allowed at vent terminal only.

CHIMNEY EXHAUST VENT WITH OUTSIDE
COMBUSTION AIR USING BAYRBF BURNER
(All venting components field supplied)

THIS INTAKE AIR LAYOUT FOR CHIMNEY APPLICATIONS ONLY
For Direct Vent Illustrations, see Appendix A

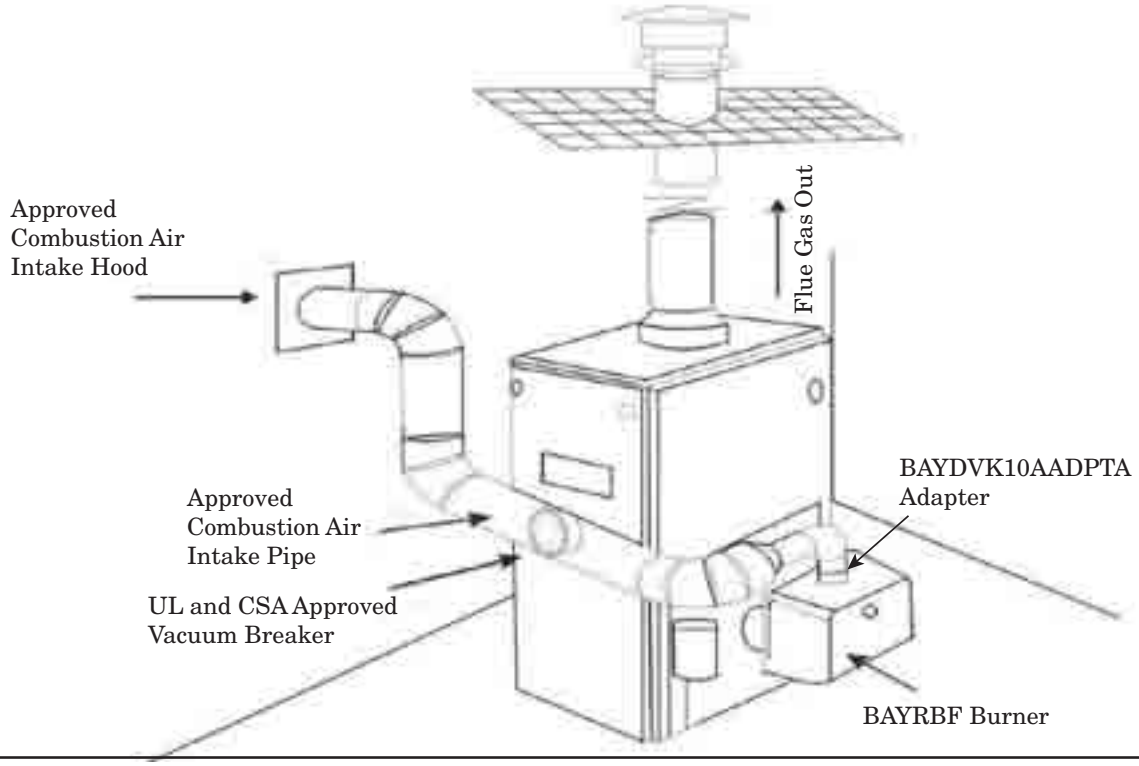
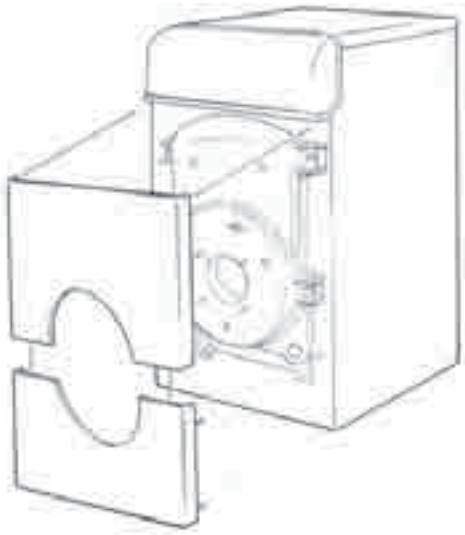


Table 5A Venting Components Approved for use in Balanced Flue Direct Vent Applications with BAYRBF Burner	
BAYDVK10ARELLA	Direct Vent Kit for BAYRBF Oil Burner - 10 Ft Long (Does not include vent terminal)*
BAYDVK20ARELLA	Direct Vent Kit for BAYRBF Oil Burner - 20 Ft Long (Does not include vent terminal)*
BAYDVK10AADPTA	Adapter, Combustion Air Intake, 3" to 4" for BAYRBF Oil Burner collar
BAYVKS10ATUBEA	Vent Pipe Sealant, Direct Vent Oil Burner - 10 OZ Tube
BAYVTS10AFAFVA	Vent Terminal, Standard, Combination Fresh Air Intake And Flue Vent
BAYVTR10AFAFVA	Vent Terminal, 18" Riser, Combination Fresh Air Intake And Flue Vent
BAYVTR20AFAFVA	Vent Terminal, 36" Riser, Combination Fresh Air Intake And Flue Vent
* Includes flex double-wall vent pipe, flex combustion air pipe, adapters, clamps and 10 oz. sealant.	

3.9 Boiler Swing Door Conversion

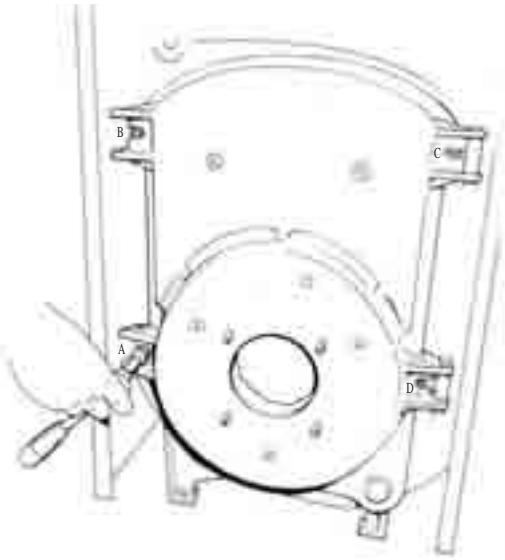
The boiler swing door ships from the factory with hinges installed on the right side of the boiler allowing the door to be opened from the left side. If an application requires the door to open from the right, use the following instructions to convert the door.

Figure 19



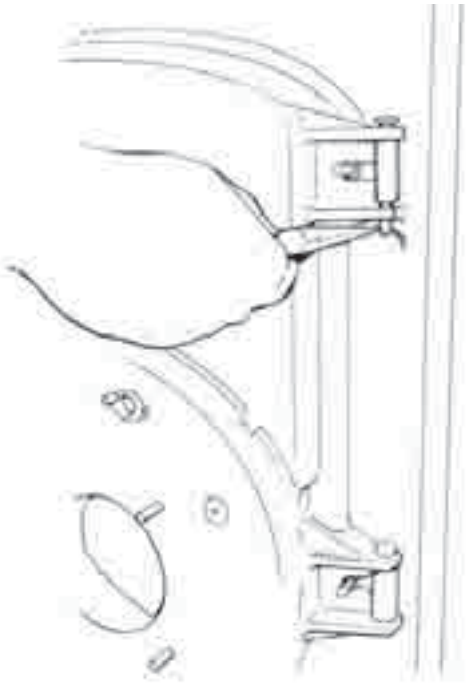
1. Remove upper and lower front access panels. Each panel is attached to the boiler with 4 pins, one in each corner. Pull panels forward to remove.

Figure 20



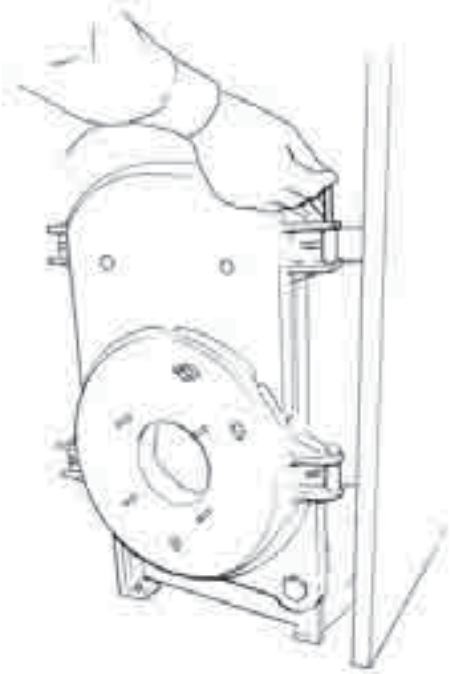
2. Remove and save 4 nuts securing door to boiler.

Figure 21



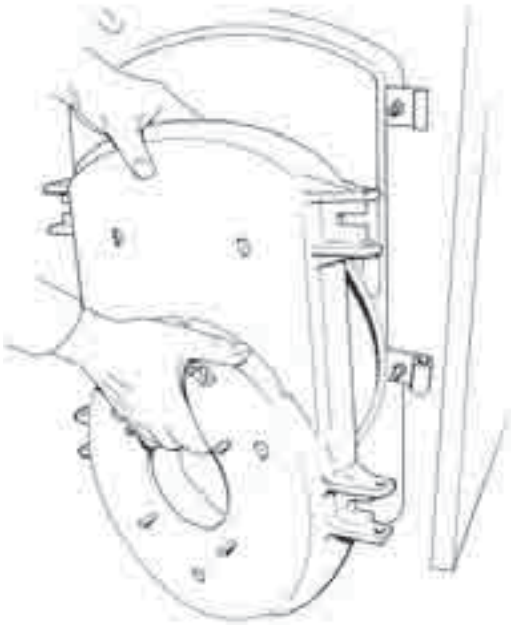
3. Remove upper and lower cotter pins from hinge pins.

Figure 22



4. Hold door to boiler and remove top and bottom hinge pins.

Figure 23

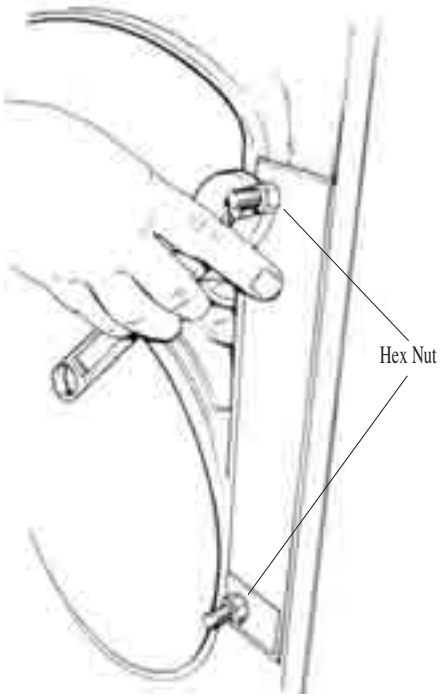


5. Remove door from hinges.

Figure 24

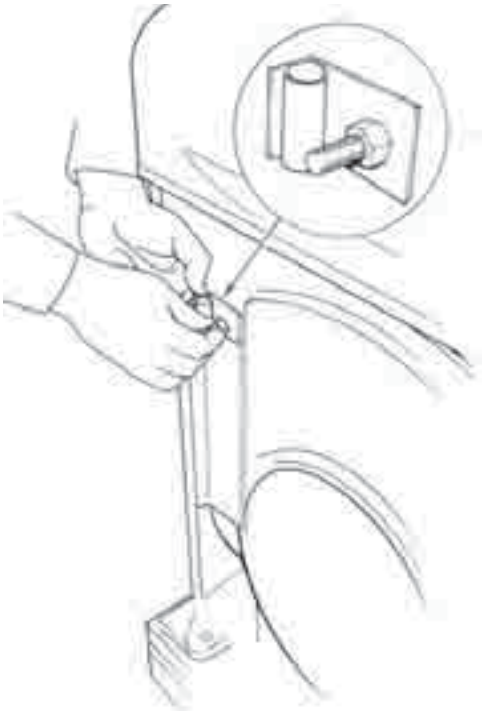
6. Remove the upper and lower hinges. To remove, rotate the hex nut securing the hinges counter clockwise. Save both threaded rod with hext nut and hinges.

Figure 25



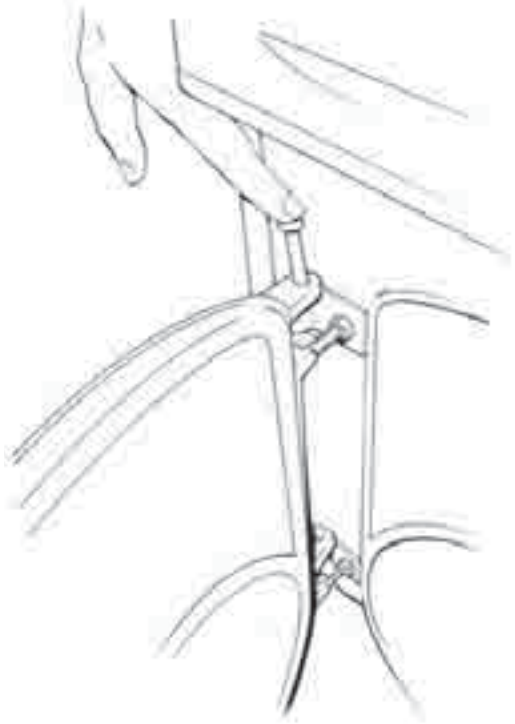
7. Replace threaded rod that secured the hinges to the right side of the boiler. Rotate the hex nut clockwise to tighten.

Figure 26



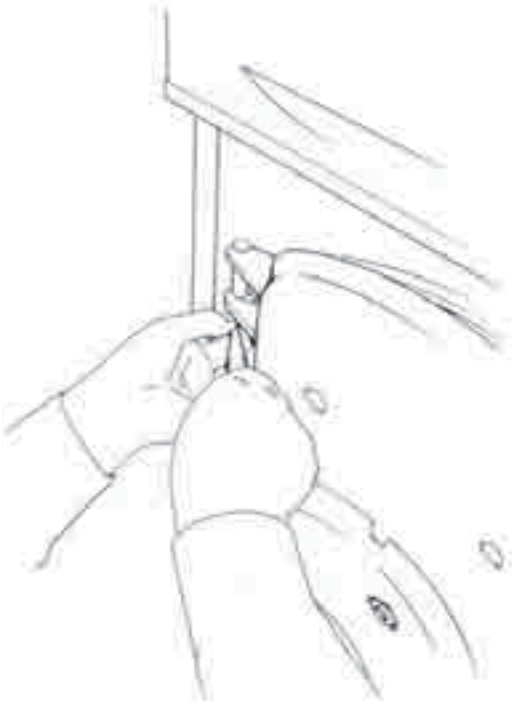
8. Remove the threaded rods with hex nuts from the left side of the boiler door frame. Install hinges as illustrated.

Figure 27



9. Set the swing door on the hinges while inserting hinge pins saved from step 3.

Figure 28



10. Replace cotter pins. Proceed with installing burner on swing door.

3.9 Oil Burner Installation Instructions

Models BAYRAF03ABURNA (F3), BAYRAF05ABURNA (F5) and BAYRAF10ABURNA (F10)

⚠ CAUTION

Before opening the boiler door, disconnect burner cord at the plug.

NOTE: The burner settings used in this manual were obtained under laboratory conditions and may vary from those obtained in the actual installation of the burner. Combustion results must be verified using proper combustion test equipment. The manufacturer of the burner and boiler will not be responsible for the improper installation or set-up of the appliance.

PACKAGE LIST

Your Riello BAYRAF03ABURNA (F3), BAYRAF05ABURNA (F5) or BAYRAF10ABURNA (F10) burner should include the following parts. Please check to make sure all parts are present before beginning the installation.

QTY. DESCRIPTION (parts bag)

1 - Burner assembly with factory assembled, prewired, wiring harness with 7 pin polarized plug
1 - Mounting Gasket
1 - Installation Manual
1 - Parts Bag, including:
- 1 - By-pass plug
- 1 - Female ¼" NPT adapter
- 1 - Male 3/8" NPT adapter
- 1 - 2.5 mm Allen key
- 1 - Oil pump connector (supply)
- 1 - Oil pump connector (return)
- 1 - Riello Burner Instructions

Nozzle(s) included with Burner:
(F3) 1 - Delavan Nozzle, 0.55x80° B
(F5) 2 - Delavan Nozzles, 1.00x60° W and 1.20x60° B
(F10) 1 - Delavan Nozzle, 1.65x60° B

BAYRAF03ABURNA, BAYRAF05ABURNA, BAYRAF10ABURNA OIL BURNERS TECHNICAL DATA

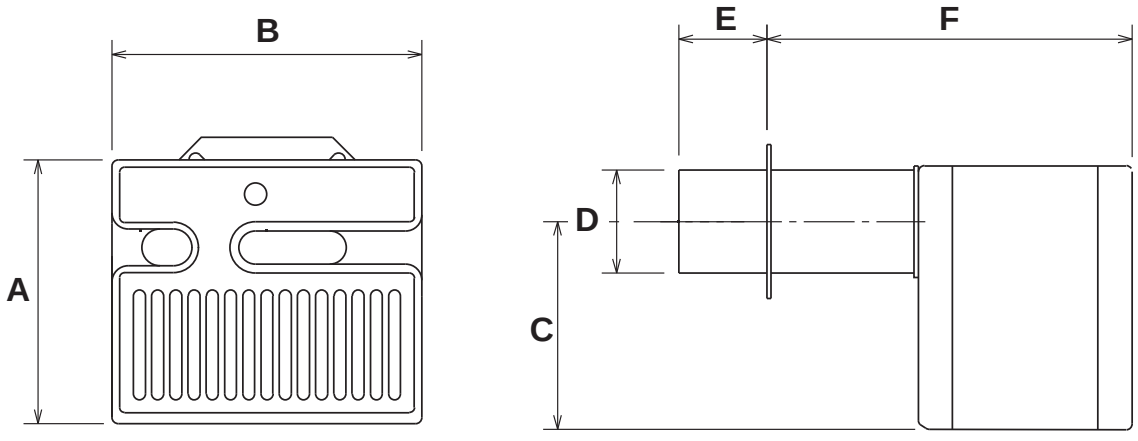


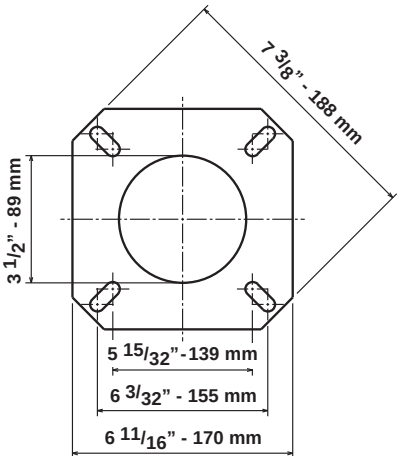
Figure 29

Table 6

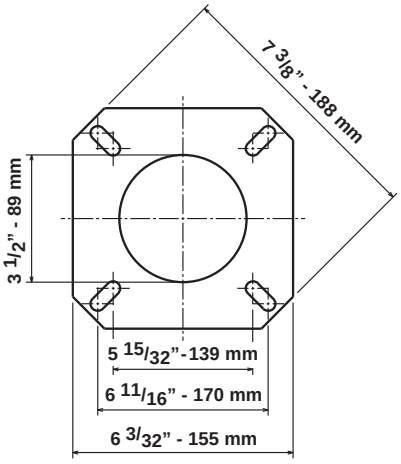
	DIMENSIONS					
MODEL	A in.(mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)
BAYRAF03ABURNA (F3)	8-15/32 (215)	9-59/64 (252)	6-15/32 (164)	3-1/2 (89)	2 (51)	12-7/8 (327)
BAYRAF05ABURNA (F5)	9-11/64 (233)	10-11/16 (272)	7-3/32 (180)	3-1/2 (89)	2 (51)	13-3/8 (340)
BAYRAF10ABURNA (F10)	10-5/16 (262)	12 (305)	8-1/32 (204)	3-15/16 (100)	2 (51)	13-7/16 (341)

Table 7			
SPECIFICATIONS			
MODEL	BAYRAF03ABURNA (F3)	BAYRAF05ABURNA (F5)	BAYRAF10ABURNA (F10)
FUEL:	NO heavier than #2 FUEL OIL	NO heavier than #2 FUEL OIL	NO heavier than #2 FUEL OIL
FIRING RATE:	0.50 to 0.95 US GPH	0.75 to 1.65 US GPH	1.45 to 2.95 US GPH
EFFECTIVE OUTPUT:	70,000 to 133,000 BTU/h	105,000 to 231,000 BTU/h	203,000 to 413,000 BTU/hr
VOLTAGE (Single Phase):	120V 60Hz (+10% -15%)	120V 60Hz (+10% -15%)	120V 60Hz (+10% -15%)
ABSORBED ELECTRICAL POWER:	155 Watts	175 Watts	230 Watts
MOTOR (rated):	3250 rpm - Run Current 2.2 AMP	3250 rpm - Run Current 2.2 AMP	3250 rpm - Run Current 2.2 AMP
CAPACITOR:	12.5 Microfarads	12.5 Microfarads	12.5 Microfarads
PUMP PRESSURE:	130 to 200 psig	130 to 200 psig	100 to 200 psig
PRIMARY CONTROL:	RIELLO 530 SE/C	RIELLO 530 SE/C	RIELLO 530 SE/C
IGNITION TRANSFORMER:	8Kv 16mA	8Kv 16mA	8Kv 16mA

Models BAYRAF03ABURNA (F3)
& BAYRAF05ABURNA (F5)



Model BAYRAF10ABURNA (F10)



Oil Burner Installation Instructions

Models BAYRBF03ABURNA (BF3) and BAYRBF05ABURNA (BF5)

⚠ CAUTION

Before opening the boiler door, disconnect burner cord at the plug.

NOTE: The burner settings used in this manual were obtained under laboratory conditions and may vary from those obtained in the actual installation of the burner. Combustion results must be verified using proper combustion test equipment. The manufacturer of the burner and boiler will not be responsible for the improper installation or set-up of the appliance.

It is mandatory that a combustion analysis be conducted at initial startup and at least annually as part of boiler maintenance. Analysis should include smoke number, CO2 % and CO ppm.

PACKAGE LIST

Your Riello BAYRBF03ABURNA (BF3) or BAYRBF05ABURNA (BF5) burner should include the following parts. Please check to make sure all parts are present before beginning the installation.

QTY. DESCRIPTION (parts bag)

1 - Burner assembly with factory assembled, pre-wired, wiring harness with 7 pin polarized plug
1 - Mounting Gasket
1 - Installation Manual
1 - Parts Bag, including:
- 1 - NPT - NPFT pipe adapter
- 1 - By-pass plug
- Nozzle(s) as follows:
- (BF3) 1 - Delavan Nozzle 0.55x80° B
- (BF5) 2 - Delavan Nozzles, 1.00x60° W and 1.20x60° B

BAYRBF03ABURNA, BAYRBF05ABURNA OIL BURNER TECHNICAL DATA

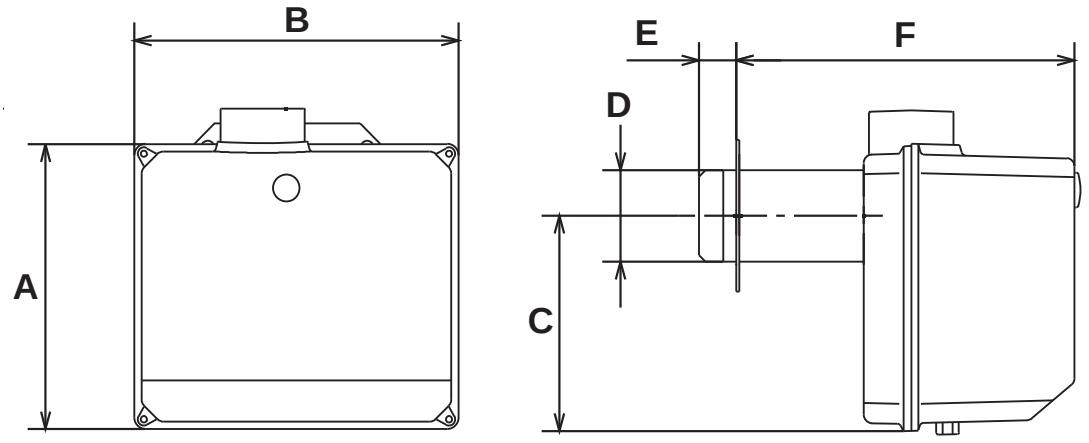


Figure 30

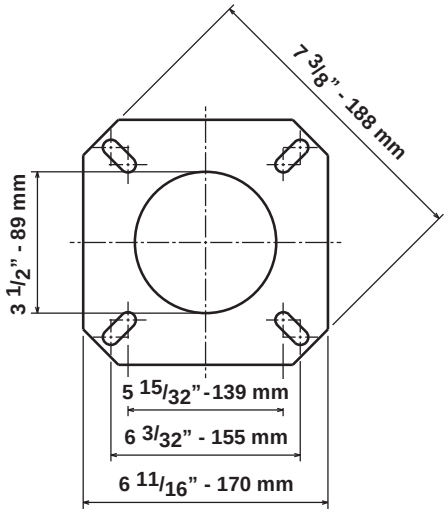
Table 8

DIMENSIONS

MODEL	A in.(mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)
BAYRBF03ABURNA	9-13/16 (249)	11-1/4 (286)	7-1/2 (193)	3-1/2 (89)	2 (51)	16-1/4 (413)
BAYRBF05ABURNA	9-13/16 (249)	11-1/2 (292)	7-1/2 (193)	3-1/2 (89)	2 (51)	16-3/4 (425)

Table 9		
SPECIFICATIONS		
MODEL	BAYRBF03ABURNA	BAYRBF05ABURNA
FUEL:	No. 2 Fuel Oil	No. 2 Fuel Oil
FIRING RATE:	0.50 to 0.95 US GPH	0.75 to 1.65 US GPH
EFFECTIVE OUTPUT:	70,000 to 133,000 BTU/hr	105,000 to 231,000 BTU/hr
VOLTAGE (Single Phase):	120V 60Hz (+10% -15%)	120V 60Hz (+10% -15%)
ABSORBED ELECTRICAL POWER:	192 Watts	204 Watts
MOTOR (rated):	3250 rpm - Run Current 2.2 AMP	3250 rpm - Run Current 2.2 AMP
CAPACITOR:	12.5 Microfarads 260V	12.5 Microfarads 260V
PUMP PRESSURE:	100 to 200 psig	100 to 200 psig
PRIMARY CONTROL:	RIELLO 530 SE/C	RIELLO 530 SE/C
IGNITION TRANSFORMER:	8Kv 16mA*	8Kv 16mA*
* with intake air temperature at 20°C (68°F)		

Models BAYRBF03ABURNA (BF3)
& BAYRBF05ABURNA (BF5)



Models BAYRAF03ABURNA, BAYRAF05ABURNA and BAYRAF10ABURNA

BURNER COMPONENTS IDENTIFICATION

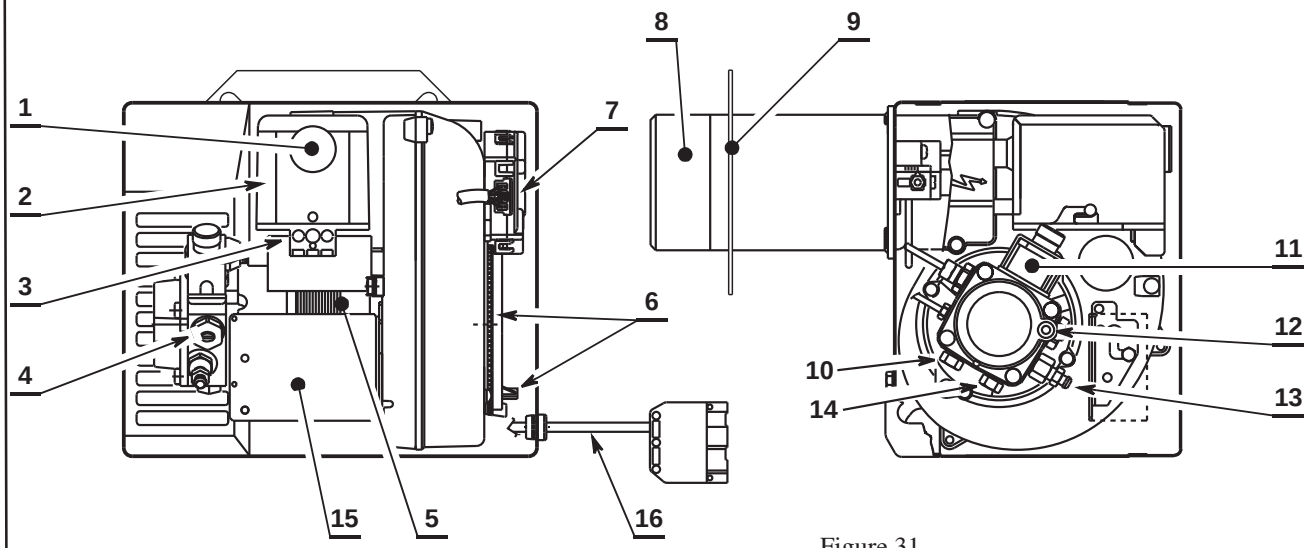


Figure 31

BURNER KEY COMPONENTS FOR
BAYRAF03ABURNA, BAYRAF05ABURNA & BAYRAF10ABURNA

1. Lockout Indicator Lamp and Reset Button
2. Primary Control
3. Primary Control Sub-base
4. Pump Pressure Regulator
5. Motor
6. Air Adjustment and Shutter
7. Electronic Air Shutter Assembly
8. Combustion Head
9. Flange
10. Supply Fuel Line Port
11. Pump Valve (Coil)
12. Vacuum Gauge Port
13. Pressure Gauge and Bleeder Port
14. Return Fuel Line Port
15. 24V Switching Relay
16. Wire Harness

Models BAYRBF03ABURNA & BAYRBF05ABURNA

BURNER COMPONENTS IDENTIFICATION

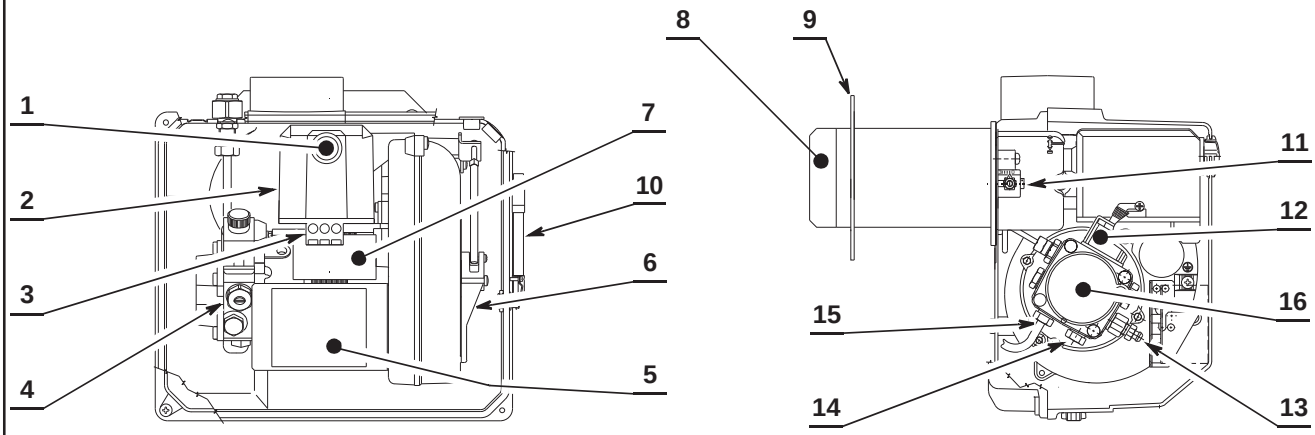
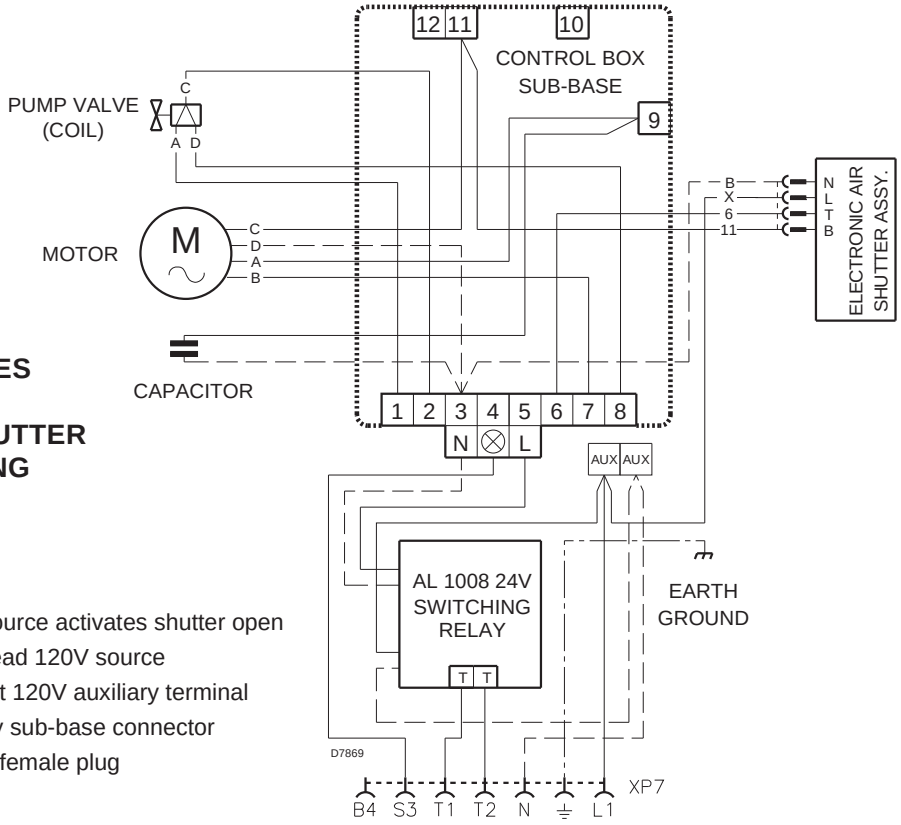


Figure 32

BURNER KEY COMPONENTS FOR
BAYRBF03ABURNA & BAYRBF05ABURNA

1. Lockout Indicator Lamp and Reset Button
2. Primary Control
3. Primary Control Sub-base
4. Pump Pressure Regulator
5. 24V Switching Relay
6. Air Adjustment
7. Capacitor
8. Combustion Head
9. Welded Flange
10. Wire Harness
11. Turbolator Adjustment Screw
12. Coil
13. Bleeder and Pressure Gauge Port
14. Return Fuel Line Port
15. Inlet Fuel Line Port
16. Pump

INTERNAL FACTORY WIRING



RIELLO 40 F3, F5, F10 SERIES OIL BURNER EQUIPPED WITH AN ELECTRONIC AIR SHUTTER INTERNAL FACTORY WIRING

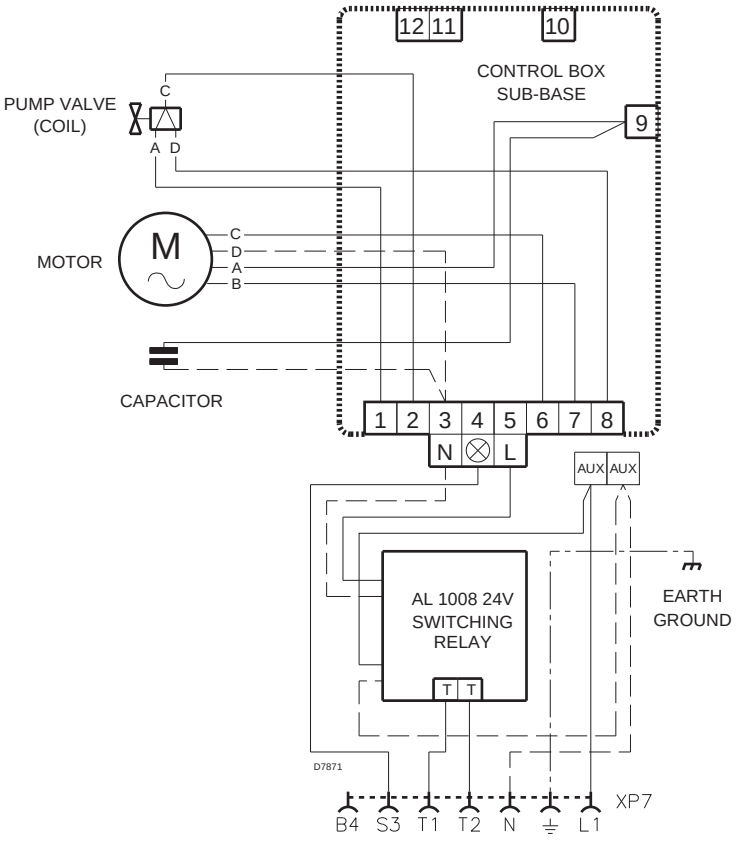
Key to lay-out:

A - Brown
B - White
C - Blue
D - Black

6 - 120V source activates shutter open
11 - motor lead 120V source
X - constant 120V auxiliary terminal
AUX - auxiliary sub-base connector
XP7 - 7 poles female plug

INTERNAL FACTORY WIRING

WARNING:
If a neutral or ground lead is attached to this terminal, the CONTROL BOX on the burner will be damaged should lockout occur.



RIELLO 40 BF3, BF5 SERIES OIL BURNER EQUIPPED WITH AN ELECTRONIC AIR SHUTTER INTERNAL FACTORY WIRING

Key to lay-out:

A - Brown
B - White
C - Blue
D - Black
XP7 - 7 poles female plug
AUX - auxiliary sub-base connector

INITIAL SET UP

NOTE: If further detail is needed, refer to the Riello burner installation guide inside the Riello Burner.

A. OPEN BURNER CARTON

Remove the burner assembly, mounting gasket, parts bag, and ship with literature from the carton. Check the parts list to ensure all parts are present. The oil burner ships factory assembled.

B. NOZZLE SELECTION/REPLACEMENT

The oil burners ship with a factory installed nozzle for application with a specific boiler model. See Page 37, for approved Riello burner and boiler combinations. Page 37 provides the correct firing rate and nozzle size for each combination. Burners ship with one or two additional nozzles to accommodate other combinations. Use the information on page 37 to determine if a nozzle change is required.

C. If a different size nozzle is needed, loosen the oil delivery tube nut from the pump. Refer to Figures 33 and 34.

Model 40 BF3 & BF5

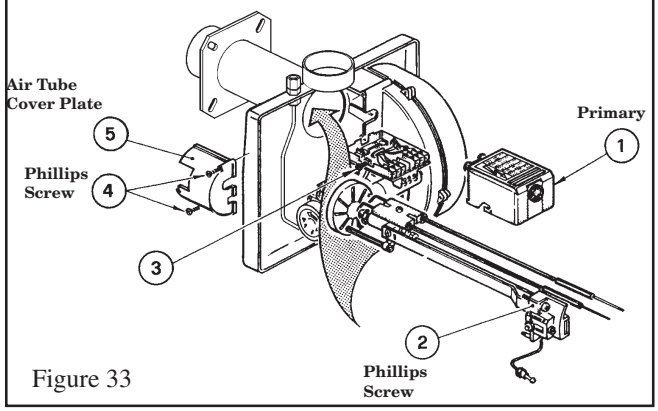


Figure 33

Model 40 F3, F5 & F10

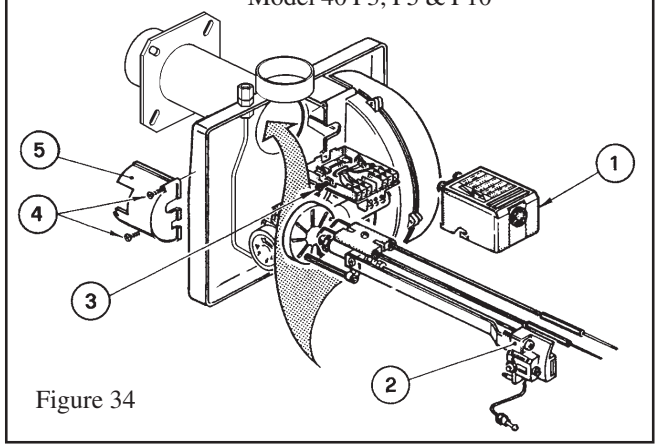


Figure 34

D. REMOVAL OF DRAWER ASSEMBLY

1. To remove the drawer assembly, loosen the screw (3) securing the PRIMARY CONTROL (1) and then unplug by carefully pulling it back and then upward.

2. Remove the AIR TUBE COVER PLATE (5) by loosening the two retaining SCREWS (4) (See Figures 33 and 34). (Two screws for Model BF5)

3. Disconnect the fuel line from the fuel pump.

4. Loosen Phillips SCREW (2) that secures the drawer assembly and then slide the complete drawer assembly out of the combustion head as shown in Figures 33 and 34.

5. To insert drawer assembly, reverse the procedures in steps 1-4 above.

E. NOZZLE REPLACEMENT

1. Remove the NOZZLE ADAPTER (2) (Figure 35) from the DRAWER ASSEMBLY by loosening the Phillips SCREW (1).

2. Insert the proper NOZZLE into the NOZZLE ADAPTER and tighten securely DO NOT overtighten.

3. Replace adapter with new nozzle installed, into the drawer assembly and secure with Phillips screw (1).

NOTE:
The nozzle and the pump pressure must be in accordance with the burner setup charts on pages 38 and 39.

4. To insert drawer assembly, reverse the procedure in steps 1 to 4 above and then attach fuel line to the pump.

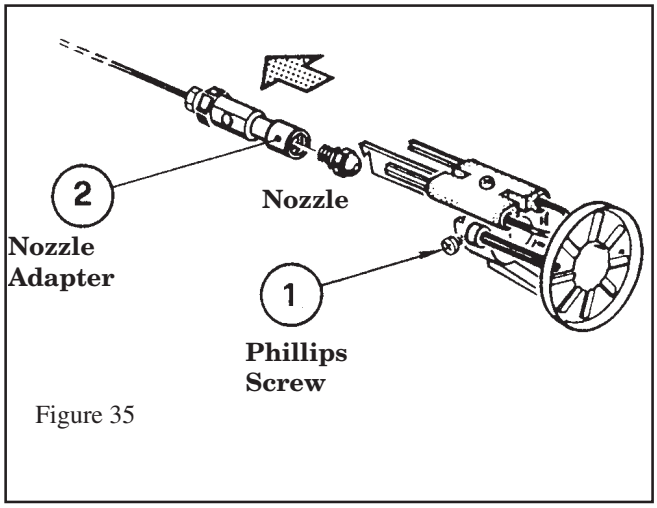


Figure 35

Approved Boiler/Oil Burner Combinations

Burner Model	*PFWF071A93ABA for 3 Pass Cast Iron HX, 3 Sections	*PFWF099A94ABAA for 3 Pass Cast Iron HX, 4 Sections	*PFWF132A95ABAA for 3 Pass Cast Iron HX, 5 Sections	*PFWF164A96ABAA for 3 Pass Cast Iron HX, 6 Sections	*PFWF201A97ABAA for 3 Pass Cast Iron HX, 7 Sections
Burner Model	BAYRAF03ABURNA	BAYRAF03ABURNA	BAYRAF05ABURNA	BAYRAF05ABURNA	BAYRAF05ABURNA
Firing Rate	0.50 GPH	0.70	0.94	1.17	1.44
Insertion Depth	2.0”	2.0”	2.0”	2.0”	2.0”
Nozzle Size	0.40	0.55	0.80	1.00	1.20
Spray Pattern	80°B	80°B	60°W	60°W	60°B
Nozzle Mfg.	Delavan	Delavan	Delavan	Delavan	Delavan
Alt Nozzle	N/A	0.55	0.80	1.00	1.20
Spray Pattern	N/A	60°B	60°B	60°SS	60°B
Nozzle Mfg.	N/A	Delavan	Delavan	Hago	Hago
Pump Pressure	170	160	140	135	145
Air Gate	1.5	2.5	2.5	3.0	3.5
Turbulator	0.0	1.0	0.0	2.0	4.0

Burner Model	*PFWF242A98ABA for 3 Pass Cast Iron HX, 8 Sections	*PFWF286A99ABAA for 3 Pass Cast Iron HX, 9 Sections
Burner Model	BAYRAF10ABURNA	BAYRAF10ABURNA
Firing Rate	1.73 GPH	2.05 GPH
Insertion Depth	2.0”	2.0”
Nozzle Size	1.35	1.65
Spray Pattern	30°B	60°B
Nozzle Mfg.	Delavan	Delavan
Alt Nozzle	1.35	N/A
Spray Pattern	30°B	N/A
Nozzle Mfg.	Hago	N/A
Pump Pressure	165	155
Air Gate	3.4	3.4
Turbulator	2.0	4.0

Note:

1. * May be "A" or "T"
2. Burner mounting flange insertion depth; measured from tip of end cone to flange.
3. Due to positive pressure in the combustion chamber, it is recommended that the air tube and flange be sealed.
4. Unit model *PFWF071 and *PFWF099; BAYRAF03ABURNA burner with 6 slots reverse flow turbulator disk.
5. Burners tested under single gravity fed fuel system, burner cover in place during all recordings and observations.
6. The *PFWF071, *PFWF099, and *PFWF132 models use a baffle in the flue passages.
7. BAYRAF03ABURNA ships with 0.40 Delavan nozzle installed with 80° B spray pattern. 0.55 nozzle is included, but not installed.
8. BAYRAF05ABURNA ships with 0.80 Delavan nozzle installed with 60° W spray pattern. 1.00 & 1.20 Hago nozzles are included, but not installed.
9. BAYRAF10ABURNA ships with 1.35 Delavan nozzle installed with 30° B spray pattern. 1.65 nozzle is included, but not installed.

Approved Boiler/Oil Burner Combinations

Burner Model	*PFWF071A93ABA for 3 Pass Cast Iron HX, 3 Sections	*PFWF099A94ABAA for 3 Pass Cast Iron HX, 4 Sections	*PFWF132A95ABAA for 3 Pass Cast Iron HX, 5 Sections	*PFWF164A96ABAA for 3 Pass Cast Iron HX, 6 Sections	*PFWF201A97ABAA for 3 Pass Cast Iron HX, 7 Sections
Burner Model	BAYRBF03ABURNA	BAYRBF03ABURNA	BAYRBF05ABURNA	BAYRBF05ABURNA	BAYRBF05ABURNA
Firing Rate	0.50 GPH	0.70	0.94	1.17	1.44
Insertion Depth	2.0”	2.0”	2.0”	2.0”	2.0”
Nozzle Size	0.40	0.55	0.80	1.00	1.20
Spray Pattern	80°B	80°B	60°W	60°W	60°B
Nozzle Mfg.	Delavan	Delavan	Delavan	Delavan	Delavan
Alt Nozzle	0.40	0.55	0.80	1.00	1.20
Spray Pattern	70°B	60°B	60°B	60°SS	60°B
Nozzle Mfg.	N/A	Delavan	Delavan	Hago	Hago
Pump Pressure	170	160	140	135	145
Air Gate	3.0	4.8	4.0	5.0	6.1
Turbulator	0.0	1.0	0.0	2.0	4.0

Note:

1. * May be "A" or "T"
2. Burner mounting flange insertion depth; measured from tip of end cone to flange.
3. Due to positive pressure in the combustion chamber, it is recommended that the air tube and flange be sealed.
4. Unit model *PFWF071 and *PFWF099; BAYRBF03ABURNA burner with 6 slots reverse flow turbulator disk.
5. Burners tested under single gravity fed fuel system, burner cover in place during all recordings and observations.
6. The *PFWF071, *PFWF099, and *PFWF132 models use a baffle in the flue passages.
7. BAYRBF03ABURNA ships with a 0.40 Delavan nozzle installed with an 80° B spray pattern. 0.55 (80° B) nozzle is included but not installed.
8. BAYRBF05ABURNA ships with a 0.80 Delavan nozzle installed with a 60° W spray pattern. 1.00 (60° W) and 1.20 (60° B) nozzles are included but not installed.
9. 20 feet of double wall flexible vent tubing 4" inside diameter - 5" outside diameter to vent combustion products outside.
10. 20 feet of single wall flexible vent tubing 4" diameter for fresh air intake.
11. One burner air adapter 3" to 4". One terminal adapter 4" to 4" to vent terminal. One appliance adapter 5" to 4".
12. Two air intake clamps. One vent terminal dual for fresh air intake and flue combination.

ELECTRODE SETTING

IMPORTANT: These dimensions MUST be observed and verified. (Figure 36)

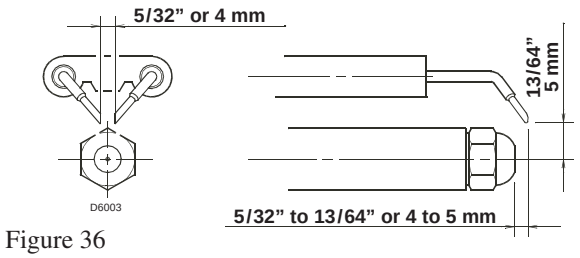


Figure 36

TURBULATOR ADJUSTMENT (Figure 37)

Set turbulator adjustment for specific input required.
A. Loosen NUT (1), and then turn SCREW (2) until the INDEX MARKER (3) is aligned with the correct index number as per the burner set up chart.

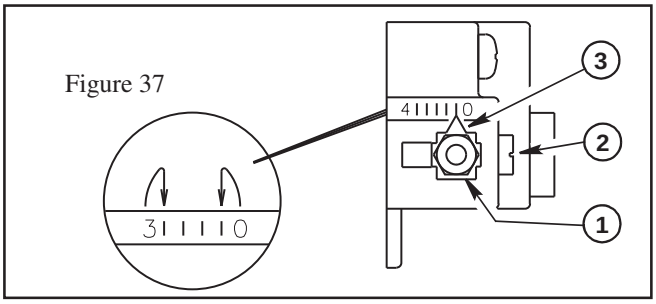


Figure 37

B. Retighten the retaining nut (1).

NOTE: Model F3 and BF3: Zero and three are scale indicators only. From left to right, the first line is 3 and the last is 0.
NOTE: Model F3 and BF5: Same as above except the scale indicators are 0 and 4 as shown in Figure 37.

Model F3, F5, and F10

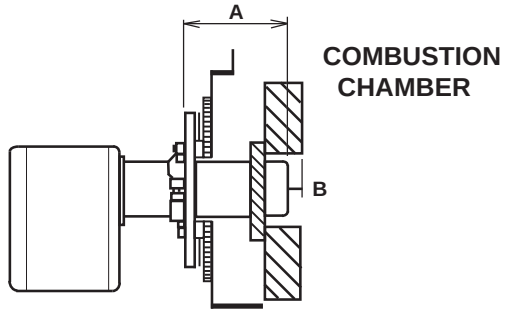


Figure 38A

BURNER INSTALLATION

A. Screw the four (4) M8 x 1.25 double end threaded studs in the four equally spaced threaded holes located in the boiler door. Screw the short end of the stud into the boiler door until the stud bottoms. (See Figures 38B & 39A, item 3)

B. Align the prepunched mounting gasket with the four (4) threaded studs on the boiler swing door. Push the gasket onto the studs and seat against the door. (See Figures 38B & 39A, item 2)

C. The burner may now be attached to the boiler by inserting the air tube through the burner access hole (8) and into the appliance, aligning the holes on the mounting flange with the threaded studs on the boiler door. Push the burner forward until the mounting flange is seated against the gasket.

D. Secure the burner to the boiler door with the four (4) locking hex washer head nuts that are included with the boiler ship with hardware.

E. Visually verify proper air tube insertion and alignment into the boiler door. Dimension "B" should be at least 1/4". The mounting flange is welded to the air tube and the end cone should align at least 1/4" back from the outer edge of the refractory on the inside of the boiler door. (See Figures 38A & 39B). The welded mounting flange provides amignment of the air tube. No further adjustment recorded.

1. Mounting Flange (welded to air tube)
2. Mounting Gasket
3. M8 x 1.25 Double End Threaded Studs, included with boiler hardware
4. Burner Access Hole

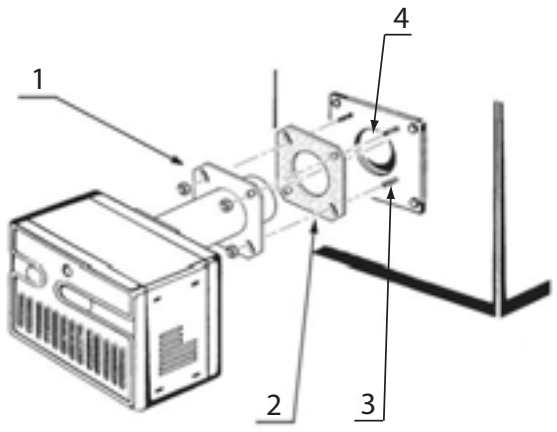
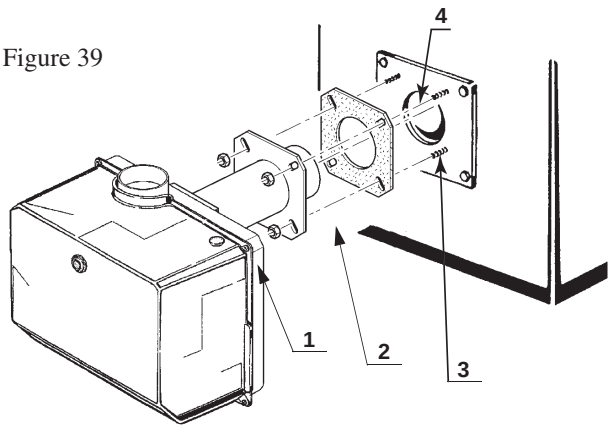


Figure 38b

Model BF3 and BF5

1. Mounting Flange
2. Mounting Gasket
3. Burner Access Hole
4. M8 x 1.25 Double End Threaded Studs, included with boiler hardware

Figure 39



The electrical connection between the boiler and the burner is made using a 7-pin plug. The boiler cord will be found near the front left base of the boiler. Connect the burner plug. Electrical connection and startup are covered later in this document.

PUMP CONNECTIONS AND PORT IDENTIFICATION

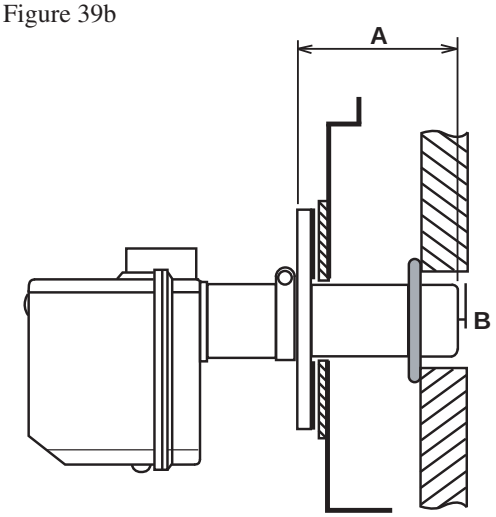
This burner is shipped with the oil pump set to operate on a **single** line system. To operate on a **two-line** system the by-pass plug must be installed.

⚠ CAUTION

Do NOT operate a **single** line system with the by-pass plug installed. Operating a **single** line system with the by-pass plug installed will result in damage to the pump shaft seal.

NOTE: Pump pressure must be set at time of burner start-up. A pressure gauge is attached to the PRESSURE PORT (8) for pressure readings. Two PIPE CONNECTORS (4) are supplied with the burner for connection to either a single or two-line system. Also supplied are two ADAPTORS (3), two female ¼" NPT, to adapt oil lines to burner pipe connectors. All pump port threads are British Parallel Thread design. **NOTE:** Direct connection of NPT threads to the pump will damage the pump body.

Figure 39b



WET BASED CHAMBER APPLICATIONS

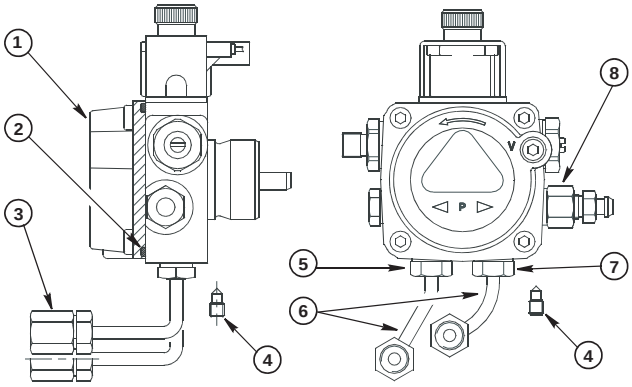


Figure 40

Pump Legend

1. Pump Cover
2. Pump Cover O-Ring
3. BSPP to NPT Adapters
4. Return Port By-Pass Screw
5. Supply Port
6. Supply and Return Oil Lines
7. Return Port
8. Pump Pressure and Bleeder Port

SINGLE LINE (GRAVITY FEED SYSTEM)

A. The burner is shipped configured for use in single line applications. No changes to the oil pump are required for use in single line applications.

NOTE: If the **pump cover** (1) is removed for any reason, be sure the O-ring (2), is properly seated in the pump cover (1) before re-attaching the pump cover to the pump housing. See Figure 40.

B. Attach the two PIPE CONNECTORS (6) to the pump SUPPLY and pump RETURN PORTS (5 and 7). Attach the required piping to these two pipe connectors using the NPT/ METRIC ADAPTERS that are supplied with the burner.

C. Connect the pipe connector to the SUPPLY PORT (5) of the pump. Attach the NPT adapter to the pipe connector. Attach the required piping to this pipe adapter. Be sure that the plug in the RETURN PORT (7) is tightened securely. See Figure 40. Do not exceed the pipe lengths indicated in the table 12.

TWO LINE (LIFT SYSTEM)
A. If a two-line system is required, install the By-pass plug provided. The By-pass plug is installed in the return port of the pump. A 2.5-mm hexagonal key provided with the by-pass plug is to be used to install the plug. DO NOT use an inch size **hexagonal key**; damage to the by-pass plug may result. When operating on a two-line system, supply and return lines should be the same diameter and both should extend to the same depth inside the fuel tank. Be sure there are no air leaks or blockages in the piping system. Any obstructions in the return will cause failure of the pump shaft seal. Do not exceed the pipe lengths indicated in the table 13.

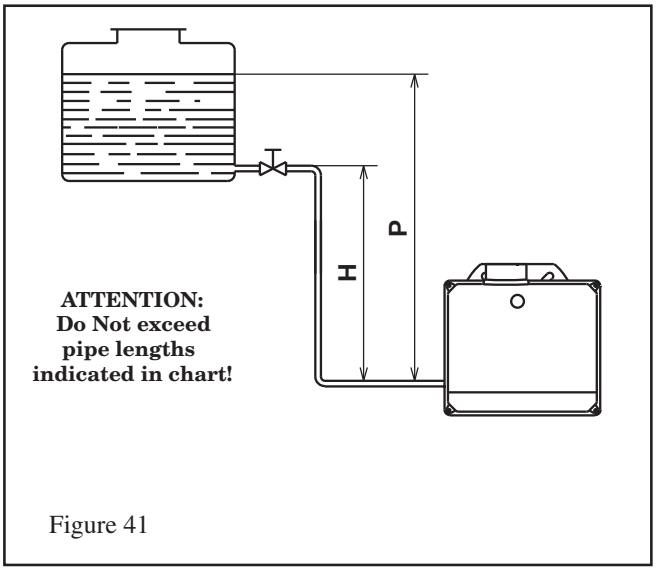


Figure 41

To install the by-pass plug: (Figure 40)
1) Remove the return plug (7)
2) Install the by-pass plug (4) using the 2.5 mm hexagonal key

Table 12
SINGLE LINE SYSTEM-PIPE LENGTHS

H		3/8" OD		1/2" OD	
FT	M	FT	M	FT	M
1.5	0.5	33.0	10.0	65.0	20.0
3.0	1.0	65.0	20.0	130.0	40.0
5.0	1.5	130.0	40.0	260.0	80.0
6.5	2.0	195.0	60.0	325.0	100.0

Table 13
2 LINE (LIFT) SYSTEM-PIPE LENGTHS

H		3/8" OD		1/2" OD	
FT	M	FT	M	FT	M
0.0	0.0	115.0	35.0	330.0	100.0
1.5	0.5	100.0	30.0	330.0	100.0
3.0	1.0	80.0	25.0	330.0	100.0
5.0	1.5	65.0	20.0	295.0	90.0
6.5	2.0	50.0	15.0	230.0	70.0
9.5	3.0	25.0	8.0	100.0	30.0
11.0	3.5	20.0	6.0	65.0	20.0

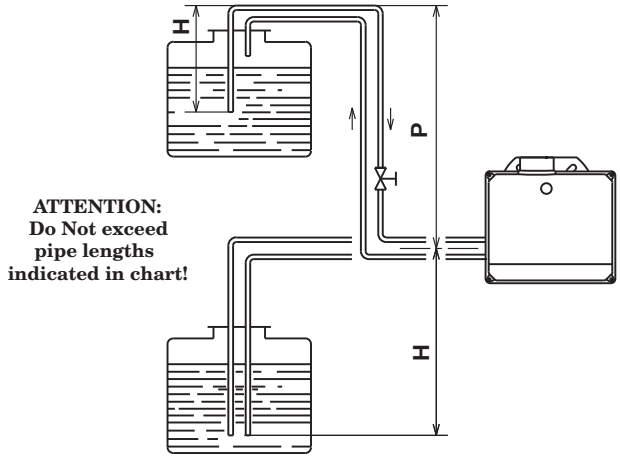


Figure 42

⚠ WARNING

PIPE DOPE AND TEFLON TAPES ARE NOT TO BE USED ON ANY DIRECT OIL CONNECTION TO THE FUEL PUMP. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

The height "P" in pipe length charts should not exceed 13 feet (4 m).

PUMP PURGE

⚠ WARNING

EXPLOSION HAZARD

OMITTING STEPS 2 AND 3 BELOW WILL RESULT IN A COLLECTION OF UNBURNED OIL IN THE COMBUSTION CHAMBER CREATING A HAZARDOUS SITUATION UPON BURNER STARTUP.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

NOTE: To protect the pump gears, it is advisable to lubricate the pump prior to purging a lift system. Apply oil through the VACUUM PORT (C). See Figure 43.

A. SINGLE LINE (GRAVITY FEED SYSTEM)

I. Loosen the bleeder valve (A) until oil flows out. Tighten the bleeder valve securely and start burner.

II. When bleeding the pump by pressure:

1) Loosen the bleeder valve (A). See Figure 43.
2) Disconnect nozzle oil supply line at the pump nozzle port (B). See Figure 43.
3) Attach a flexible plastic tube to the pump nozzle, port directing the oil flow into a bucket.
4) Loosen the screw(s) securing the air tube cover, allowing it to be removed freely. See Initial Setup on page 34.
5) Holding the air tube cover in its proper location start the burner.
6) When the solenoid valve is engaged ap proximately 10 seconds after starting, remove the air tube cover and shine a light source on the photocell, allowing it to see false light.
7) Run the burner until the fuel pump has been purged of air, then tighten the bleeder valve and immediately shut down the burn er.

⚠ CAUTION

The vacuum should not exceed 11.44 inches of mercury.

NOTE: An external, appropriately listed and certified oil filter must be placed in the fuel line between the fuel tank and the burner pump.

3.10 Electrical Connection

B. TWO LINE (LIFT SYSTEM)

⚠ WARNING

WHEN THE BYPASS PLUG IS INSTALLED, A TWO-PIPE SYSTEM MUST BE USED OR FAILURE OF THE PUMP SHAFT WILL OCCUR.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

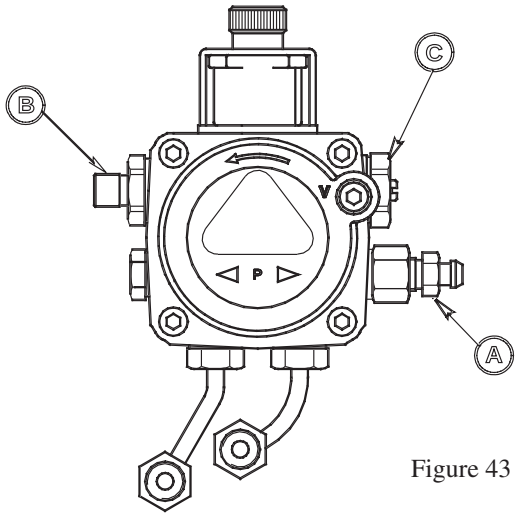


Figure 43

Turn off the main power source to the burner and remove the air tube cover. Shines a light source on the photocell (now visible when the air tube cover on the oil burner is removed) See Initial Setup on page 34. Return power to the burner and activate the burner. With the light source in place, the burner will operate in prepurge only. Run the boiler until the pump is purged of air. Once purged, turn off the power source and replace the air tube cover. Return power to the burner. The burner is now ready to operate

NOTE: It is important that the fuel line be completely sealed and free from air leaks or any internal blockages.

3.10 Installation Instructions for replacing the Factory Installed Automatic-reset Water Temperature Limit with the Optional Manual Reset Water Temperature Limit Accessory

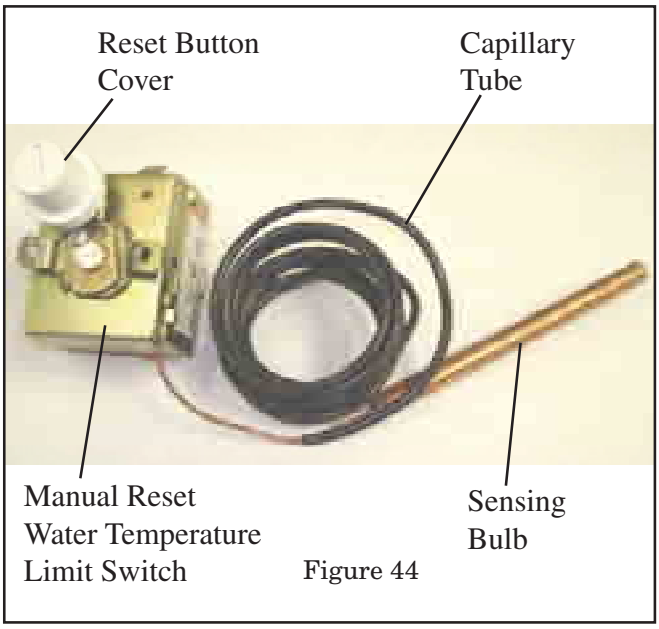


Figure 44

REMOVING THE EXISTING AUTO-RESET WATER TEMPERATURE LIMIT

⚠ WARNING

ELECTRICAL HAZARD

SHUT OFF POWER TO THE BOILER BEFORE BEGINNING THIS INSTALLATION.

FAILURE TO FOLLOW THE SAFETY WARNING EXACTLY COULD RESULT IN SERIOUS INJURY, DEATH OR PROPERTY DAMAGE.

Steps to remove the existing auto-reset water temperature limit switch.

1. Open the control panel and locate the existing auto-reset water temperature limit. See Figures 45 and 46.

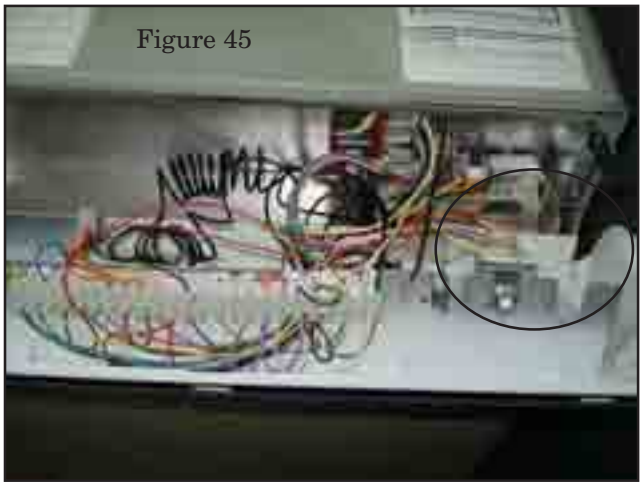


Figure 45

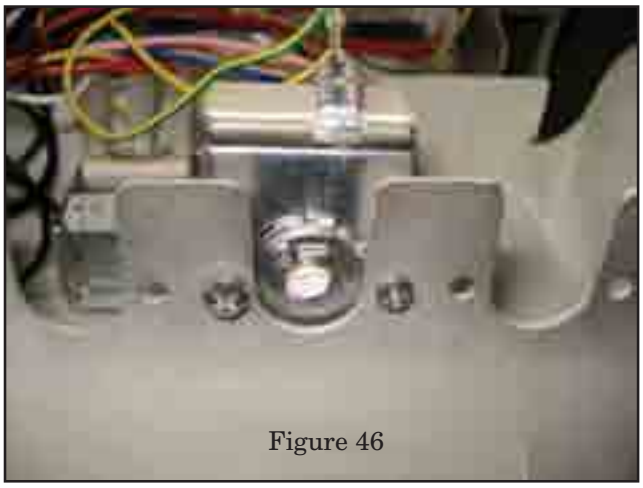


Figure 46

2. Remove the existing auto-reset water temperature limit and discard the screws. See Figure 47.

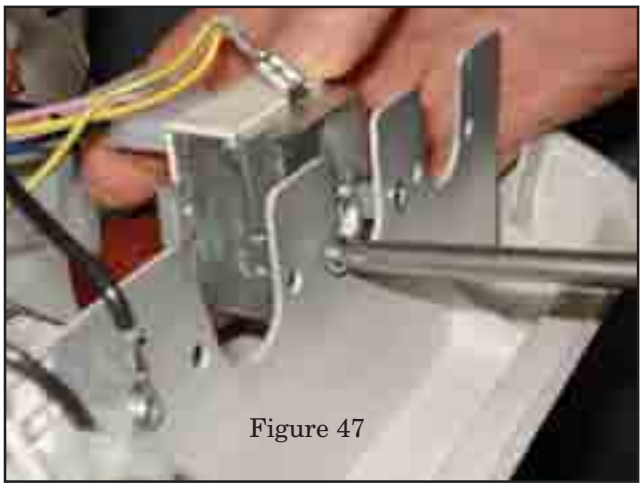


Figure 47

3. Remove the wires from the existing auto-reset water temperature limit. See Figure 48.

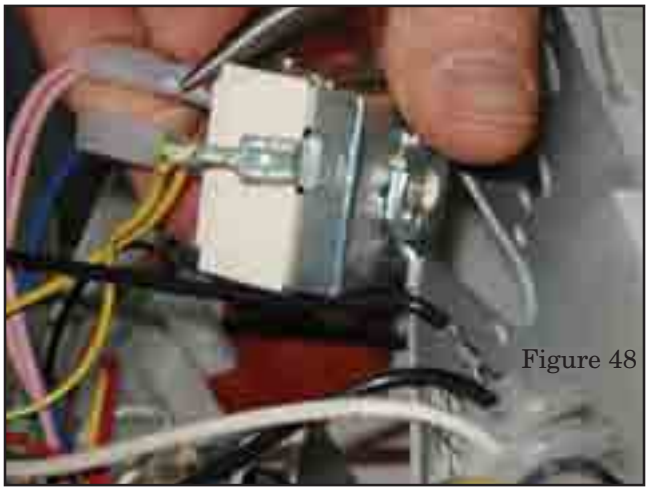


Figure 48

4. Remove the panel to gain access to the strain relief cable clamp. See Figure 49.

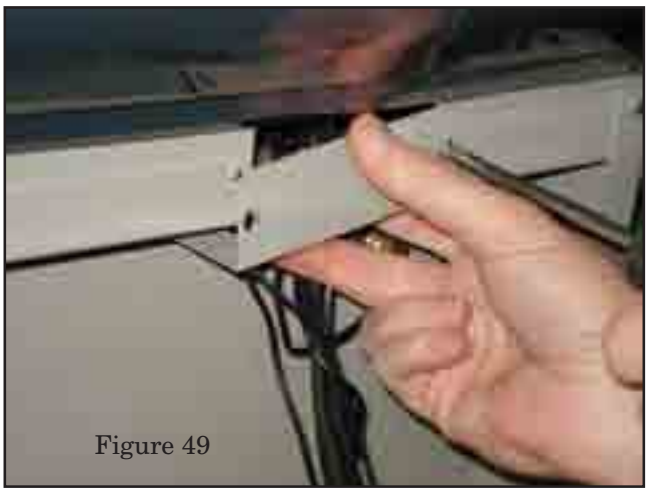


Figure 49

5. Loosen the strain relief cable clamp with a screwdriver. See Figure 50.

Figure 50

6. Remove the cable ties to isolate and remove the capillary tube of the existing auto-reset water temperature limit switch. See Figure 51.

Figure 51

7. Remove the spring clip and the sensing bulb of the existing auto-reset water temperature limit switch from the boiler temperature well. Do not remove the bulbs of the adjustable supply water thermostat and temperature gauge. See Figure 52.

Figure 52

8. Locate the capillary tube of the existing auto-reset water temperature limit and remove it from the strain relief clamp. See Figure 53.

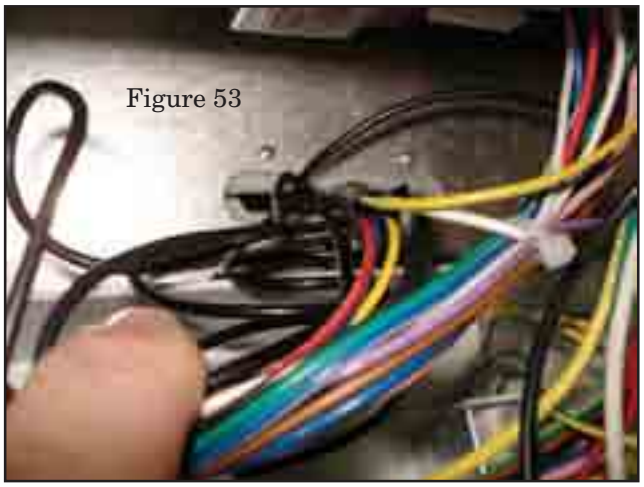


Figure 53

INSTALLING THE NEW MANUAL-RESET WATER TEMPERATURE LIMIT

1. Remove the cover from the reset button on the new manual reset water temperature limit switch by turning counter clockwise. See Figure 54.

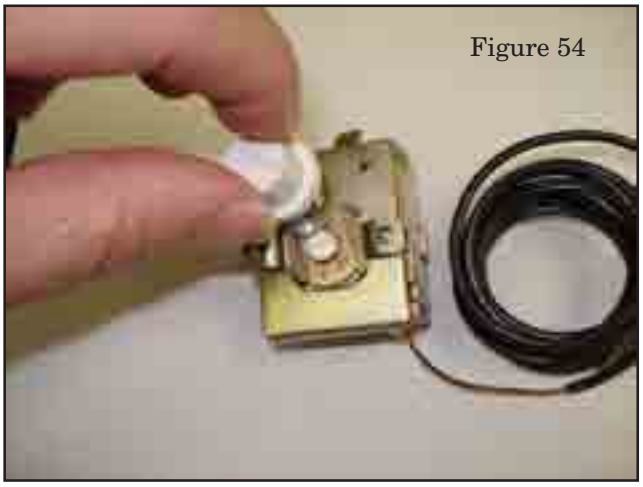


Figure 54

2. In a similar manner, remove the locking nut from the new manual reset water temperature limit. See Figure 55.


Figure 55

3. Insert the manual reset push button of the water temperature limit through the hole in the control panel. See Figure 56.


Figure 56

4. Center the reset button in the hole and secure with a locking nut. Use needle nose pliers. See Figure 57.

Figure 57

5. Replace the reset button cover on the new manual reset water temperature limit switch. See Figure 58.

Figure 58

6. Attach the wires removed earlier from the auto-reset water temperature limit to the new manual water temperature limit. See Figure 59.

Figure 59

7. Carefully unroll the capillary tube of the new manual reset water temperature limit and feed the sensing bulb through the strain relief clamp. See Figure 60.

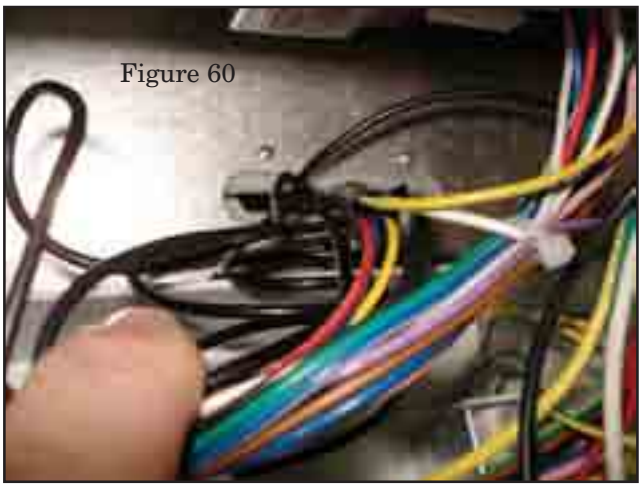


Figure 60

8. Place the bulb of the new manual reset water temperature limit along with the existing adjustable supply water thermostat and thermometer gauge bulbs in the boiler temperature well and secure with a spring clip. See Figure 61.

Figure 61

9. Route the capillary tube of the manual reset water temperature limit with the other capillary tubes, dress neatly and secure with new cable ties. See Figure 62.

Figure 62

10. Tighten the strain relief cable clamp with a screwdriver. See Figure 63.

Figure 63

11. Replace the strain relief access panel, close and secure the control box, and replace the front and top boiler panels. Restore power and check out limit switch operation per boiler installation instructions. See Figure 64.

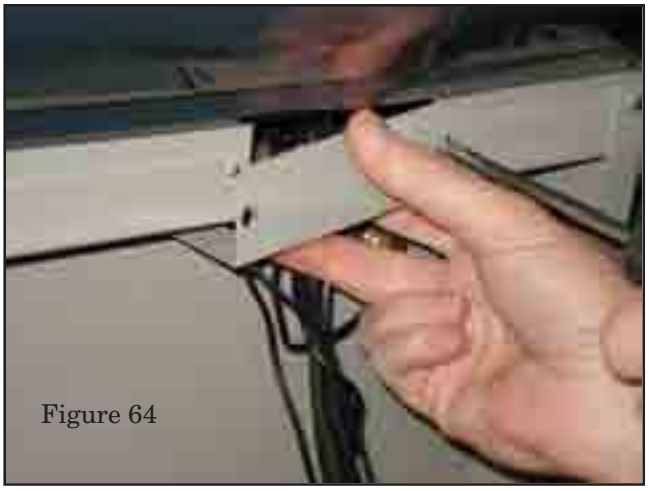


Figure 64

⚠ WARNING

TO PREVENT INJURY OR DEATH DUE TO ELECTRICAL SHOCK OR CONTACT WITH MOVING PARTS, LOCK UNIT DISCONNECT SWITCH IN THE OPEN POSITION BEFORE SERVICING THE UNIT.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

THE BOILER JACKET / CABINET MUST HAVE AN UNINTERRUPTED OR UNBROKEN GROUND ACCORDING TO NATIONAL ELECTRICAL CODE, ANSI/NFPA 70- "LATEST EDITION" AND CANADIAN ELECTRICAL CODE, CSA C22.1 OR LOCAL CODES TO MINIMIZE PERSONAL INJURY IF AN ELECTRICAL FAULT SHOULD OCCUR.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

The integrated boiler control is polarity sensitive. The hot leg of the 115 VAC power must be connected to the BLACK field lead.

NOTE: All field wiring must conform to local, state, and national installation codes.

A disconnect switch equipped with overcurrent protection (e.g. a time delay-type fuse or inverse time, circuit breaker) should be installed in the service line for shutting down and protecting the boiler and electrical system.

Since the boiler is entirely pre-wired at the factory, it is only necessary to connect the building electrical service lines to the junction box on the boiler. The service lines to the boiler should be no smaller than 14 Ga., insulated copper wire with a temperature rating of 60ºC, or greater.

Connect an equipment ground wire to the boiler in the boiler junction box. . If wiring is run through metal electrical conduit, it may not be necessary to run a separate equipment ground wire. Consult local codes and authorities for specific minimum requirements.

Using 18 gauge control wire, connect control wiring to thermostat or other external as required. Consult the National Electrical Code, ANSI/NFPA 70-2002, for guidelines for proper wiring methods and materials for control circuits.

3.11 Electrical Connections

Important: All aspects of the installation of this boiler, including electrical materials and methods of supplying electrical power must comply with all local codes and the following national standards:
1) NFPA 70 (most recent edition) - National Electrical Code (US)
2) CSA 22.1 (most recent edition) - Canadian Electical Code (Canada)

Make wiring connections to the boiler as indicated in the Installer's Guide wiring diagrams. As with all appliances using electrical power, this boiler shall be connected into a permanently live electric circuit. It is recommended that it be provided with a separate "circuit protection device" electric circuit. The boiler must be electrically grounded in accordance with local codes; or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 "latest edition" or Canadian Electrical Code, CSA C22.1.

All field supplied wiring must conform with the temperature limitation for Type T wire [63° F. (35° C)] installed in accordance with these instructions and wiring diagrams supplied with the boiler. A disconnecting means must be located within sight from, and readily accessible to, the boiler.

CONNECTION TO ELECTRICAL GRID

The boiler must be connected to single-phase, 120 Volt-60 Hz electric service.

CONTROL BOX ACCESS

To access the electrical components and high and low voltage terminal strip inside the control box, follow the sequence in Figure 65.

The layout of the terminals for the various connections is given in the wiring diagrams and schematic on pages 47 and 48.

NOTE: Do not use gas or water pipes to ground electrical appliances.

Control panel and cover removal

1. Remove the front access panel.
2. Remove top boiler panel.
3. Remove screw from attachment clip.
4. Lower the control panel.

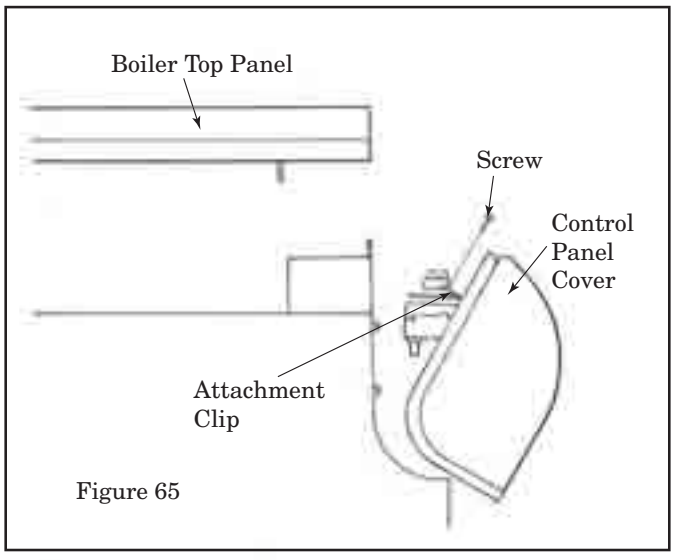


Figure 65

Remove two screws and two attachment clips (2) to access control box.

3.12 Supply Water Thermostat (SWT) Settings Above 180°F

The adjustable SWT knob includes a factory installed rotation stop that prevents supply water temperature settings below 140°F or above 180°F. Under no circumstances should the SWT knob be modified to allow temperature settings below 140°F. Lower settings may allow corrosive condensation from flue products, decreasing the life of the boiler.

Some applications may call for supply water temperature settings above 180°F. For these applications, the SWT rotation stop may be modified to allow the SWT to be set as high as 194°F. (Note: modifying the stop to allow higher maximum setting will also result in a corresponding increase in the minimum SWT temperature setting.) Follow the steps below to reset the SWT rotation stop to allow water temperature settings up 194°F:

1. Remove the knob from the adjustable SWT by pulling the knob directly outward away from the boiler.
2. Look on the back of the knob and find the metal rotation stop in one of the numbered positions (see Figure 66). This metal stop should have been factory set to position 1 or 7.
3. Remove the metal stop from the knob by grasping it firmly with needle nose pliers and pulling it directly outward. See Figure 67.
4. Place the metal stop in position 5 by grasping it firmly with needle nose pliers (see Figure 68) and pushing it directly inward. Note: Positions 1, 5 and 7 are the only approved locations for the SWT rotation stop.
5. Replace the modified knob by aligning with the flat on the shaft of the SWT and pushing firmly on the SWT. Make sure that the indicator mark on the front of the knob is between the proper modified setting range as marked on the boiler. If not, remove the knob and rotate the shaft of the SWT as appropriate so that the indicated adjustment range will be between approximately 155°F and 195°F.

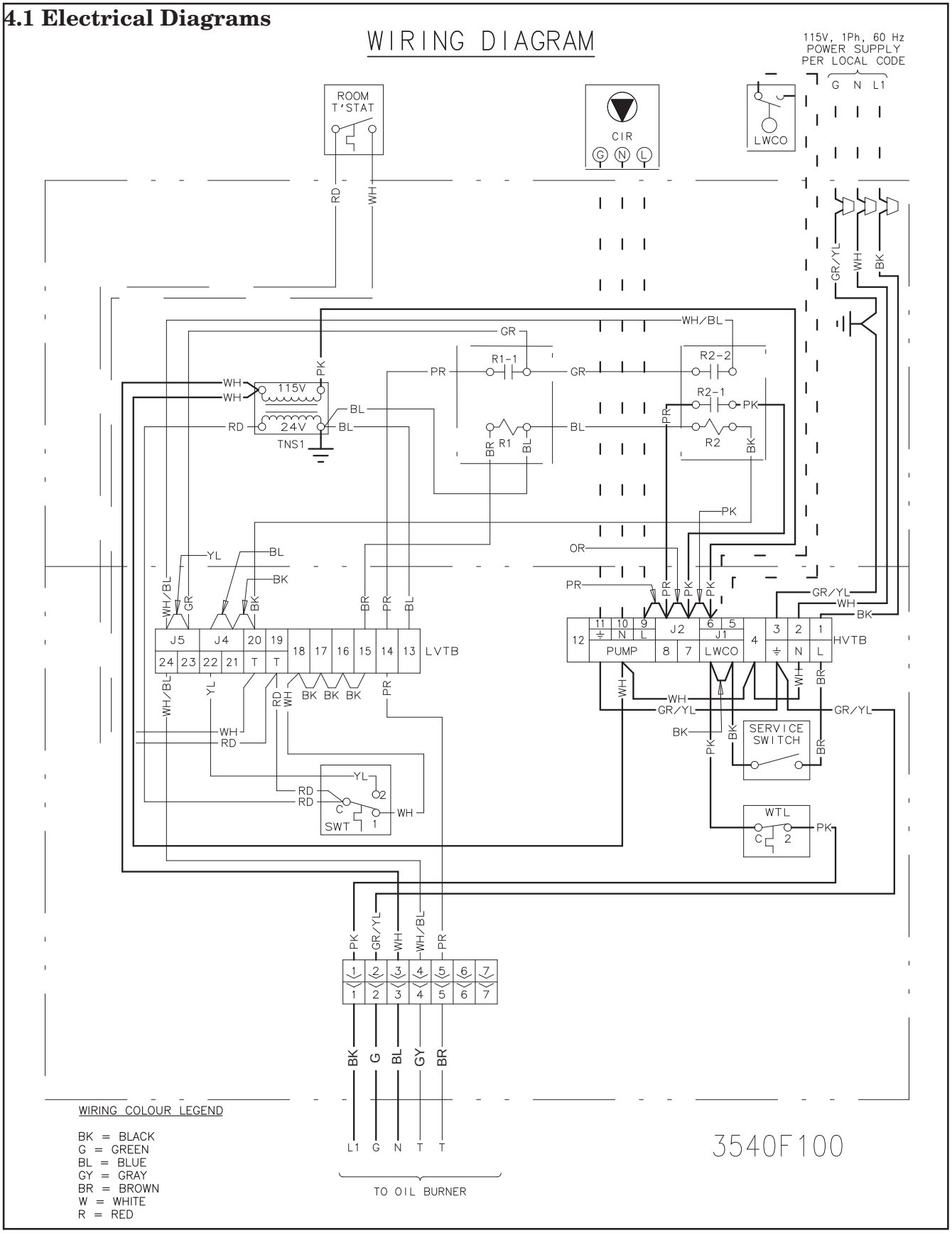
Figure 66

Figure 67

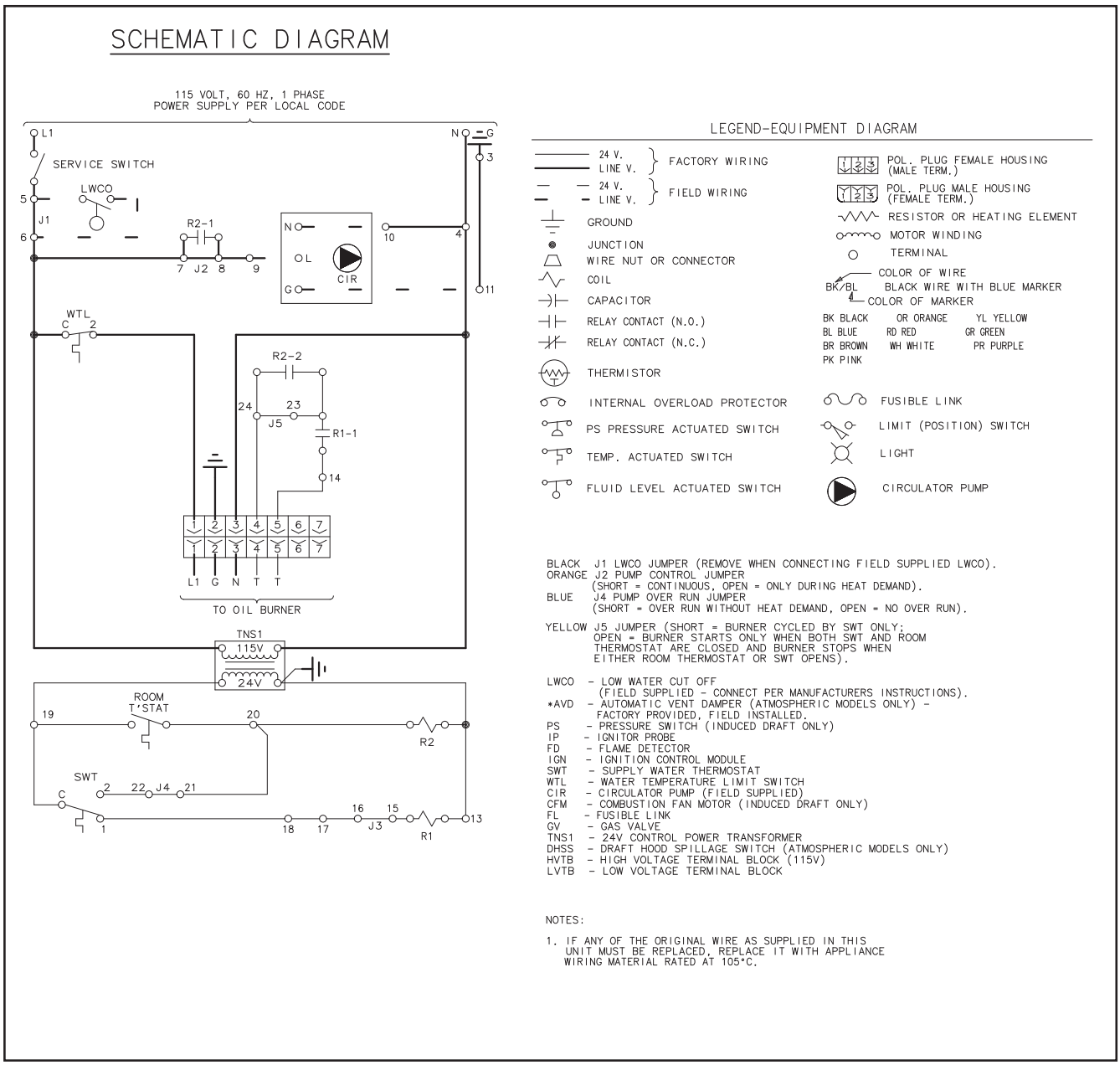
Figure 68

4.0 Technical Data

4.1 Electrical Diagrams

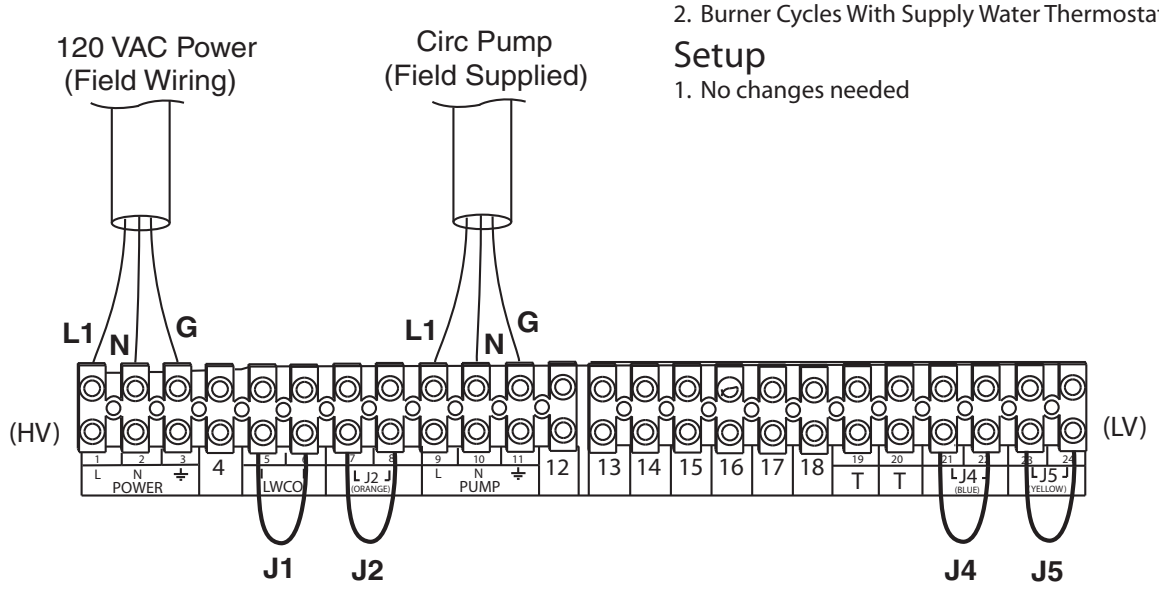


4.2 Schematic Diagram



4.3 Field Wiring Diagrams

Option 1 - Factory Jumpers in Place



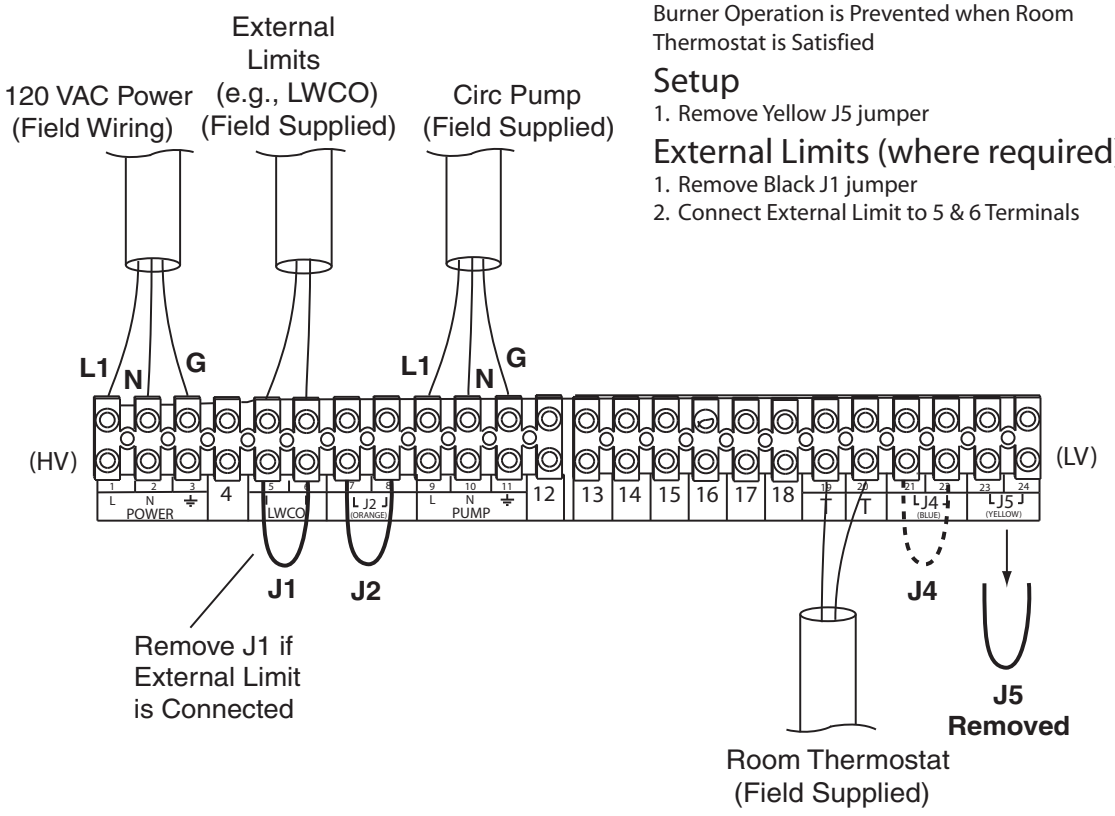
System Configuration

1. Continuous Pump Operation
2. Burner Cycles With Supply Water Thermostat

Setup

1. No changes needed

Option 2 - Field Installed Room Thermostat, Yellow J5 jumper removed



System Configuration

1. Continuous Pump Operation
2. Burner Cycles with Supply Water Thermostat when Call from Room Thermostat is present; Burner Operation is Prevented when Room Thermostat is Satisfied

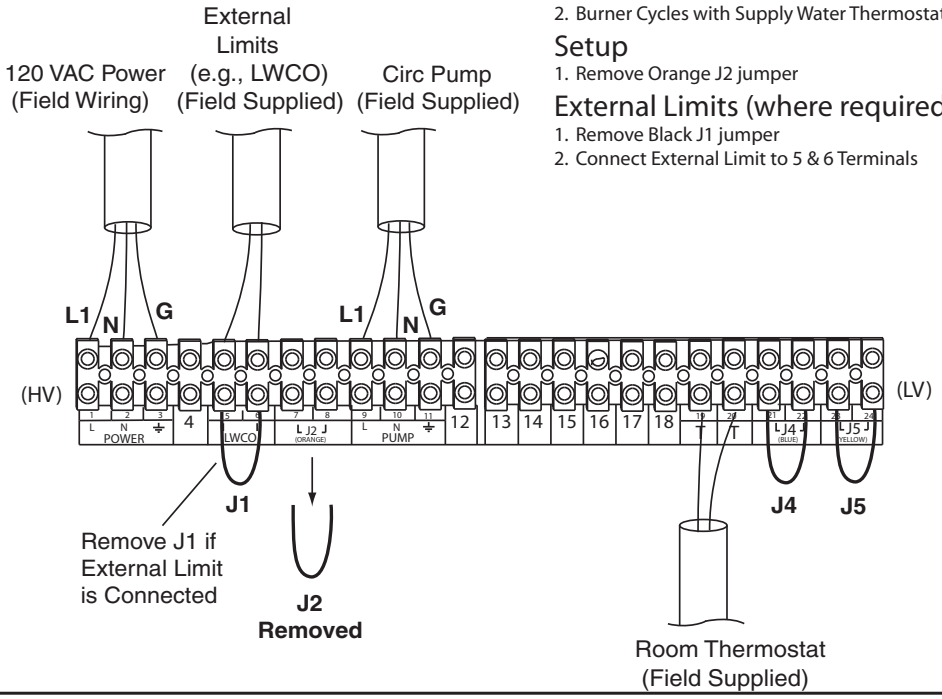
Setup

1. Remove Yellow J5 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 3 - Field Installed Room Thermostat, Orange J2 jumper removed



System Configuration

1. Pump Runs on Call from Room Thermostat OR if Water Temperature is Above Supply Water Thermostat setting
2. Burner Cycles with Supply Water Thermostat

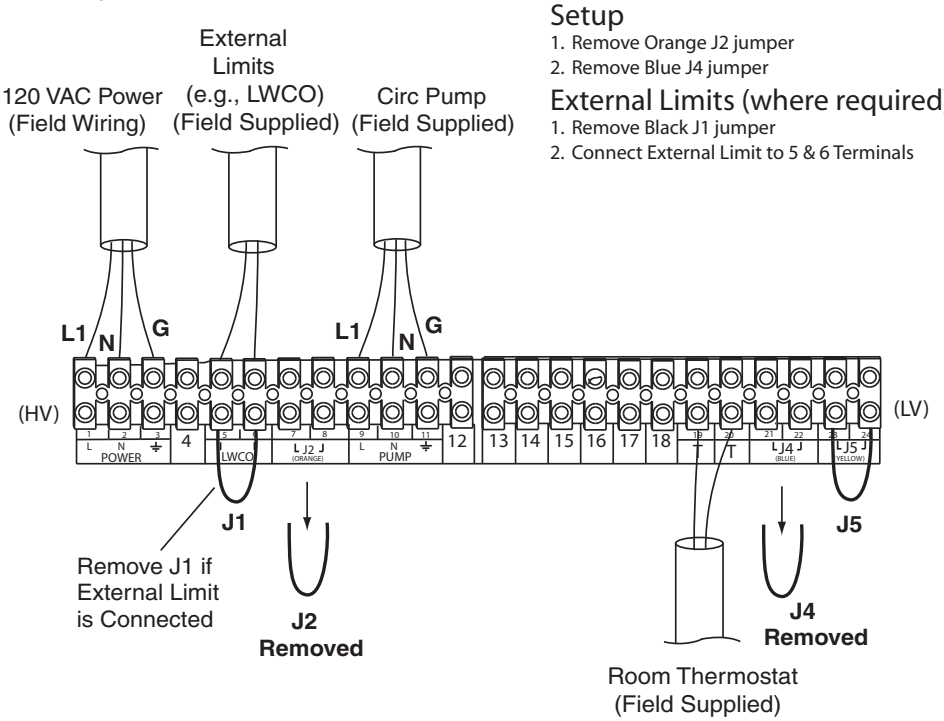
Setup

1. Remove Orange J2 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 4 - Field Installed Room Thermostat, Orange J2 jumper removed, Blue J4 jumper removed



System Configuration

1. Pump Controlled by Room Thermostat
2. Burner Cycles with Supply Water Thermostat

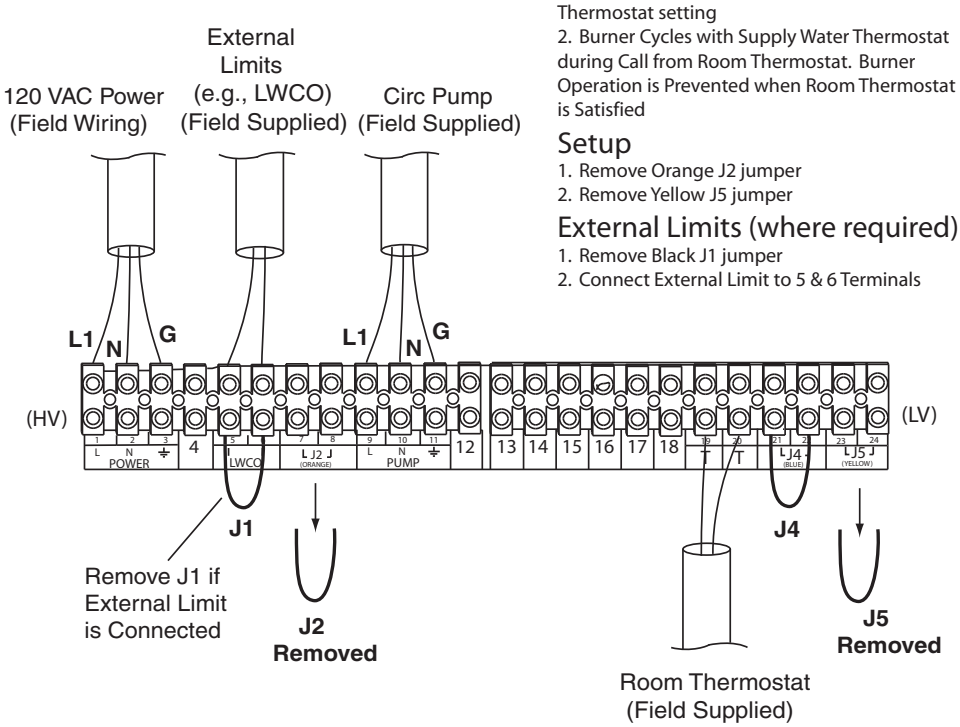
Setup

1. Remove Orange J2 jumper
2. Remove Blue J4 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 5 - Field Installed Room Thermostat, Orange J2 jumper removed, Yellow J5 jumper removed



System Configuration

1. Pump Runs on Call from Room Thermostat OR if Water Temperature is Above Supply Water Thermostat setting
2. Burner Cycles with Supply Water Thermostat during Call from Room Thermostat. Burner Operation is Prevented when Room Thermostat is Satisfied

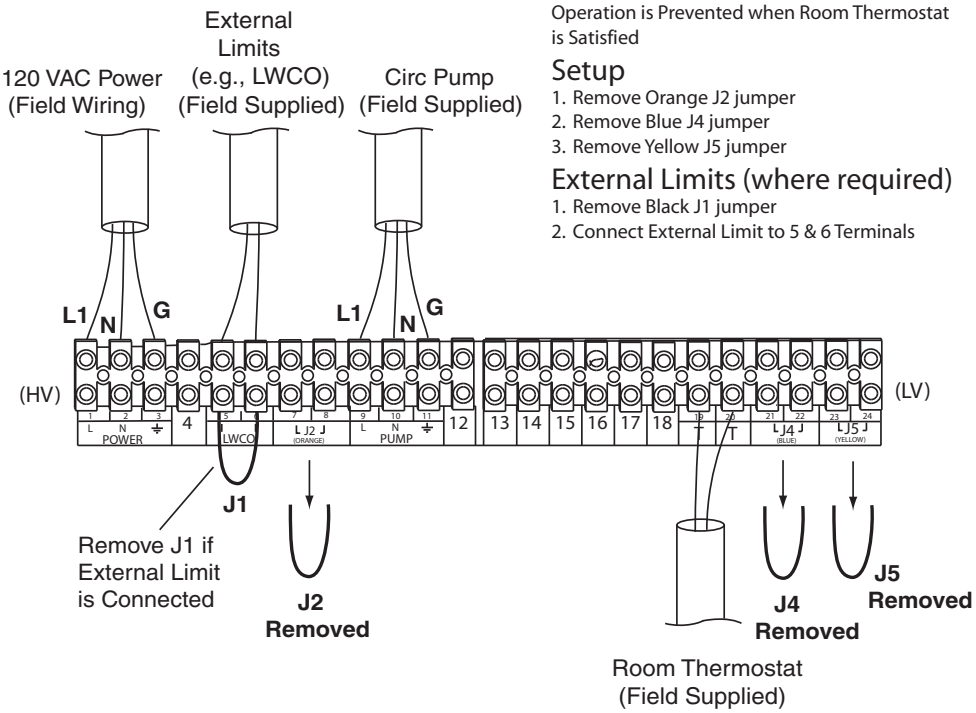
Setup

1. Remove Orange J2 jumper
2. Remove Yellow J5 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 6 - Field Installed Room Thermostat, Orange J2 jumper removed, Blue J4 jumper removed, Yellow J5 jumper removed



System Configuration

1. Pump Runs off Room Thermostat
2. Burner Cycles with Supply Water Thermostat during Call from Room Thermostat; Burner Operation is Prevented when Room Thermostat is Satisfied

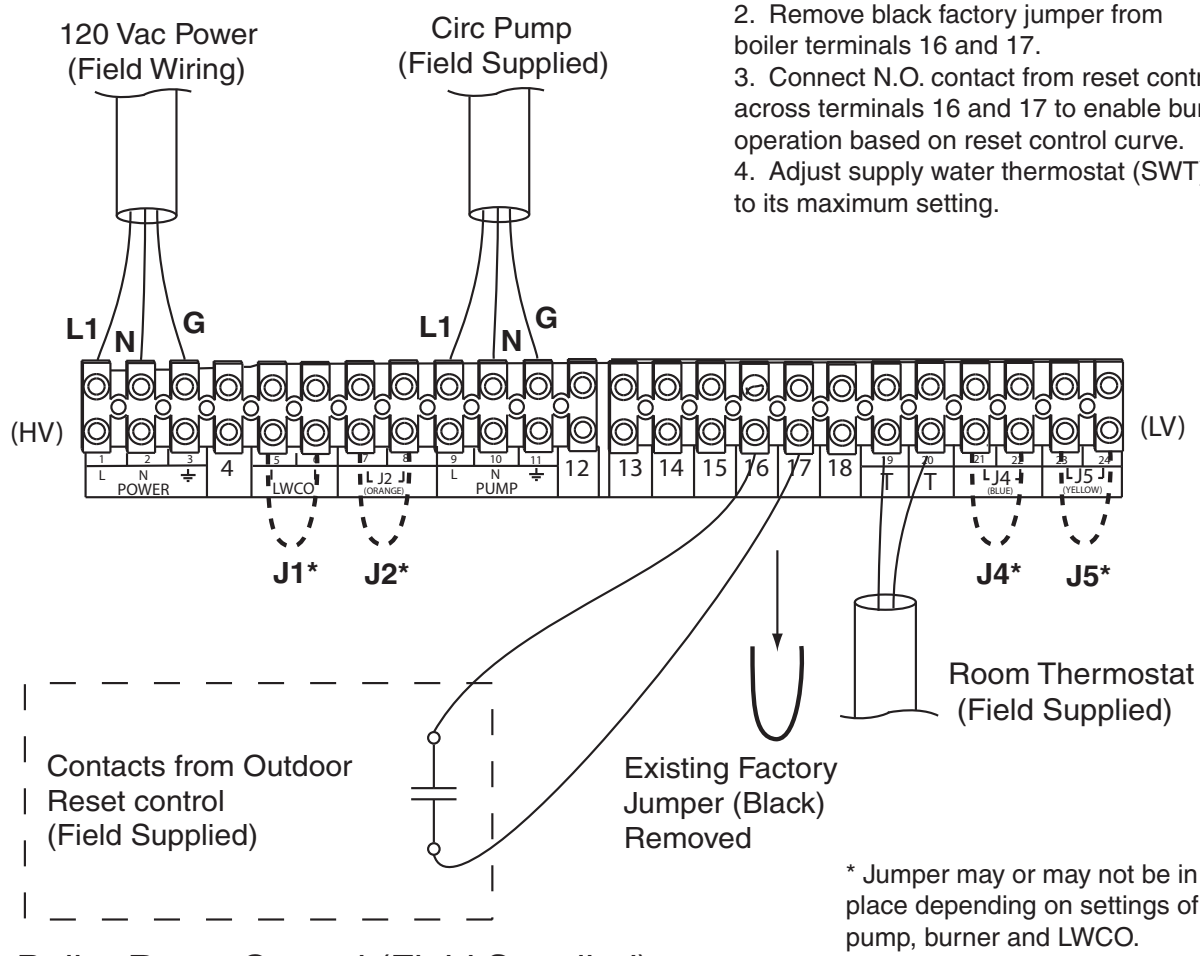
Setup

1. Remove Orange J2 jumper
2. Remove Blue J4 jumper
3. Remove Yellow J5 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Boiler Reset Option - Field Wiring for Field Supplied Boiler Temperature Reset Controls (to Decrease Boiler Water Temperature with Increasing Outdoor Temperature)



Boiler Reset Control (Field Supplied)

Boiler Reset Configuration

NOTE: This Boiler Reset option may be used in combination with any of the other system configuration options and jumper arrangements shown in this document.

1. Use field supplied boiler reset control with water temperature sensor and outdoor temperature sensor. Install according to manufacturer's instructions.
2. Remove black factory jumper from boiler terminals 16 and 17.
3. Connect N.O. contact from reset control across terminals 16 and 17 to enable burner operation based on reset control curve.
4. Adjust supply water thermostat (SWT) to its maximum setting.

4.4 Start-Up and Adjustment

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

FAILURE TO FOLLOW THE INSTALLATION INSTRUCTIONS FOR THE VENTING SYSTEM BEING PLACED INTO OPERATION COULD RESULT IN CARBON MONOXIDE POISONING OR DEATH.

FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

FAILURE TO FOLLOW STARTUP AND CHECKOUT PROCEDURES COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ WARNING

ELECTRICAL HAZARD

DISCONNECT POWER BEFORE INSTALLING OR SERVICING. FAILURE TO FOLLOW THE SAFETY WARNINGS EXACTLY COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

In case of an electrical power failure while the boiler is working, the burner will be de-energized and automatically fire when power is restored.

Determine that the water pump(s) are operating properly.

Test low water cutoffs, automatic feed controls, pressure, and temperature limit controls, and relief valves to determine they are in operating condition.

Preliminary Inspections

System Start-Up and Adjustment must be carried out by qualified installers.

The following checks must be made at Start-Up and whenever maintenance or service is performed:

With electrical power "OFF" and fuel line valve "OFF"

1. Verify the boiler system is filled with water and make sure all the air in the hydronic system, including boiler, has been vented.
2. Verify there are no water leaks in the boiler or system.

NOTE: Maximum operating pressure is printed on the boiler data plate. Do Not exceed this pressure and Do Not plug the system pressure relief valve.

3. Verify the electrical system is properly connected and grounded.
4. Visually inspect the venting system for proper size, horizontal pitch and vent termination, and verify the vent system is not blocked or restricted, does not leak, has no corrosion and any other deficiency which could cause and unsafe condition.
5. Determine that the chimney or vent is acceptable to the authority having jurisdiction.
6. Make sure there are no flammable liquids or materials in the same room with the boiler.
7. Verify an external oil filter is installed between the oil tank and the boiler.
8. Check all fuel lines connections for leaks.

Checkout and Startup Procedure

1. Disconnect burner electrical harness.
2. Attach oil presssure gauges to oil pump pressure ports.
3. Verify burner is properly installed to boiler door.
4. Verify oil line (gravity fed).
5. Verify oil pump. Bleed oil line and verify pump connector.
6. Verify nozzle selection.
7. Verify electrode setting.
8. Verify turbo setting.
9. Verify airgate setting.
10. Reconnect burner electrical harness.
11. Turn the electrical power to the boiler On.
12. Set the room thermostat to continuous heating operation as required.
13. Turn the boiler service switch to On. This is located on the boiler control panel.
14. Turn the boiler supply water thermostat knob to the desired setting. The boiler will begin to function automatically.
15. As the boiler is energized, set up and verify operation of the boiler.

If the burner does not fire, refer to the Troublshooting section of the Service Facts, shipped with the boiler.

16. Verify pump pressure and adjust as needed.
17. Check CO2 level.
18. Check smoke.
19. Make minor adjustment to CO2 and turbulator settings as needed.
20. Recheck CO2 and smoke. Repeat process as needed. Upon completion, de-energize boiler and disconnect power.
21. Disconnect oil pressure gauge and secure oil pressure port.
22. Install burner cover.
23. Re-energize boiler.
24. Recheck CO2 and smoke levels.
25. Perform additional adjustments as needed.

BURNER MODELS BAYRAF03ABURNA, BAYRAF05ABURNA, BAYRAF10ABURNA:

SETTING THE AIR ADJUSTMENT PLATE

The electronic air shutter assembly (1) is operated on a 120v 60Hz. motor, and the burner motor will not operate until the air shutter is in its fully open position.

Set the air plate (4) setting according to OEM setup information or by following the settings listed in this manual. To adjust the air plate to the desired set point indicator (2), loosen the center air shutter assembly screw (5) and loosen the side air plate screw (3), move air plate (4) by using the air gate adjust arm. After adjustments are made retighten screws (3) & (5).

The final position of the air adjustment plate will vary on each installation. Use proper combustion test instruments to establish the proper setting of the air plate to acheive safe and efficient results.

NOTE: Variations in flue gas, smoke, CO2 and temperature readings may be experienced when burner cover is put in place. Therefore, the burner cover **must** be in place when making final combustion instrument readings, to ensure proper test results are obtained.

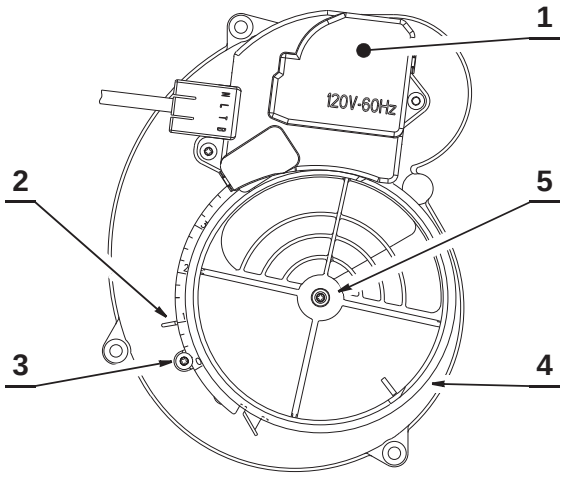
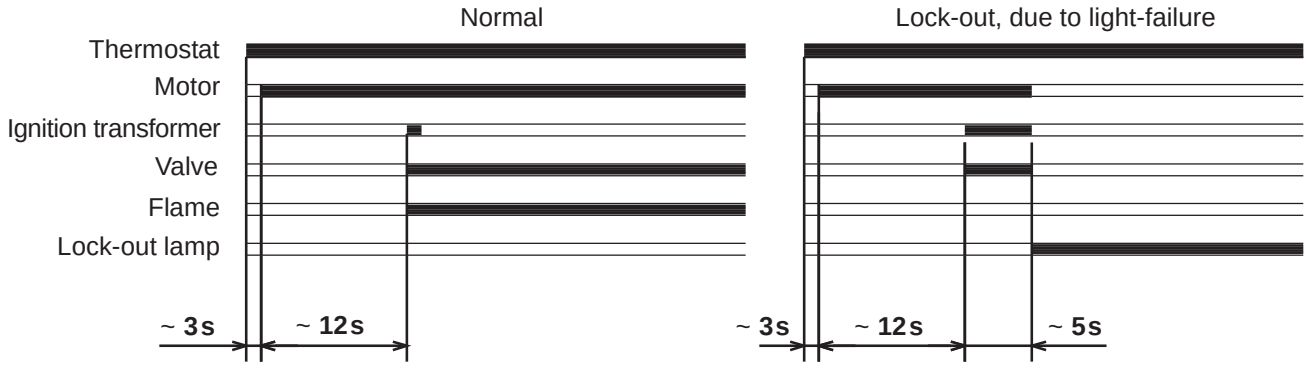


Fig. 69



BURNER MODELS BAYRBF03ABURNA and BAYRBF05ABURNA:

SETTING THE AIR ADJUSTMENT PLATE

The initial air damper setting is made by turning screw (2) until the top edge of the air damper (3) is alligned with the number according to the burner setup chart.

Further adjustments can be made with the burner cover in place by removing plastic plug on the top right hand side of the cover. Turn the screw clockwise (- indicator) to decrease combustion air.

The final position of the air damper will vary on each installation. Use instruments to establish the proper settings for maximum CO_2 and smoke reading of zero.

NOTE: Variations in flue gas, smoke, CO2 and temperature readings may be experienced when burner cover is put in place. Therefore, the burner cover **must** be in place when making final combustion instrument readings, to ensure proper test results are obtained.

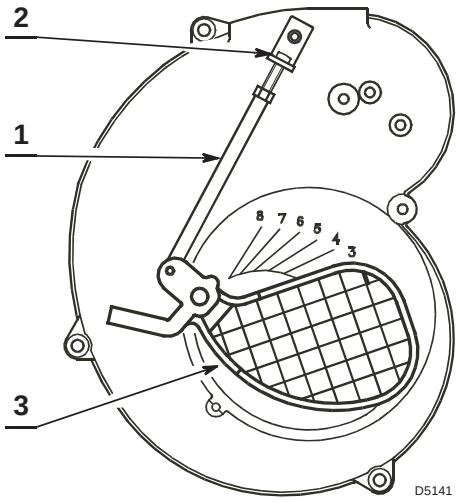
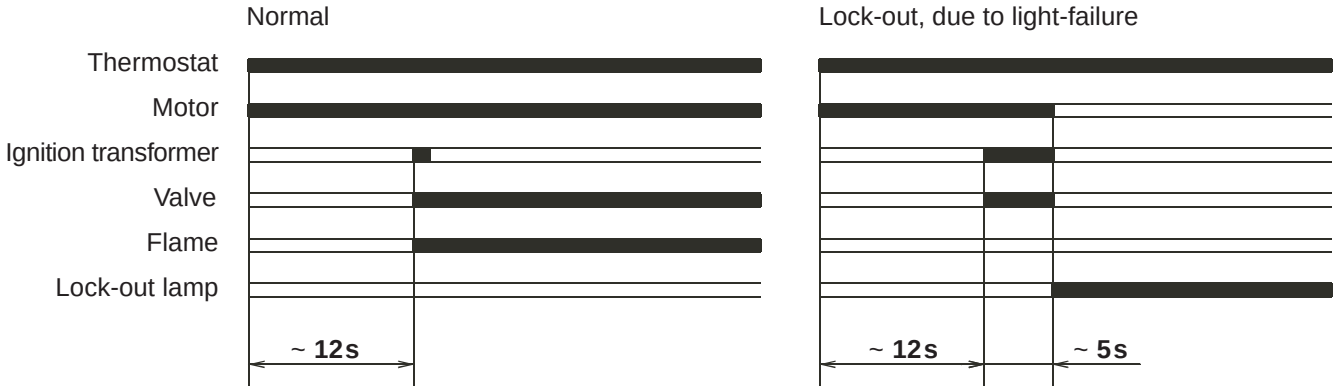
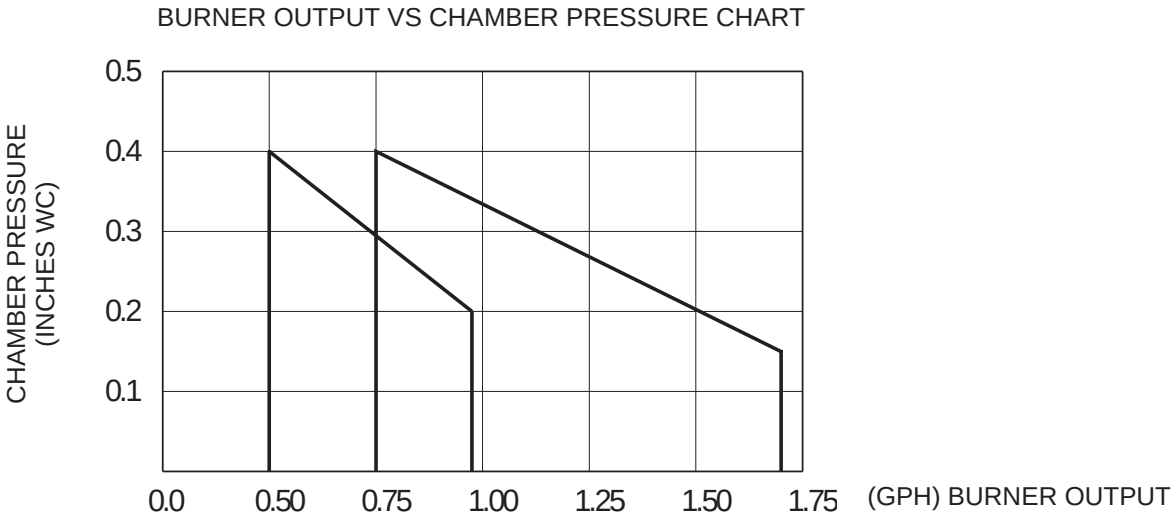


Fig. 70

BURNER START-UP CYCLE



COMBUSTION CHAMBER PRESSURE CHART



Control and Safety Switch Adjustment

Limit Switch Check Out
The limit switch is a safety device designed to shut off the burner should the boiler become overheated. Since proper operation of this switch is important to the safety of the unit, it must be checked out on initial start up by the installer.

IMPORTANT: To check for proper operation of the Water Temperature Limit switch (WTL), shut off the power to the boiler and TEMPORARILY bypass the supply water thermostat (SWT) with a TEMPORARY JUMPER. TEMPORARILY remove power from the boiler water circulator pump and restore power to the boiler. Burners should come on and operate. Closely monitor the water temperature. DO NOT allow the boiler to overheat excessively during the checkout of the WTL limit switch. When the boiler water temperature reaches 230°F, the burners should turn off automatically. Immediately shut off power to the boiler if the burners did not shut off automatically as the water temperature reached 230°F. The WTL limit switch must be replaced and proper operation of the new WTL verified.

After the boiler cools, REMOVE THE JUMPER from the SWT and RESTORE POWER to the boiler and the boiler water circulator pump.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CAN/CGA B149 Installation Codes and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54 and/or CAN/CGA B149 Installation Codes.
8. After it has been determined that each appliance connected to the venting system properly vents where tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

BURNER START-UP FORM*

Burner S/N or Model: _____ Appliance:: _____

Installer name: _____

Company: _____ Installation date: _____

Address: _____

Phone: _____ Fax: _____

Owner Name: _____

Address: _____

Phone: _____ E-mail: _____

Burner Start-up Info (OIL)

Nozzle Info: _____

Pump Pressure: _____

Air Setting: _____ Turbulator setting: _____

Draft Over fire: _____ Dratt breech: _____

CO_2: _____ CO: _____ O_2: _____

Smoke density: _____ (Bacharach) _____

Single Line: ☐ Two Lines: ☐

Burner Start-up Info (GAS)

Gas Supply Pressure: _____

Pump Pressure: _____

Air Setting: _____ Head Setting: _____

Draft Over fire: _____ Draft breech: _____

CO_2: _____ CO: _____ O_2: _____

Manifold pressure: _____

Ionization Reading (μAd.c.) _____ Input BTU/Hr: _____

This form was designed and provided in the installation manual for reference and also for providing technical information, which can be faxed or mailed for technical support

6.0 Appendix A

Insulated Direct Vent System for Oil Burning Appliances

INSTALLATION AND MAINTENANCE INSTRUCTIONS

PRODUCT:

Flexible Insulated Direct Vent System for oil burning appliances.

COMPONENT LIST:

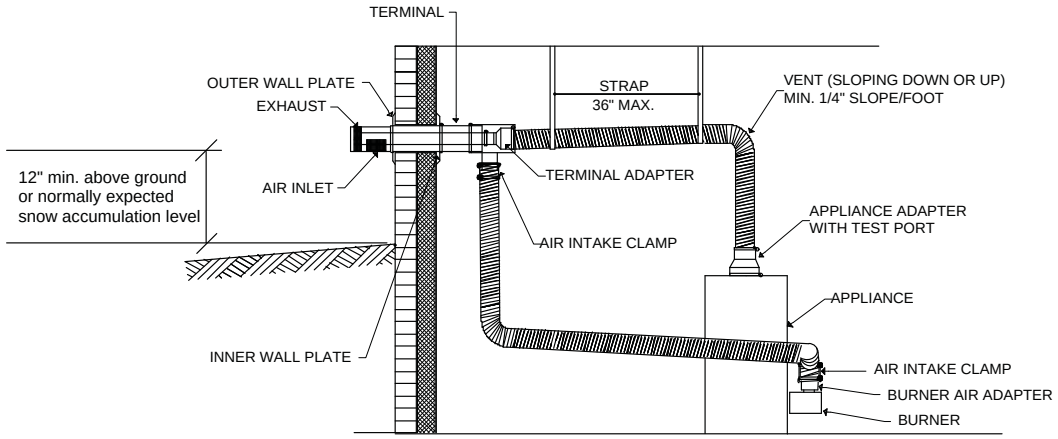
Part No.	Description
BAYDVK10ARELLAA	Direct Vent Kit for BF Oil Burner - 10 Ft Long (Does not include vent terminal)*
BAYDVK20ARELLAA	Direct Vent Kit for BF Oil Burner - 20 Ft Long (Does not include vent terminal)*
BAYDVK10AADPTAA	Adapter, Combustion Air Intake, 3" to 4" BF Oil Burner
BAYVKS10ATUBEAA	Vent Pipe Sealant, Direct Vent Oil Burner - 10 OZ Tube
BAYVTS10AFAFVAA	Vent Terminal, Standard, Combination Fresh Air Intake And Flue Vent
BAYVTR10AFAFVAA	Vent Terminal, 18" Riser, Combination Fresh Air Intake And Flue Vent
BAYVTR20AFAFVAA	Vent Terminal, 34" or 36" Riser, Combination Fresh Air Intake And Flue Vent

* Includes 4" insulated flex vent pipe, 4" fresh air flex pipe, adapters, clamps and 10 oz. sealant

INSTALLATION CONSIDERATIONS (Illustration #1)

1) The vent pipe bend radius is 12".
2) Place metal strapping every 36" to support vent pipe and prevent it from sagging.
3) Maximum wall thickness is 14". Contact the manufacturer for recommendations in case of thicker wall.
4) This system is not designed for common venting. Use for a single appliance only unless otherwise approved.
5) Utilize the appliance adapter test port for combustion testing required by manufacturers.
6) Follow national codes for the installation of oil burning equipment: in USA - NFPA 31, in Canada - CAN/CSA-B139 and local regulations.

ILLUSTRATION # 1



TYPICAL INSTALLATION

MAINTENANCE

The boiler manufacturer recommends the entire heating system, including the appliance and vent, to be checked annually by a qualified heating professional.

JOINT ASSEMBLY (Illustration #2 & #3)

1) Loosen the gear clamp attached to the adapter sleeve.
2) Pull the corrugated inner pipe out of the vent pipe for easy access to insert the adapter.
3) Apply sealant around the corrugated end of the adapter.
4) Align the flat seams at the end of both corrugated pipes and insert the adapter into the vent pipe. Screw the adapter into the vent pipe with a counterclockwise motion. The adapter should be fully inserted into the inner vent pipe until it's tight. The seams of both pipes must be aligned for ease of insertion. If the adapter does not completely screw into the vent pipe, unscrew it and try again as per Step # 4.
5) Seal around edge of vent pipe inner pipe.
6) Tighten the gear clamp to complete the connection.
7) If the vent requires cutting to length, a fine toothed hacksaw can be used. Remove any burrs and flare out the end of the inner vent pipe for easy installation of the adapter.

ILLUSTRATION # 2

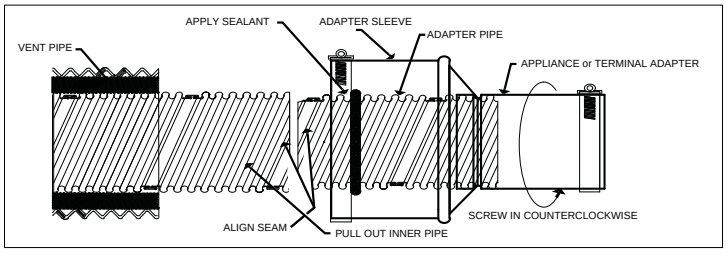
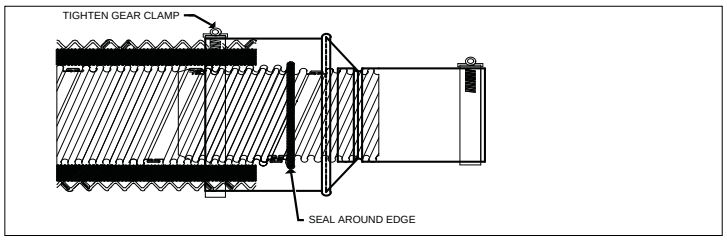


ILLUSTRATION # 3



INSTALLING TERMINAL (Illustration #4 & #5)

1) Determine the terminal location.
2) Cut 8-1/4" dia hole through the wall (slightly larger than the O.D. of the terminal).
3) Pull apart the inner and the outer terminal sections.
4) Slide the outer wall plate over the outer section of the terminal until it rests against the bead.
5) From the outside of the building, insert the outer section through the hole until it rests against the wall.
6) From the inside of the building, slide the inner wall plate over the outer section and secure using four (4) screws.
7) Position the outer section so the seam on the flue collar is on the top and the air intake on the bottom. Secure the outer section by tightening the gear clamp around it. The gear clamp is factory welded to the inner wall plate.
8) Seal with a weather proof sealant around the bead and edge of the outer wall plate to prevent water from getting inside.

ILLUSTRATION # 4

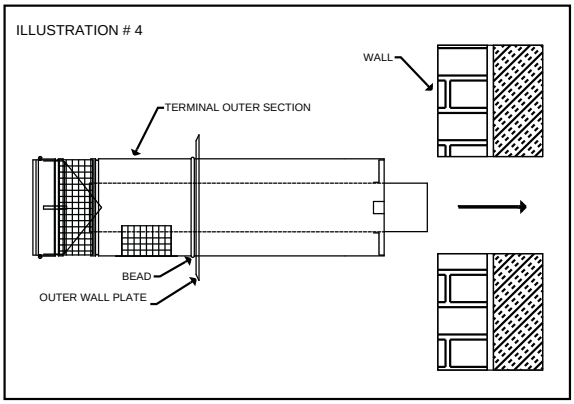
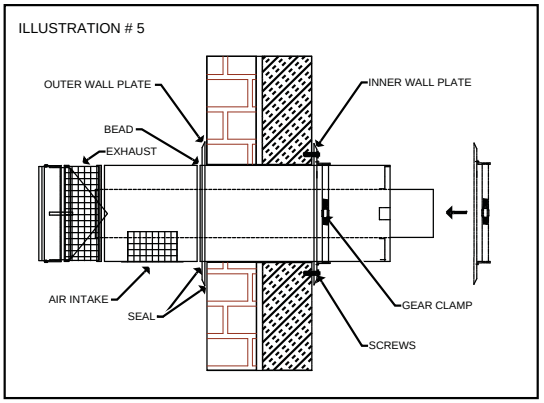


ILLUSTRATION # 5



CONNECTIONS TO TERMINAL (Illustration #6 & #7)

1) Slide the terminal inner section over the vent pipe.
2) Connect the terminal adapter to the vent pipe as per joint assembly.
3) Apply a bead of sealant around the terminal flue collar.
4) Slide the appliance adapter pipe over the flue collar.
5) Tighten the gear clamp of the terminal adapter around the flue collar.
6) Seal the seam in the adapter with sealant.
7) Slide the inner section over the outer section and secure by tightening the gear clamp.
8) Stretch the air intake flex to the desired length and slide over the air intake collar. Seal the connection with the aluminum tape and secure using air intake clamp. Beaded end of the air intake clamp should go first over the air intake collar.
9) Seal the gap between the vent pipe and the inner section with silicone sealant.

ILLUSTRATION # 6

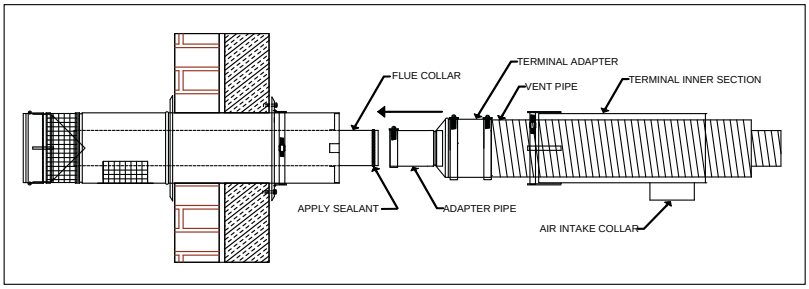
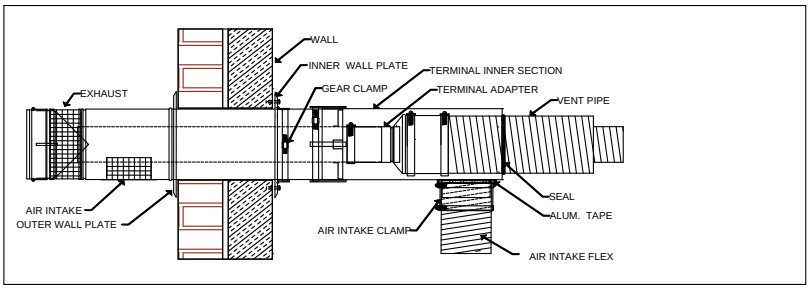


ILLUSTRATION # 7



CONNECTIONS TO APPLIANCE (Illustration #8, #9, #10 & #11)

1) Connect the appliance adapter to the vent pipe as per joint assembly.
2) Apply sealant around the appliance flue collar.
3) Slide the appliance adapter over the appliance flue collar.
4) Tighten the gear clamp of the appliance adapter around the flue collar.
5) Seal the seam in the adapter with sealant.
6) Install burner air adapter.
7) Slide the end of air intake flex over the burner air adapter and underneath gear clamping sleve. Seal the connection with aluminum tape and secure using air intake clamp.
8) A vacuum relief device may need to be installed if required by the appliance manufacturers' installation instructions.

ILLUSTRATION # 8

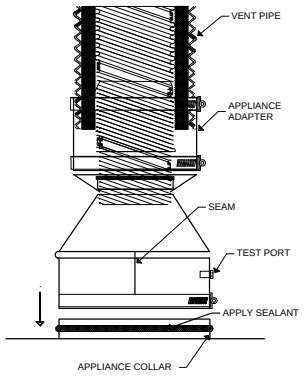


ILLUSTRATION # 9

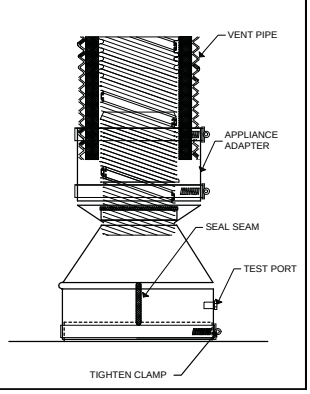


ILLUSTRATION # 10

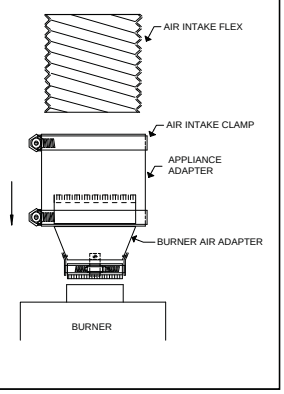
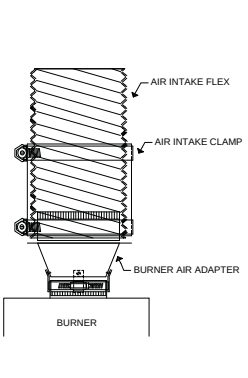


ILLUSTRATION # 11



NOTE: Information printed with permissioin from Riello Burners Flex-L, International and Z-Flex.

Literature Order Number	18-CG03D1-3	P.I.
File Number	18-CG03D1-3	
Supersedes	New	
Stocking Location	-	

American Standard Inc.
6200 Troup Highway
Tyler, TX 75707

For more information contact your local dealer (distributor)