

Series **WB90™**

Oil Boilers



Installation, Operation & Maintenance Manual



PeerlessBoilers.com

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USING THIS MANUAL

A. INSTALLATION SEQUENCE

Follow the installation instructions provided in this manual in the order shown. The order of these instructions has been set in order to provide the installer with a logical sequence of steps that will minimize potential interferences and maximize safety during boiler installation.

B. SPECIAL ATTENTION BOXES

Throughout this manual you will see special attention boxes intended to supplement the instructions and make special notice of potential hazards. These categories mean, in the judgment of PB Heat, LLC.:



DANGER

Indicates a condition or hazard which will cause severe personal injury, death or major property damage.



WARNING

Indicates a condition or hazard which may cause severe personal injury, death or major property damage.



CAUTION

Indicates a condition or hazard which will or can cause minor personal injury or property damage.



NOTICE

Indicates special attention is needed, but not directly related to potential personal injury or property damage.

1. PREINSTALLATION

NOTICE

In accordance with Section 325 (f) (3) of the Energy Policy and Conservation Act, this boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

THIS OVERRIDE MUST NOT BE USED UNLESS AT LEAST ONE OF THE FOLLOWING CONDITIONS IS TRUE:

- An external energy management system is installed that reduces the boiler water temperature as the heating load decreases.
- This boiler is not used for any space heating
- This boiler is part of a modular or multiple boiler system having a total input of 300,000 BTU/hr or greater.
- This boiler is equipped with a tankless coil.

A. GENERAL

1. WB90™ boilers are supplied complete with all controls and safety devices required by UL726, Oil-Fired Boiler Assemblies. The packaged components should be inspected for damage upon receipt and any damage should be reported to the shipping company and wholesaler. This boiler and its components should be stored in a clean, dry area.

NOTICE

This equipment shall be installed in accordance with installation requirements in force in the local area where the installation is to be made, including the current edition of NFPA-31 (Standard for the Installation of Oil-Burning Equipment) and, in Canada, CAN/CSA B139 (Installation Code for Oil-Burning Equipment). These shall be carefully followed in all cases. The Authority having jurisdiction shall be consulted before installation.

CAUTION

Never burn garbage or paper in this appliance. Never leave combustible material near it.

CAUTION

Do not tamper with boiler controls. Disabling controls with jumper wires or defeating fixed temperature stops may lead to severe personal injury, death or major property damage.

WARNING

Do not use this appliance if any part has been under water. Improper or dangerous operation may result. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system and any control that has been under water. Note that the pressure vessel may corrode if it is exposed to salt water.

2. Carefully read these instructions and be sure to understand the function of all connections prior to beginning installation. Contact your PB Heat, LLC Representative for help in answering questions.
3. This boiler must be installed by a qualified contractor. The boiler warranty may be voided if the boiler is not installed correctly.
4. A hot water boiler installed above radiation or as required by the Authority having jurisdiction, must be provided with a low water fuel cut-off device either as part of the boiler or at the time of installation. This boiler is equipped with an integrated, reset-type, limit control that includes the low water cut-off function.

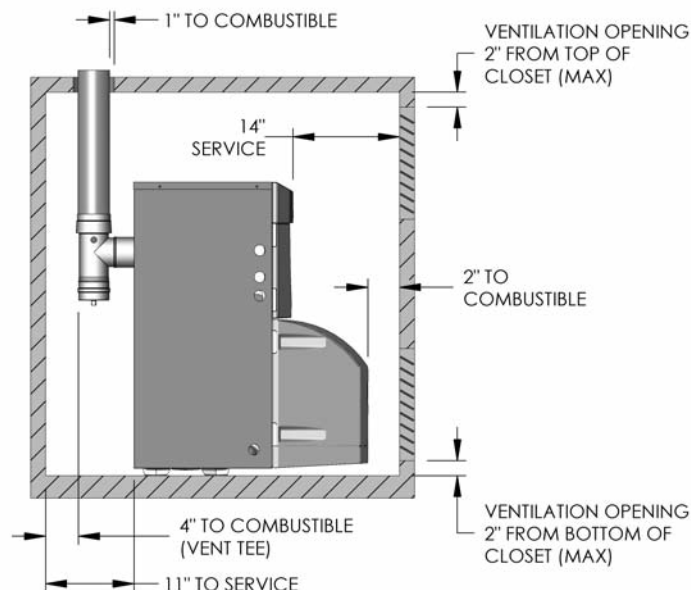
B. CODES & REGULATIONS

1. The WB90™ boiler is designed, tested and certified by ETL to the UL 726, Oil-Fired Boiler Assembly standard for installation in the United States or Canada.
2. The cast iron heat exchanger has been designed, tested and marked in accordance with Section IV (Heating Boilers) of the ASME Boiler and Pressure Vessel Code.

3. This boiler exceeds the requirements of the United States Department of Energy for energy efficient operation and is ENERGY STAR® compliant.
4. Installation and repairs are to be performed in strict accordance with the requirements for state and local regulating agencies and codes dealing with boiler and oil-fired appliance installations.
5. In the absence of local requirements the following codes/standards should be followed:
 - a. ASME Boiler and Pressure Vessel Code, Section IV (Heating Boilers)
 - b. ASME Boiler and Pressure Vessel Code, Section VI (Recommended Rules for the Care and Operation of Heating Boilers)
 - c. NFPA 31 (Standard for the Installation of Oil-Burning Equipment)
 - d. ANSI/NFPA 70 (National Electric Code)
 - e. ANSI/NFPA 211 (Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances)
6. Where required by the Authority having jurisdiction, the installation must conform to ANSI/ASME CSD-1 (Standard for Controls and Safety Devices for Automatically Fired Boilers).

C. ACCESSIBILITY CLEARANCES

1. The drain tee supplied with the WB90™ boiler requires a minimum of 4" clearance to combustibles. Do not store combustible items (clothing, furniture, etc.) within 4" of this component.
2. The remaining venting components (ordered separately) are listed for 1" clearance to combustible construction.



3. The WB90™ boiler is certified for closet installations with clearances as shown in Figure 1.1. In addition, it is suitable for use on combustible flooring, if a metal drip pan is positioned under the boiler. DO NOT INSTALL THIS APPLIANCE ON CARPETING.

⚠ DANGER

Do Not Install this Appliance on Carpeting.

4. Figure 1.1 shows the minimum recommended clearances to allow reasonable access to the boiler for inspection and maintenance. However, local codes or special conditions may require greater clearances.
5. Care should be taken to prevent combustible materials from being stored in the vicinity of the boiler. DO NOT STORE CLOTHING OR OTHER COMBUSTIBLE MATERIALS IN CONTACT WITH THE BOILER VENTING SYSTEM OR JACKET.

⚠ WARNING

Do not install this appliance where gasoline or other flammable liquids are stored or are in use. Do not store clothing or combustible materials on or against the venting system or jacket.

⚠ CAUTION

Do not install this appliance where corrosive materials, such as ammonia, chlorine, water softener salt, etc., are stored.

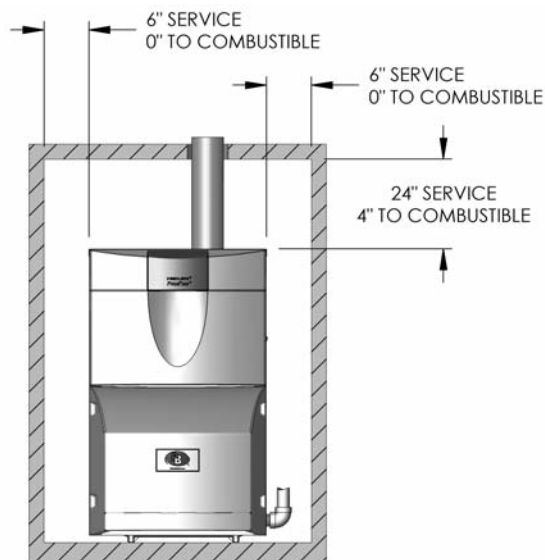


Figure 1.1: Clearances to Combustible Construction & for Service Accessibility

D. AIR FOR COMBUSTION AND VENTILATION – OUTDOOR AIR

1. The WB90™ boiler is designed to allow combustion air to be piped directly to the appliance from outside the building (sealed combustion). To do this, an optional Combustion Air Inlet Kit (54557) is available from your PB Heat, LLC distributor.
2. Combustion air can be supplied from within the building only if the boiler is vented vertically through a chimney and only if there is adequate combustion air for safe combustion in accordance with NFPA 31 (Standard for the Installation of Oil-Burning Equipment). Section 3 of this manual, Venting & Air Inlet Piping, provides guidelines for determining adequate combustion air.

E. APPROVED VENTING/AIR INLET CONFIGURATIONS

1. Vertical Venting with Chimney Liner: The WB90™ boiler may be vented vertically through a chimney lined with a corrosion resistant liner which is approved for use with oil-fired appliances.
 - a. Option 1 – Indoor Combustion Air
 - b. Option 2 – Combustion Air from Outdoors using the optional combustion air inlet kit.

CAUTION

Vertically vented, oil-fired appliances must be connected to a flue having sufficient draft at all times to assure proper operation. Refer to Section 3, Venting and Inlet Air Piping, for proper exhaust vent configuration.

2. Sidewall Venting with Concentric Termination: The WB90™ may be sidewall vented using the optional sidewall vent kit.
 - a. The WB90™ cannot be sidewall vented using indoor air.
 - b. The WB90™ vent & air inlet must be balanced (same length and pressure drop) and may be sidewall vented only with the concentric vent termination specified.

F. INSTALLATION SURVEY

1. For new and existing installations, a Water Installation Survey is available from PB Heat, LLC. The survey will provide information on how the boiler works with your specific system and will provide an general overview of boiler system operation.
2. This survey can help to identify system problems which must be corrected. To obtain copies of this Survey, contact your PB Heat, LLC representative or download it from PeerlessBoilers.com

G. PLANNING THE LAYOUT

1. Prepare sketches and notes of the layout of the installation. Include boiler location, venting system, existing piping and wiring. Show existing equipment that may interfere with installation of the new equipment.
2. The following Sections of this manual should be reviewed for consideration of limitations with respect to:
 - a. Venting and Air Inlet Piping: Section 3
 - b. Water Piping: Section 4
 - c. Oil Burner: Section 5
 - d. Condensate Removal: Section 6
 - e. Electrical Connections & Controls: Section 7
 - f. Maintenance: Section 8
 - g. Boiler Dimensions and Ratings: Section 9

WARNING

This boiler is certified as an indoor appliance. Do not install this boiler outdoors or locations where it will be exposed to freezing temperatures.

WARNING

Do not install this boiler in an attic.

2. BOILER PLACEMENT & ASSEMBLY

A. BOILER PLACEMENT

1. Provide a level foundation, located as close as possible to the center of the heating system.
2. It is a good idea to remove the boiler jacket wrapper, top panel and plastic front panels before moving the boiler down steps or through doorways. This reduces the chance of damaging the jacket panels.
3. Do not attempt to move the boiler by pushing or pulling on the plastic front panels.



WARNING

Do not attempt to move the boiler by pushing or pulling on the plastic front panels. These panels are intended to detach easily for convenient access to the burner and controls.

4. This manual is arranged in the suggested order of connection, starting with the largest diameter connections (venting) and working toward the smallest. This will save time on the installation.
5. Once the boiler is placed in its location, open the hinged burner mounting plate to make sure the ceramic target wall is seated in place at the back of the combustion chamber. On the WB90-04, a ceramic blanket should be lying flat on the bottom of the combustion chamber between the target wall and burner mounting plate.

6. See clearance to combustibles and accessibility clearance information provided in Section I (Preinstallation).

B. CONNECTING THE FLUE OUTLET

1. A 4" condensate drain tee with a gasket is provided with every WB90™ boiler.
2. A vent restrictor orifice is supplied for vertical vent applications. Do not use the vent restrictor in sidewall vent installations because it will limit the input of the boiler.
3. Figure 2.1 shows correct installation of the condensate drain tee.

C. CONNECTING AIR INLET

1. If the Outdoor Air Inlet Kit (Stock Code #54557) is used, the air inlet cover plate at the back of the boiler must be removed to allow installation of the air inlet connection (bulkhead fitting).
2. The air boot, which is part of the Outdoor Air Inlet Kit, must be installed on the H2L burner in place of the air shutter.

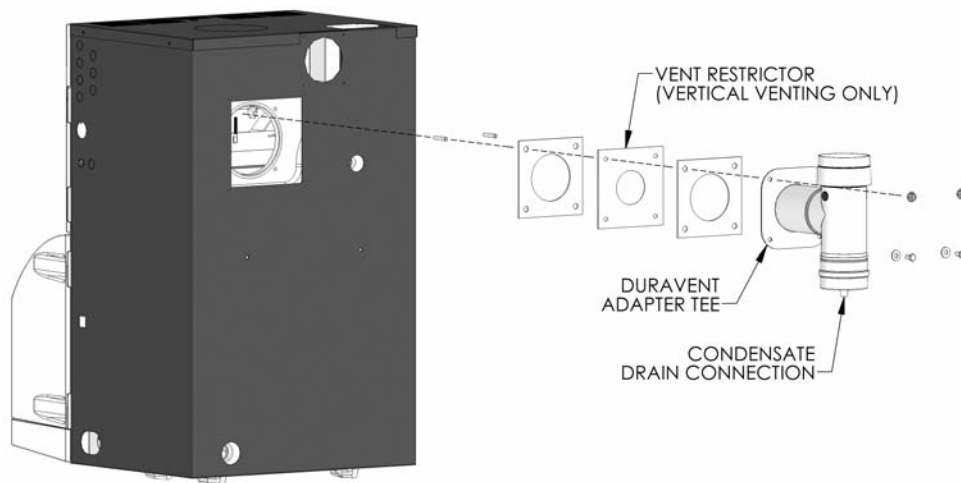


Figure 2.1: Condensate Drain Tee Installation

3. VENTING & AIR INLET PIPING

A. GENERAL

1. The WB90™ boiler can be vented vertically through a stainless steel lined chimney or horizontally using the approved Sidewall Vent Termination Kit (DuraVent 47PVP-OKA / PB Heat Stock Code #54086).
2. It is extremely important to follow these instructions to prevent damage to the boiler and/or building structure.

B. VERTICAL CHIMNEY VENTING

1. General
 - a. The WB90™ boiler may be vented vertically through a masonry chimney provided an approved stainless steel liner is used.
 - b. A Draft Regulator (such as the Fields Model RC Draft Damper) must be used with vertical vent installations.
 - c. In Canada, the blocked vent switch kit (Stock Code #50344) must be used with vertical vent installations. This includes a draft regulator (Stock Code #50251).
 - d. Combustion air for the burner may be supplied from inside the building unless:
 - normal infiltration does not supply sufficient air for combustion.
 - the appliance is located in a confined space as defined by NFPA 31, Chapter 5
 - e. An optional Combustion Air Inlet Kit (Stock Code # 54557) is available if sufficient combustion air is not available in the space.
 - f. All piping for exhaust vent and air inlet must be a minimum of 4" diameter. The chimney liner and, if used, the air inlet piping may be up to 6" pipe.
2. Components Supplied with the Boiler:
 - a. 4" Condensate Drain Tee
 - b. Vent Restrictor
3. The WB90™ boiler is approved only with the Pellet Vent Pro (PVP) series of for exhaust vent pipe manufactured by DuraVent. Table 3.1 lists the components to be used for this purpose.
4. See Figure 3.1 for a typical vertical chimney venting illustration. Contact a DuraVent representative for specific venting questions.

Table 3.1: Approved Vertical Venting Components

Description	DuraVent Article #	PB Heat Stock Code
Vertical Vent Cap	4PVP-VC	54564
Storm Collar	4PVP-SC	54565
Top Cover Plate	5TKP	54566
Male Flex Adapter	4PVP-ADFM	54567
BioFlex Pipe (Specify Length in feet "##", 15, 20, 25, 30, 35 or 100)	4PVP-15BF	54580
	4PVP-20BF	54581
	4PVP-25BF	54582
	4PVP-30BF	54583
Example: 4PVP-30BF is 30 feet long.	4PVP-35BF	54584
	4PVP-100BF	54585
Female Flex Adapter	4PVP-ADFF	54568
Barometric Damper Tee	4PVP-TAD	54569
Elbow 90°	4PVP-E90*	54570*
Elbow 45°	4PVP-E45*	54571*
Straight Length Pipe (Specify Length in inches "##", 6, 12, 24, 36 or 60)	4PVP-6*	54572*
	4PVP-12*	54573*
	4PVP-24*	54574*
	4PVP-36*	54575*
Pipe Extensions – Adjustable (Specify Length "##", 12, 18 or 48)	4PVP-60*	54576*
	4PVP-12A*	54577*
	4PVP-18A*	54578*
	4PVP-48A*	54579*

*These parts may be used in sidewall venting installations.

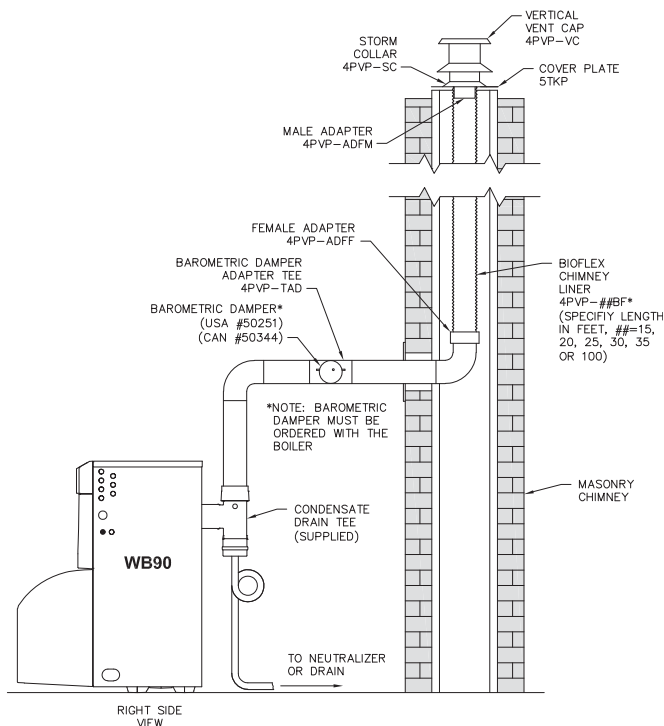


Figure 3.1: Vertical Venting with Stainless Steel Chimney Liner

C. SIDEWALL VENTING

1. Use the CONDENSATE DRAIN TEE supplied with the boiler to attach venting to the boiler. DO NOT USE THE VENT RESTRICTOR FOR SIDEWALL VENTING.

NOTICE

Do not use the vent restrictor supplied with the boiler for sidewall venting. This restrictor will prevent adequate combustion air from entering the boiler.

CAUTION

Outside combustion air must be used with horizontally vented boilers. Failure to do so may cause minor personal injury or property damage.

2. Use the sidewall vent termination kit (DuraVent 47PVP-OKA / PB Heat Stock Code #54086) from DuraVent for horizontal venting installations.
 - a. Figure 3.2 shows a typical installation with sidewall venting.
 - b. For sidewall venting use only Straight Length Pipe, Pipe Extensions and elbows listed in Table 3.1.
 - c. BioFlex Pipe may NOT be used in sidewall installations.

WARNING

The Sidewall Vent Kit specified above must be used for horizontal venting of this appliance. Failure to use the correct termination may cause severe personal injury or property damage.

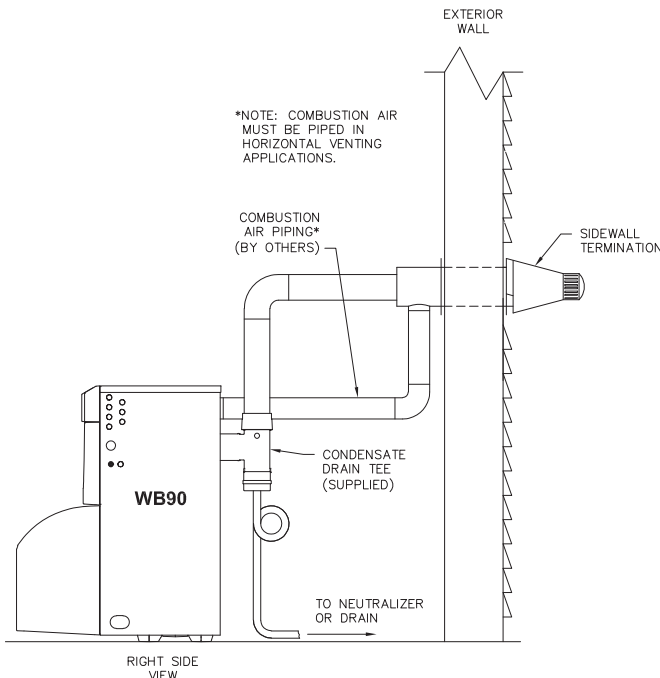


Figure 3.2: Horizontal Sidewall Venting

3. The exhaust and inlet air piping for horizontally vented boilers must be 4" diameter.
4. The maximum equivalent length of sidewall exhaust vent pipe is 20 feet which includes straight length equivalents for elbows and other fittings. The air inlet must be balanced (similar length and pressure drop) with the exhaust.
5. Use (5) equivalent feet for each 90 degree elbow and (3) equivalent feet for a 45 degree elbow.

D. ADEQUATE AIR FOR COMBUSTION

1. General: The WB90™ boiler may be vertically vented with room air inlet where there is adequate combustion air available for safe combustion of oil fuels.
 - a. The boiler is to be located so it does not interfere with the supply of air within the space.
 - b. In buildings with unusually low infiltration where sufficient air for combustion is not available, outside air must be introduced.
 - c. All combustion air ducts to bring outdoor air to the boiler room are to have the same cross-sectional area as the free area of the openings to which they connect.
 - d. Combustion air may be supplied using the optional Combustion Air Inlet Kit (54557).
2. Residential Construction – Unconfined Space:
 - a. If the WB90™ boiler is installed in an unconfined space of a normally constructed residential building, air for combustion and ventilation may be supplied by normal infiltration.
 - b. If the building is unusually tight and normal infiltration is not sufficient to provide air for combustion, the air is to be provided directly from outdoors, or from adjacent spaces that freely communicate with outdoors through permanent openings. Table 3.2, column 1, shows the required open area for each boiler model under these conditions.
 - c. If additional appliances share the same space as the boilers, adequate combustion air for those appliances must be provided.

Table 3.2: Required Free Area of Openings (Vertical Venting Only)

Boiler Model	Required Free Area – sq. in. (sq. cm.)			
	(1)	(2)	(3)	(4)
	Unconfined Space Tight Construction	Confined Space Indoor Air	Confined Space Outdoor Air Direct/Vert. Ducts	Confined Space Outdoor Air Horizontal Ducts
WB90-03	27 (175)	133 (858)	33 (213)	66 (425)
WB90-04	37 (238)	182 (1175)	47 (303)	94 (606)

The area listed above is for each boiler, for multiple boilers this area should be multiplied by the number of boilers present. If additional appliances share the space, sufficient combustion air must be determined for those appliances as well.

3. **Residential Construction – Confined Space:** For boilers installed in confined spaces, air for combustion is to be provided as follows:
 - a. **Combustion Air from Indoors:**
 - Two permanent openings are to be provided as shown in Figure 3.3. One near the top of the space and one near the bottom. Each opening is to have free area not less than shown in Table 3.2, column 2. Each opening shall freely communicate with interior areas which have adequate infiltration from outside.

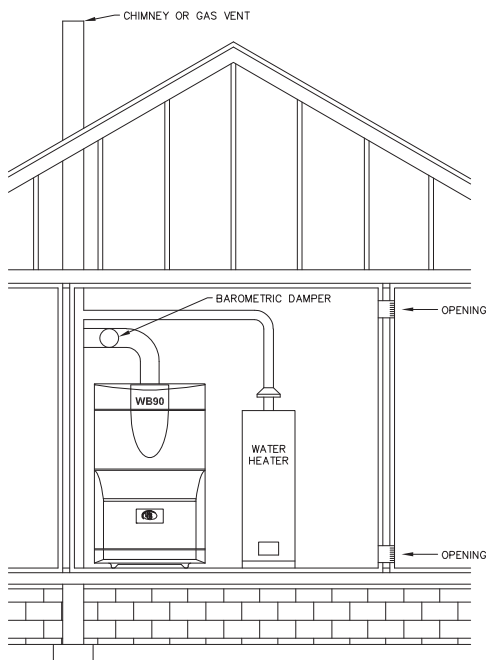


Figure 3.3: Combustion Air Inlet from Indoors

- b. **Combustion Air from Outdoors:**
 - Two permanent openings are to be provided as shown in Figures 3.4 and 3.5, one near the top of the space and one near the bottom. The openings must communicate directly to the outdoors, by means of ducts, or to spaces such as an attic or crawl space that freely communicates with the outdoors.
 - Table 3.2, column 3, shows the required free area for openings and ducts directly communicating with outdoors for communicating by ducts. If horizontal ducts are connected to outdoors, the values in Table 3.2, column 4, should be used.

4. **Louvers and Grilles:**

- a. The effects of louvers and grilles should be taken into consideration when determining free area.
- b. Screens used in louvers or grilles are not to have openings smaller than 1/4" (6.3 mm) square and must be accessible for cleaning.

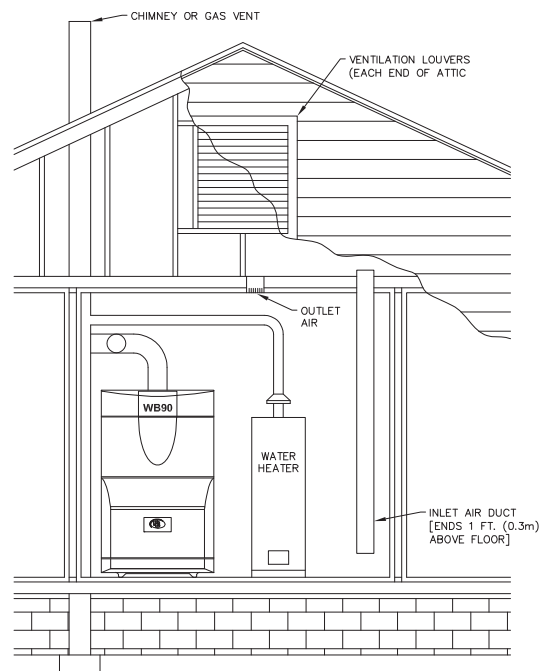


Figure 3.4: Combustion Air Inlet from Outdoors through an Attic

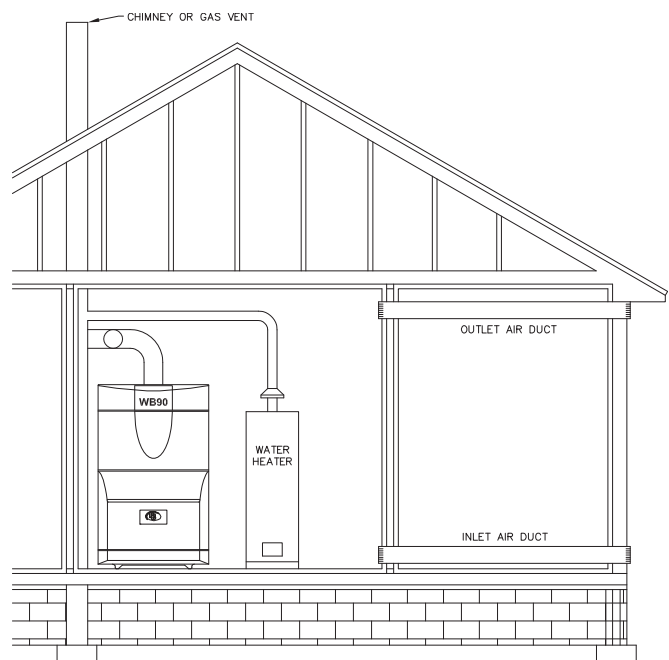


Figure 3.5: Combustion Air Inlet Directly from Outdoors

- c. If the free area of a particular louver or grill is known this should be used to determine the required size. If the free area is not known, assume 20-25% free area for wooden louvers and 60-75% free area for metal louvers.

5. Special Conditions: If the boiler is located in areas where exhaust fans, clothes dryers, direct-fired water heaters or fireplaces can create conditions for unsatisfactory combustion or venting, special provisions must be made.
6. Specially Engineered Installations: The size of combustion air openings shown in this section may not apply to specially engineered systems. These systems are to be designed to ensure an adequate supply of air for combustion and ventilation.

4. WATER PIPING

A. GENERAL

CAUTION

The boiler return pipe **MUST** be piped to the rear 1-1/4" tapping of the WB90™ boiler to prevent flue gas condensation which may damage the cast iron sections. Failure to comply may void the warranty.

1. Follow these instructions closely in order to be sure that the boiler operates as it is intended. Water piping is extremely important to the system operation.
2. Size water supply and return piping in accordance with system requirements.
3. If the WB90™ boiler is replacing an existing boiler, make sure that the system piping is thoroughly cleaned and free from debris before installing this boiler.

ISOLATION VALVE



BALANCING VALVE



PRESSURE REGULATOR



THREE WAY MIXING VALVE



ZONE VALVE

DIFFERENTIAL PRESSURE
BYPASS VALVECHECK VALVE
(BACKFLOW PREVENTER)

CIRCULATOR



DIVERTER TEE

TEMPERATURE
PRESSURE GAUGE

4. Install this boiler so that the oil burner and limit controls are protected from water (dripping, spraying, etc.) during operation and service.
5. The WB90™ boiler is designed to operate in a closed loop hydronic system under forced circulation. However, there is no minimum water flow rate for this boiler.

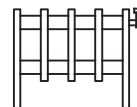
B. SYSTEM COMPONENTS

Figure 4.1 shows the symbol key for the piping diagrams in this section. The following are brief descriptions of system components.

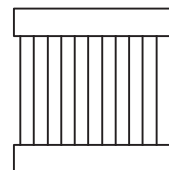
1. *Pressure/Temperature Gauge:* A combination pressure/temperature gauge is provided with each WB90™ boiler to be mounted in the supply (outlet) piping as shown in figure 4.2. Most local codes require this gauge.

BASEBOARD
RADIATION

RADIATOR



RADIANT PANEL

AIR SEPARATOR
& AIR VENT

EXPANSION TANK

SAFETY RELIEF
VALVE

Figure 4.1: Symbol Key

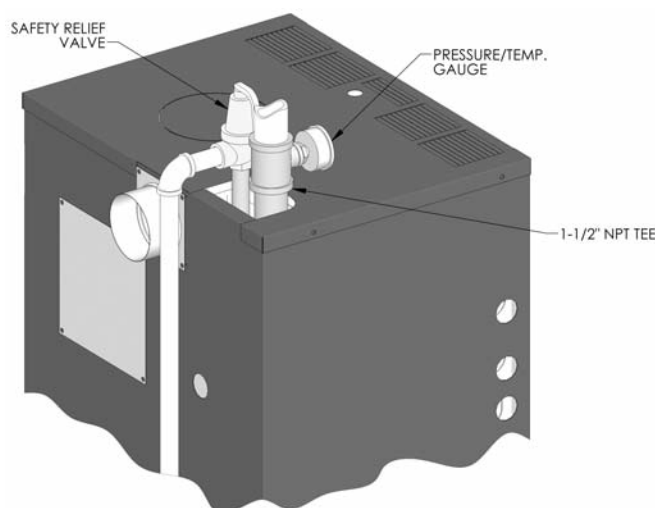


Figure 4.2: Pressure/Temperature Gauge & Relief Valve Piping

2. *Air Elimination:* Closed loop hydronic systems require air elimination devices. As the system water is heated, dissolved oxygen and other gases will separate from the liquid. An air elimination device (such as a TACO Vortech Air Separator) is required to remove the dissolved gases preventing corrosion in the piping system and eliminating noise.
3. *Expansion Tank:* An expansion tank (such as a Bell & Gossett Series HFT) is required to provide room for expansion of the heating medium (water or glycol solution). Consult the expansion tank manufacturer's instruction for specific sizing information. The expansion tank is to be sized for the required system volume and capacity. In addition, care must be taken to size the expansion tank based on the proper heating medium. Glycol solutions may expand more than water for a similar temperature rise. Table 4.1 shows the approximate water volume of the boiler for sizing the expansion tank and determining glycol solution concentration.

Table 4.1: Boiler Water Volume

Boiler Model	Water Volume, Gal (Liter)
WB90-03	11.75 (44.5)
WB90-04	14.75 (55.8)

4. *Flow Control Valve (Check Valve):* Flow control valves or check valves are used to prevent gravity circulation by incorporating a weighted disc into the check valve. These valves also prevent problems with reverse circulation through parallel heating loops which cause erratic behavior of the heating system and prevent heat from reaching its intended load.
5. *Pressure Reducing Valve:* A pressure reducing valve, such as the Bell & Gossett B-38 or a TACO #29, is used in a hydronic system to automatically feed water to the system whenever the pressure drops below the set pressure. These valves should not be used on glycol systems unless close supervision of the glycol solution is practiced.

6. *Back Flow Preventer:* A back flow preventer (check valve) is required by some jurisdictions to prevent water in the hydronic system from backing up into the city water supply if the supply pressure drops below that of the heating system. This is especially important on systems in which glycol solution is used as a heating medium.
7. *Pressure Relief Valve:* The boiler pressure relief valve is shipped separately for field installation. On the WB90™ boiler, this can be piped into the connection provided next to the boiler supply (outlet) connection or, alternatively, on the connection at the rear of the boiler below the supply. The value is to be installed as shown in Figure 4.2.

⚠ WARNING

Do not operate this appliance without installing the pressure relief valve supplied with the boiler or one with sufficient relieving capacity in accordance with the ASME Rating Plate on the boiler.

Pipe the discharge of the safety relief valve to within 12" of the floor and close to an open drain. The discharge piping must be the same size or larger than the relief valve outlet. **DO NOT INSTALL A CAP OR VALVE AT THE RELIEF VALVE OUTLET.**

⚠ CAUTION

Pipe the discharge of the relief valve as close as possible to the floor and away from high traffic areas. Pipe the discharge close to a floor drain. Failure to do so may result in personal injury and/or property damage.

⚠ CAUTION

The relief valve must be mounted in a vertical upright position. No other valve or restriction is to be installed in this line.

8. *Circulator:* The boiler circulator on the WB90™ boiler is specifically designed to prevent the boiler from condensing. This circulation pump operates on a call for central heat to recirculate water through the boiler until the water temperature exceeds 125°F. At this point, the central heating circulator is allowed to operate, sending warm water out to the heat distribution. A circulator is supplied with the boiler to act as the boiler circulator. Circulators for central heating distribution should be sized and installed in accordance with system requirements and pump manufacturers recommendations.
9. *Indirect Water Heater:* An indirect water heater should be piped to a dedicated zone as shown in Figure 4.3. The WB90™ provides 120 VAC output to operate a domestic hot water (DHW) circulation pump.
10. *Boiler Drain Valve:* Fittings are provided for mounting the boiler drain valve in the return tapping at the bottom rear of the boiler.

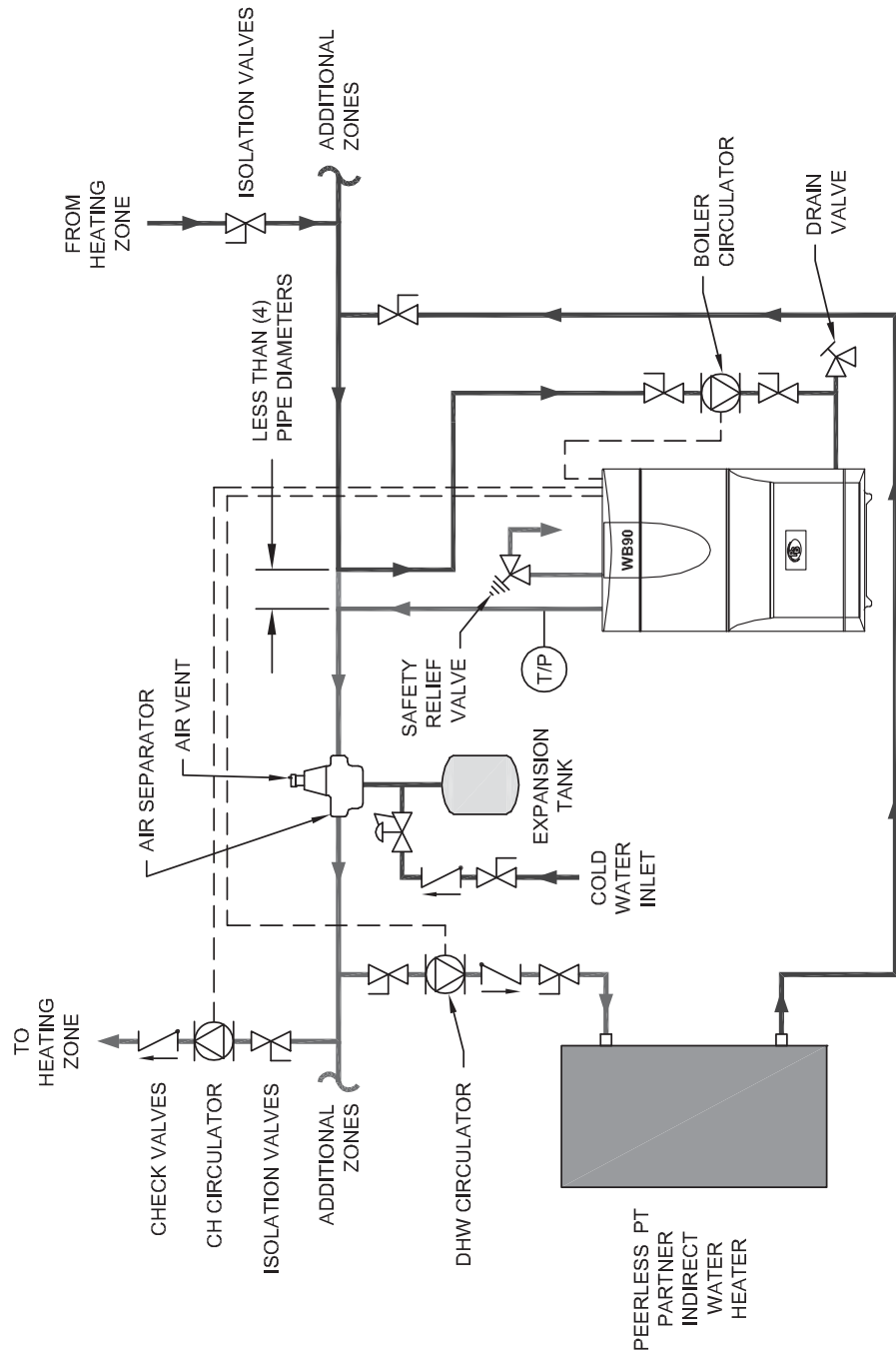


Figure 4.3: Recommended Water Piping

C. SYSTEM PIPING

1. Figure 4.3 shows the recommended piping for the WB90™ boiler. It is extremely important that the boiler is piped primary/secondary (as shown) to prevent damage to the boiler due to condensation.
2. The DHW zone is piped from the primary loop in parallel with the central heating (CH) zones. It should be piped as close to the boiler as possible since it should be the hottest zone.

D. FREEZE PROTECTION

Glycol for hydronic applications is specially formulated for heating systems. It includes inhibitors which prevent the glycol from attacking metallic system components. Make sure that the system fluid is checked for correct glycol concentration and inhibitor level.

E. SPECIAL APPLICATIONS

1. If the WB90™ boiler is used in conjunction with a chilled medium system, pipe the chiller in a separate secondary loop as shown in Figure 4.4.
2. If using the WB90™ with a hot water coil in a forced air system, be sure the hot water coil is downstream of the cooling coil in the airstream.

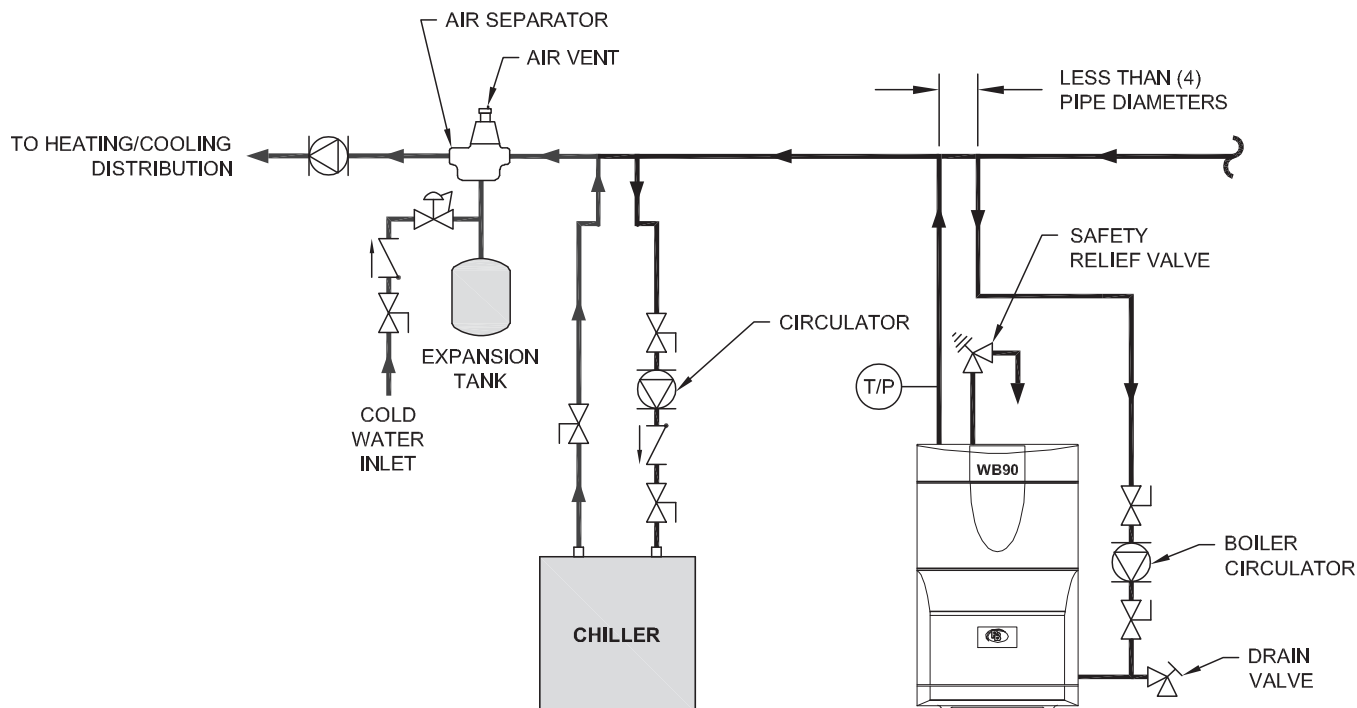


Figure 4.4: WB90™ Piped with a Chiller

5. OIL BURNER

A. GENERAL

1. The WB90™ boiler is available exclusively with the H2L Oil burner from Carlin Combustion Technologies, Inc.
2. The burner is UL Listed for commercial standard No. 1 or No.2 heating oil meeting the ASTM D396 fuel oil specification.

⚠ CAUTION

This appliance is designed to burn only commercial standard No.1 or No.2 Fuel Oil (ASTM D396). Do not use gasoline or waste oil.

3. The H2L burner is a two-stage burner that allows the input of the boiler to more closely follow the required heating load.

B. SPECIFICATIONS

Table 5.1: Burner Setup Parameters

Boiler Model	Input Rate (gph)		Nozzle Spec.	Pump Pressure (psig)		Air Band Setting	Head Bar
	High Fire	Low Fire		High Fire	Low Fire		
WB90-03	0.90	0.50	Danfoss 0.55 gph 60 AH	260	90	35%	#1
WB90-04	1.30	0.75	Danfoss 0.85 gph 60 AB	235	85	65%	#2

Electrical:

Power Supply: 120 VAC, Single Phase, 60 Hertz

Motor: Carlin PSC, 1/6 HP, 3450 RPM

Current Draw: Approximately 2.5 Amps

C. BURNER FUEL SUPPLY

1. Pipe oil lines to the burner through the holes provided on the left side of the jacket.
2. Check fuel unit (oil pump) data sheet (Suntec OT245A) for recommended line sizing, lift limitations and maximum length.
3. Use continuous runs of heavy-wall copper tubing if possible. Use copper flare fittings or fittings specifically labeled for oil supply piping.
4. Check all connections and joints to ensure they are air tight. Bleed the oil supply line and fuel unit completely prior to starting the burner.

⚠ CAUTION

Do not use compression fittings for oil supply lines. Do not use copper sweat fittings with oil piping. Air leaking into the oil supply system may cause erratic burner operation and/or burner lockout. Oil leaks may occur causing a fire hazard.

⚠ NOTICE

Oil piping must be air tight. Air leaking into the oil supply system may cause erratic burner operation and/or burner lockout.

5. To prevent air from entering the fuel system, a fuel-oil de-aerator (such as Tiger Loop) may be used. If a de-aerator is used, follow the manufacturer's instructions for this device.
6. Never use pipe thread sealing tape on oil lines. Tape fragments can break off and plug fuel line components.
7. Install a shut-off valve at the tank and one near the burner.

⚠ NOTICE

A fusible-handle shut-off valve is required at the tank by some jurisdictions to automatically close the fuel supply in the event of a fire emergency. Check your local codes for requirements.

8. Care must be taken when routing the oil lines so they do not interfere with opening and closing of the hinged burner mounting plate. Flexible oil lines or flared copper disconnects with valves (when copper lines are used) may be installed to assure full opening of the burner mounting plate.
9. Install a course fuel filter (rated for 50 microns or less) at the fuel-oil storage tank supply.
10. A high-efficiency, 10 micron filter (Gar-Ber or equivalent) is recommended at the burner to prevent sediment and particles from clogging the nozzle.

⚠ CAUTION

Filter maintenance must be performed annually as a minimum. This includes replacement of the filter and flushing of the suction line. Failure to comply may lead to a failure of the heating system to operate properly. This in turn can cause damage to hydronic piping due to freezing and dangerous conditions for building residents.

11. *Fuel unit bypass plug*: The boiler is shipped with the fuel unit (oil pump) bypass plug NOT installed. The bypass plug is shipped loose for use only when a two-line oil supply system is used. Operating with the bypass plug in place when installed in a one-line oil supply system will damage the fuel unit and may lead to oil leakage resulting in a fire hazard.

WARNING

Do not install the bypass plug when operating the burner in a one-line oil supply system. This will damage the fuel unit and may lead to oil leakage resulting in a fire hazard.

12. Never exceed 3 psig of pressure at the inlet to the fuel unit. Install a suitable OSV (oil safety valve – Suntec or equivalent) if the fuel line or fuel supply is above the burner.

WARNING

Do not operate the burner with a fuel pressure higher than 3 psi at the inlet to the fuel unit. Failure to comply may result in seal damage at the burner fuel unit and may lead to oil leakage resulting in a fire hazard.

13. Be sure the total lift required for the pump does not exceed 8 feet (this is the height difference from the bottom of the tank to the inlet of the fuel unit).

D. BURNER SETUP

1. Read the Carlin EZ-H₂L Burner Instruction Manual included with the boiler before proceeding.
 - a. Inspect the burner components as instructed.
 - b. Perform all checkout procedures as required.
2. Test Equipment:
 - a. *Vacuum Gauge*: Connect a vacuum gauge in the fuel supply line near the burner or into the optional inlet port of the fuel unit.
 - b. *Pressure Gauge*: Nozzle pressure measurement is not required in most cases since the oil pressure is factory set. If nozzle pressure is to be measured, use a flow through type, glycerin-filled gauge suitable for at least 300 psig operation. If a dead head gauge is connected to the bleed fitting on the fuel unit, the pressure may be 10 psig or so lower than the specified pressure.
 - c. *Draft Gauge*: (Vertical Vent Only) A draft gauge capable of reading +0.05" to -0.10" of water is required to properly set the draft regulator in vertically vented boiler.
 - d. *Smoke Tester*: A smoke tester such as a Bacharach True Spot® smoke tester must be used for all boiler installations.
 - e. *Combustion Analyzer*: A combustion analyzer capable of reading percent CO₂ and parts per million (ppm) CO must be used to assure proper boiler operation.
3. Start burner and bleed air from oil lines.
 - a. Single Line Oil Supply System:
 - Connect a clear plastic tube to the oil bleed connection. This is on the rear of the fuel unit toward the boiler.
 - Route the tubing to a can or bucket to capture purged oil (bleeding 1-2 quarts of fuel should be sufficient to purge the air from the fuel unit and lines).
 - Use a 3/8" open end wrench to open the bleed line.
 - b. Two Line Oil Supply Systems can usually purge air in the burner by normal operation.
 - c. Turn the boiler service switch OFF.
 - d. Initiate a call for heat (thermostat or other dry contact input).
 - e. Turn the service switch to ON.
 - f. Operate the burner until all air in the oil lines has been purged (oil flows clear through the plastic tubing). Note that fuel will not flow during prepurge and postpurge periods.
 - g. Continue burner operation for another 15-20 seconds. The burner primary control may need to be reset several times to achieve the desired run time. Note that the burner primary control is designed to enter a "latch-up" if lockout occurs 3 times during a single call for heat. Latch-up requires a special resetting procedure and is intended to be performed by a qualified service technician as described below. This feature prevents the burner from running by permanently holding in the reset button.
 - Push in and hold the reset button on the 60200 primary ignition control for 10 seconds.
 - Alternating amber and red lights on the control will begin to flash.
 - Continue holding the reset button, allowing the lights to flash for approximately 20 additional seconds.
 - After the lights turn off, release the button. If the button is released before the lights go off, the burner control will remain in latch-up.
 - h. Terminate the call for heat and allow the burner shut down. Close the bleed connection and disconnect the tubing.

WARNING

DO NOT attempt to set up the burner without using test instruments. Failure to check and adjust combustion using combustion test instruments may result in severe personal injury, death and/or major property damage.

4. Adjust High Fire Combustion:
 - a. Be sure the service switch is ON and initiate a call for heat.
 - b. Assure that the Carlin 65000 control is in the manual firing rate mode by toggling the MANUAL/AUTO key until the MANUAL light is lit.
 - c. Assure that the Carlin 65000 control is set to the high firing rate by toggling the LOW/HIGH key until the LOW FIRE CALL light is OFF.
 - d. Operate the burner for 15 minutes before making any adjustments.

WARNING

Inspect fuel lines for leaks. Repair any leaks to prevent fire hazards from fuel spillage and/or combustion problems due to air in the fuel lines.

- e. Inspect the flame through the observation port in the burner door.
 - The flame should be well defined and should not visibly impinge on any surface in the combustion chamber.
 - If adjustments are made, inspect the flame again.

WARNING

DO NOT attempt to set up the burner without using test instruments. Visual inspection cannot be trusted to assure proper operation. Failure to check and adjust combustion using combustion test instruments may result in severe personal injury, death and/or major property damage.

- f. Check oil suction line pressure at the vacuum gauge on the oil supply line.
 - Assure that the vacuum gauge reading does not exceed 15 inches Hg.
 - If the vacuum is excessive, turn off the burner and inspect the fuel lines for blockage, excessive lift or incorrect sizing.
 - Correct fuel supply problems before attempting to adjust the burner.
- g. Check the draft in the breaching for vertically vented boilers.
 - Be sure that the breaching pressure, at the connection provided in the boiler outlet tee, is between 0.00" and -0.05" water column.
 - Adjust the draft regulator to maintain the breaching draft within the range specified above.
- h. Set the combustion:
 - Use the connection provided in the exhaust vent tee to obtain a sample of combustion products for the combustion analyzer.
 - Verify that the burner head position bar is correct as indicated in Table 5.1.

- If the head position bar is correct, loosen the air band clamping screw and rotate the air band slightly to increase or decrease air flow.
- Adjust the air band (or air shutter if an air boot is used) for the highest CO₂ (Lowest O₂) possible with 0 smoke on the Bacharach scale. Do not exceed 13.0% CO₂ (3.3% minimum O₂).
- After making adjustments, tighten the air band clamping screw and check combustion again after the burner has run for a few minutes to stabilize.
- Repeat adjustments to assure that the high fire combustion is at the desired values.

WARNING

DO NOT adjust the high-fire fuel pressure regulator on the fuel unit. This pressure is factory set for the WB90™ boiler and should not be changed.

- i. Use the smoke tester to sample the smoke in the vent.
 - Use the smoke tester in accordance with the manufacturers instructions.
 - The smoke sample should be zero (0) on the Bacharach scale.
- j. Check the draft at the breaching (exhaust tee) after making air band adjustments.

5. Adjust Low Fire Combustion
 - a. Be sure the service switch is ON and a call for heat is present.

CAUTION

DO NOT adjust the air band when checking low-fire combustion. Use only the low-fire pressure regulator as described below. Changing the air band will affect high fire combustion and may cause minor personal injury or property damage.

- b. Assure that the Carlin 65000 control is in the manual firing rate mode by toggling the MANUAL/AUTO key until the MANUAL light is lit.
- c. Assure that the Carlin 65000 control is set to the low firing rate by toggling the LOW/HIGH key until the LOW FIRE CALL light is ON.
- d. Operate the burner for 15 minutes before making any adjustments.
- e. Inspect the flame through the observation port in the burner door.
 - The flame should be well defined and should not visibly impinge on any surface in the combustion chamber.
 - If adjustments are made, inspect the flame again.

**WARNING**

DO NOT attempt to set up the burner without using test instruments. Visual inspection cannot be trusted to assure proper operation. Failure to check and adjust combustion using combustion test instruments may result in severe personal injury, death and/or major property damage.

- f. Set the combustion (Note that the low-fire combustion CO₂ values are typically 0.5% to 1.0% lower than on high-fire.
- g. Adjust low-fire pressure regulator if necessary
 - If the CO₂ value is not 0.5% to 1.0% lower than the high-fire value, adjust the low-fire oil pressure.
 - Figure 5.1 shows the location of the low-fire pressure adjustment.
 - Turn the screw clockwise to increase CO₂ (increase oil/flow) or counterclockwise to decrease CO₂.

- h. Use the smoke tester to sample the smoke in the vent.
 - Use the smoke tester in accordance with the manufacturers' instructions.
 - The smoke sample should be zero (0) on the Bacharach scale.

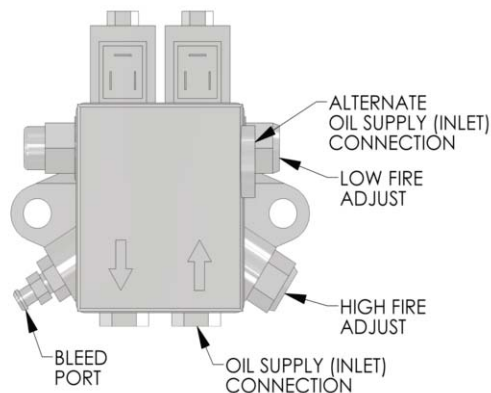


Figure 5.1

6. CONDENSATE REMOVAL

A. GENERAL

1. The disposal of all condensate into public sewage systems is to be in accordance with local codes and regulations. In the absence of such codes, follow these instructions.
2. Proper piping and removal of condensation from the vent system is critical to the operation of the WB90™ boiler.
3. Depending on several factors, the pH of condensate from oil-fired appliances may be as low as 2.0. Some local codes require the use of neutralization equipment to treat acidic condensate.
4. Acidic condensate is corrosive and may attack metal pipe and drain fittings. Use plastic (PVC, Polypropylene or other material resistant to acidic condensate) fittings for condensate drain components. Metal components may be used after appropriate neutralization.

B. CONDENSATE TRAP

1. Connect 5/8" ID PVC Tubing to the drain fitting on the tee supplied with the boiler. Figure 6.1 shows this connection.
2. Create a smooth siphon loop using tubing as shown to prevent combustion gases from exiting through the condensate drain system.
3. Be sure that all condensate piping has a minimum inside diameter of 5/8 inch to prevent blockage that may occur from debris entering from the vent system.

4. Route the exit of the condensate system to a suitable drain or neutralization system.
5. If the boiler condensate drain is above the level of a gravity drain, a condensate pump must be used. Be sure to check the applicability of the condensate pump to acidic combustion condensate.
6. Use a propylene glycol solution to keep the trap primed and prevent the fluid from evaporating. Depending on the installation conditions, there may be periods when the condensate produced will evaporate from the trap, causing a path for combustion products to escape.

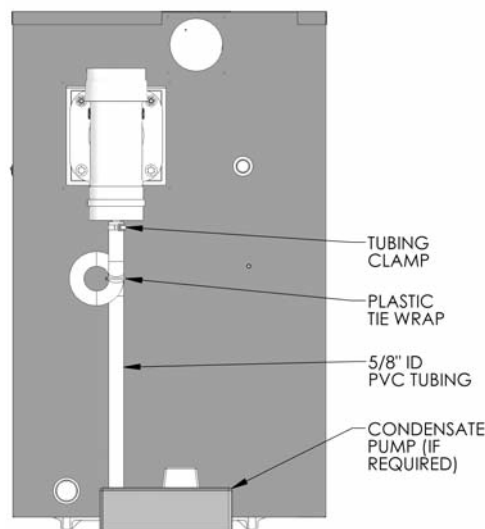


Figure 6.1: Condensate Drain with Trap

7. ELECTRICAL CONNECTIONS & CONTROLS

A. GENERAL

The WB90™ boiler is to be wired in accordance with local codes and regulations as defined by the Authority having jurisdiction. In the absence of such local codes, this appliance is to be wired in accordance with the latest edition of the National Electrical Code, ANSI/NFPA 70.

B. CUSTOMER CONNECTIONS

1. Electrical knockouts are provided on the right side of the jacket to connect power supply wiring, circulator wiring and wiring to various external sensors or controls.
2. The electrical terminals are located behind a panel located behind the PCABS upper front cover. With the plastic front cover removed, loosen the screw to the right of the boiler limit control then remove the screw on the right side of the access cover (See Figure 7.1).
3. Figure 7.2 shows the customer connections and internal wiring for the WB90™ boiler.
4. Terminals #1 and #2 are for connection to the room thermostat or zone control output to activate a call for central heating (CH).
5. Terminal #3 & #4 are for attaching an outdoor sensor if desired. The outdoor sensor can provide two functions.
 - a. If the outdoor sensor is connected, the boiler will use an outdoor reset algorithm instead of Thermal Targeting that is the default of the control.
 - b. In order to use Thermal Targeting with an outdoor sensor to hold the boiler off unless the outdoor temperature is below a specified value, the sensor wire in the HydroStat H2L control should be switched to WWSD from OR.
6. Terminals #5 & #6 are for incoming electrical power for all boiler components including the Burner and the limit/LWCO control. The voltage should be 120 VAC, 60 Hertz, Single Phase.
7. Terminals #7 & #8 provide 120 VAC output to operate the boiler pump. This pump should always operate when the burner is firing. The maximum rating of the boiler pump is 5.8 full load amps.
8. Terminals #9 & #10 provide 120 VAC output to operate central heating (CH) pumps.
 - a. This 120 VAC output controls the CH pumps to prevent condensation in the boiler. The CH and DHW pump output terminals are often held off to allow the boiler to quickly heat up from a cold start.

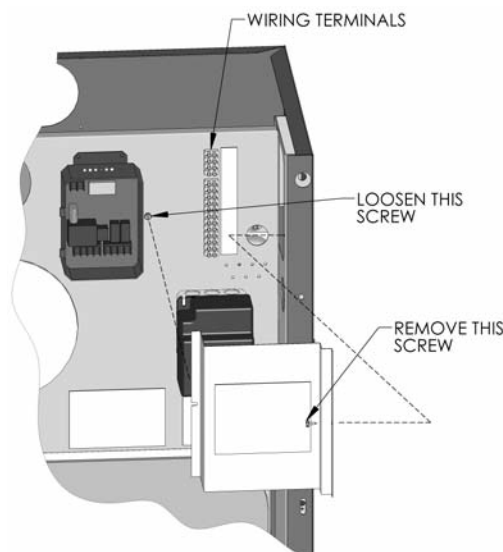


Figure 7.1: Electrical Terminal Access

- b. The maximum rating of the CH terminals is 7.4 FLA. Therefore, if multiple zones are controlled using a zone circulator relay panel which adds up to more than 7.4 amps, an isolation relay will be required.
 - c. Section 7.C provides instructions for connecting a zone circulator panel.
9. Terminals #11 & #12 provide 120 VAC output to operate domestic hot water (DHW) pumps. The maximum rating for these terminals is 5.8 FLA.
10. Terminals #13 and #14 are to be connected to a DHW thermostat (such as Honeywell L4080B). The thermostat makes the 120 VAC circuit between the terminals to signal a DHW call for heat to the limit control.
11. Terminals #15 & #16 provide a 120 VAC alarm output signal. This output may be used to power a remote alarm (100 watts maximum). Note that the red indicator light on the side of the boiler, near the power switch, is illuminated when this is powered.
12. Note that the service switch does not disconnect power to the convenience outlet.

WARNING

The service switch does not disconnect power to the convenience outlet or its associated internal wiring. To service the electrical system, be sure that the power to the boiler is turned off at the main disconnect.

ELECTRICAL CONNECTIONS & CONTROLS

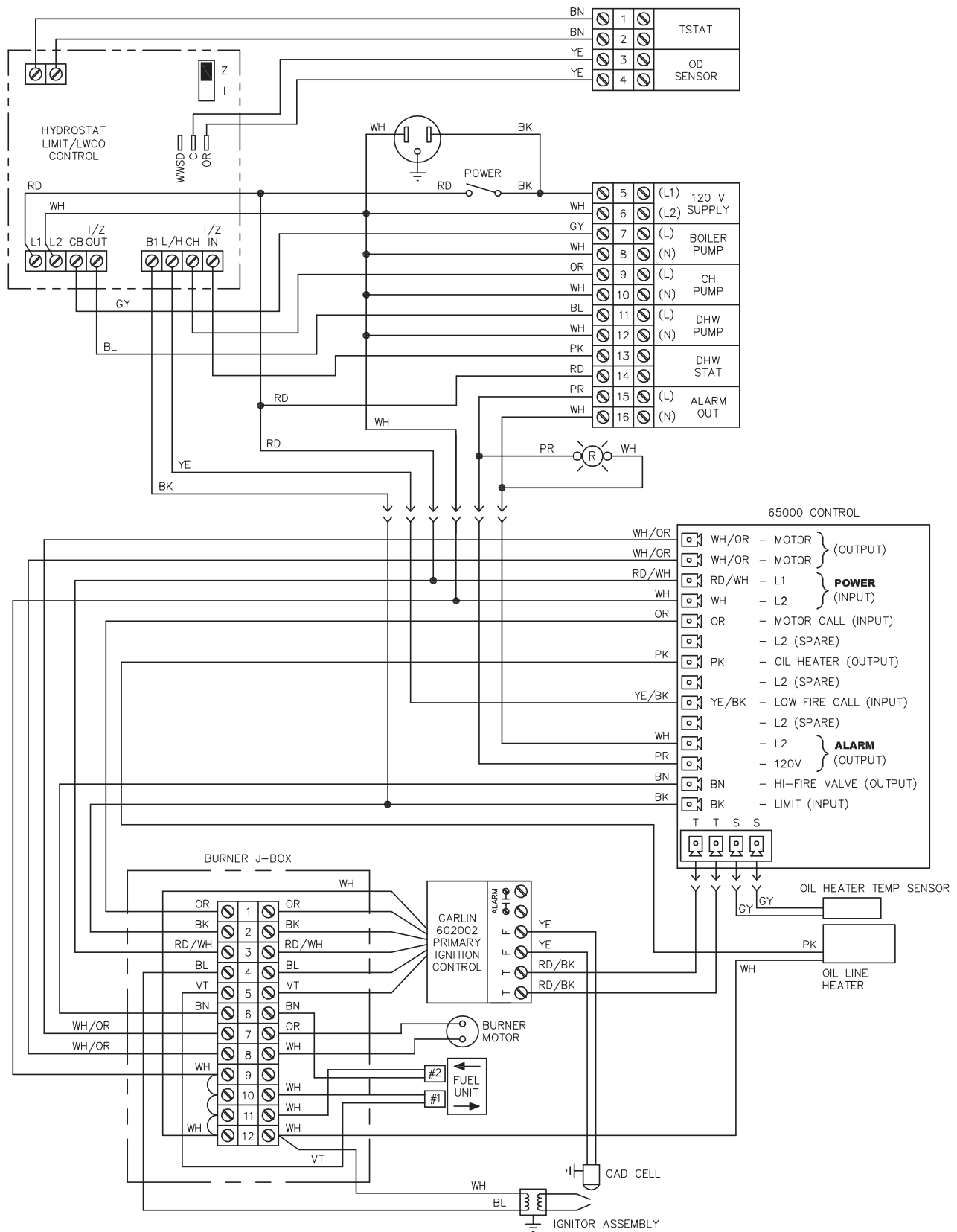


Figure 7.2: WB90™ Electrical Wiring Schematic

C. ZONE CIRCULATOR WIRING

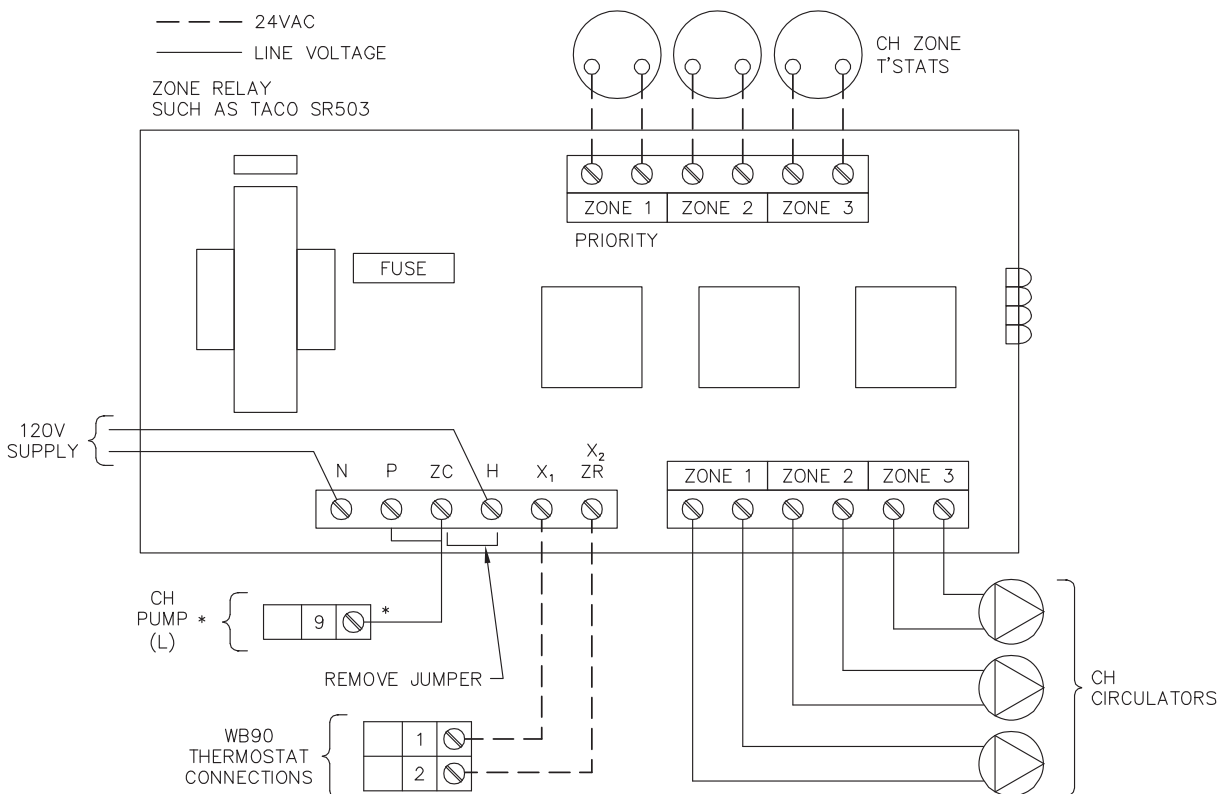
1. Wiring for a typical zone circulator relay is shown in Figure 7.3.
 - a. Power from WB90™ terminal #9 supplies 120 volts to terminal ZC on the zone panel. This configuration uses the neutral from the zone relay power supply so no neutral is necessary from terminal #10.
 - b. Remove the jumper between ZC and H.
 - c. In this configuration, the power for the zone circulators is provide by the boiler output. If a zone is calling and the boiler is prioritizing the DHW output, the pumps are not allowed to run.

CAUTION

If power is supplied to the ZC terminal on the zone control panel, then the jumper between ZC and H must be removed.

CAUTION

The CH Pump output, Terminal 9, **MUST** be used to enable all CH circulators, either directly or through a relay (switching and/or zone relay) in order to prevent corrosion from flue gas condensation in the boiler. This corrosion in the cast iron heat exchanger can cause significant damage and premature failure, as well as void the boiler warranty.



* ZONE PUMP LOADS ARE CARRIED BY WB90 CONTROL. IF CH ZONE PUMP LOADS TOTAL MORE THAN 7.4 AMPS, INSTALL RELAY TO ISOLATE CH PUMP TERMINALS.

Figure 7.3: Typical Zone Circulator Relay Wiring

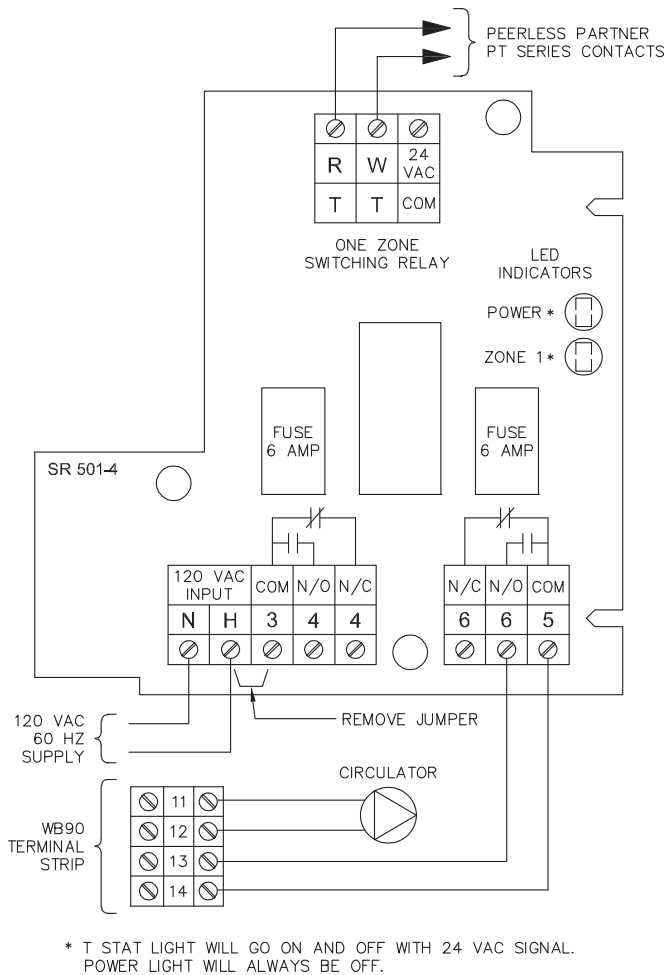


Figure 7.4: WB90™ Boiler with Peerless® Partner® (PT Series)

2. Note that, in this configuration, the zone pump loads are carried by the WB90™ limit control which is limited to 7.4 FLA.
 - a. If the total load of all of the pumps on the zone panel exceeds 7.4 amps, an isolation relay must be used to prevent the load from being drawn through the limit control.
 - b. Figure 7.5 shows typical wiring for an isolation relay.

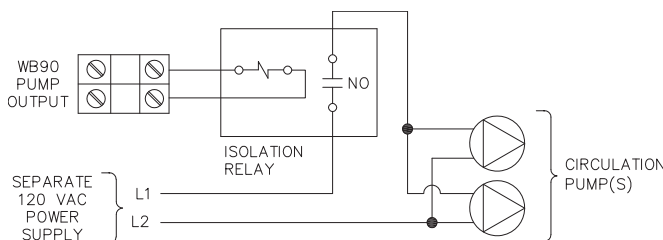


Figure 7.5: Isolation Relay Wiring

D. RESET LIMIT / LOW WATER CUTOFF (LWCO) CONTROL

1. The WB90™ comes equipped with the HydroStat 3250-H2L which is specifically designed to:
 - a. Provide low water cutoff (LWCO) protection
 - b. Operate as a reset-type temperature limit control
 - Thermal Targeting (Default)
 - Outdoor Reset (Optional)
 - c. Provide 2-stage operation of the H2L burner
 - d. Accept thermostat input for central heat (CH) [24 VAC Circuit]
 - e. Accept thermostat input for domestic hot water (DHW) using an indirect storage tank [120 VAC Circuit]
 - f. Operate a boiler circulator
 - g. Operate a CH circulator
 - h. Operate a DHW circulator
 - i. Display boiler temperature
 - j. Provide boiler diagnostic output
2. Low Water Cutoff Protection:
 - a. The HydroStat H2L is a safety rated control that provides low water cutoff protection in accordance with UL353, Limit Controls when used in conjunction with the Hydrolevel Electro-Well provided with the boiler.
 - b. The control is remote mounted with a 24" sensor/well installed in the Hydrolevel Electro-Well.
 - c. Do not use a tapping other than the one provided for this purpose.
3. Thermal Targeting: The Thermal Targeting technology analyzes thermostat activity and continually evaluates the heating load of the building.
 - a. When the outdoor temperature is low, the heat demand will be high causing the Fuel Smart HydroStat to raise the target temperature of the boiler. This maximizes the boiler heat output when it is needed.
 - b. When the outside temperature is milder, the heat demand is lower. In these off-peak load periods, which tend to be a substantial part of the heating season, the target temperature of the boiler is lower, saving fuel and providing comfortable temperatures even close to the radiators.
4. Economy Feature:
 - a. The economy feature is factory set to "1". As a starting point, this should be set to the number of central heating (CH) zones or higher.
 - b. If the heating system reacts too slowly to the heat load, the Economy dial may be adjusted to a lower value.

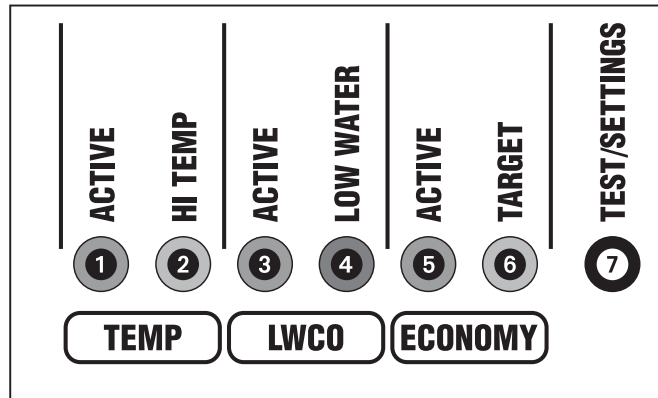
- c. If the boiler provides adequate heat at the value chosen, an opportunity for greater fuel savings may be achieved by selecting a higher setting.
5. Zone/Indirect (I/Z) Switch:
- a. When installing the WB90™ with an indirect water heater, the Z/I switch should be set to the “I” position.
- b. When this switch is set in the “I” position, a call to I/Z in will bypass the Thermal Targeting feature and target the high limit setting of the control.
6. Setting the High Limit:
- a. The high limit setting is factory set for 190°F (88°C). To adjust, turn the HI TEMP dial until the desired setting is shown on the display screen.
- b. The range of this setting is from 100°F to 220°F (38°C to 105°C).
7. Optional Features (Program Mode):
- a. To access the program mode of the HydroStat control, turn the LO TEMP dial to a position between OFF and 110°F. The display reads “Pro” which indicates the control is in programming mode. (Note: turning the LO TEMP dial to “PRO” will likely initiate a burner cycle.)
- b. The feature to be set is selected by turning the HI TEMP dial.
- This dial will scroll through the available options from 1 – 7 or dEF.
 - Once the feature has been selected, pushing the test button will toggle through the available options.
 - When the desired option is shown on the display, it is considered selected. No further action is required.
 - The HI TEMP dial can then be used to choose another feature for adjustment.
 - When both dials are returned to the desired operating position, then all values are locked in and the control is no longer in program mode.
 - The settings are stored in non-volatile memory so that power cycling will not affect the values.

Table 7.1: HydroStat 3250-H2L Programming

Dial Setting	Feature	Options	Description	Default Setting
1	Thermal pre-purge: When activated, the control will attempt to satisfy a heat demand with residual heat from the boiler. If the heat demand is not satisfied, a burner cycle will be initiated.	OFF	Purge inactive	OFF
		on	Purge active	
2	Temperature Units: If “c” for Celsius is chosen, “c” will appear after the temperature in the display if the temperature is below 100 degrees.	F	Fahrenheit	F
		c	Celsius	
3	LWCO Reset: Automatic or manual reset selection for the low water fuel cutoff.	A	Automatic Reset	A
		b	Manual Reset	
4	<i>Not available on this control</i>			
5	<i>Not available on this control</i>			
6	<i>Not available on this control</i>			
7	Forced Low Fire: To prevent short-cycling of the burner, the HydroStat will, by default, force the burner into low fire after it lights on high fire. After the selected delay period,	A	5 minutes on any call from T-T and/or DHW (IZ IN)	A
		b	3 minutes on a call from either T-T or DHW (IZ IN), not both. High fire if both call. <i>Note: In the Z position "IZ IN" is not considered a DHW call so a call to both forces 3 minutes of low fire</i>	
		C	5 minutes on a call for heat to T-T or (IZ IN) with the switch in the Z position. Any call for DHW, (IZ IN) with the switch in the “I” position will interrupt forced low fire.	
		d	No forced low fire on a call	
dEF	Restore Factory Defaults: Choosing Y will restore all 7 values in this table to their default values.	Y	Restore defaults	n
		n	Do not restore defaults	

8. LED Legend and Test/Settings Button

LED LEGEND and TEST/SETTINGS BUTTON



1 TEMP ACTIVE Indicates that the Fuel Smart HydroStat control is powered and that the temperature function is active.

2 TEMP HI TEMP Illuminates when the boiler water temperature reaches the high limit setting. It will remain lit until the water temperature falls 10°. The Fuel Smart HydroStat prevents burner operation while this LED is on. See Differential explanation on page 7.

3 LWCO ACTIVE Indicates that the low water cut-off (LWCO) function of the Fuel Smart HydroStat is active. When the control is installed with a Hydrolevel Electro-Well, this LED will be on at all times when the control is powered. **IMPORTANT:** If the control is installed with a well other than the Electro-Well, this LED will not illuminate indicating that the control is not providing low water cut-off functionality.

4 LWCO LOW WATER Indicates that the boiler is in a low water condition. The HydroStat control will prevent burner operation during this condition. If the LOW WATER light is blinking, the control has been programmed to provide lock-out protection in the event a low water condition is detected (see Manual Reset Low Water Cut-Off on page 9). Pressing the TEST/SETTINGS button will reset the control.

IMPORTANT: The system must be checked by a qualified heating professional prior to resuming operation.

WARNING: ALLOW THE BOILER TO FULLY COOL BEFORE ADDING WATER.

5 ECONOMY ACTIVE Indicates that the Thermal Targeting function is active and the Fuel Smart HydroStat will reduce boiler temperature to conserve fuel. The Economy feature is activated using the ECONOMY dial. (See "How Thermal Targeting Works" on page 8 for more information).

6 ECONOMY TARGET When the Economy feature is active, the Fuel Smart HydroStat continually sets target

temperatures below the high limit setting to maximize fuel efficiency. When the boiler water reaches the target temperature, the LED illuminates and the burner will shut down. The boiler water will continue to circulate and heat the house as long as the thermostat call continues. The LED will stay lit until the boiler temperature drops below the differential set point at which point the boiler will be allowed to fire again. **NOTE:** This LED illuminates regularly during normal boiler operation.

7 TEST/SETTINGS Button

To Test Low Water Cut-Off: Press and hold the Test/Settings button for 5 seconds. The display will read LCO.

LWCO TEST LCO

The red Low Water light should illuminate and the burner circuit (B1 and B2) should de-energize. **NOTE:** The control must be installed with a Hydrolevel Electro-Well for low water cut-off functionality (see page 2 for more details).

To View Current Settings: Press and release the Test/Settings Button in short intervals to sequentially display the following settings:

HIGH LIMIT SETTING HL
 LOW LIMIT SETTING LL
 ECONOMY SETTING ECO

CURRENT TARGET TEMPERATURE 000

The display will return to boiler temperature (default) if Test/Settings Button is not pressed for 5 seconds.

E. CARLIN 65000 FIRING RATE CONTROL

1. Functions:
 - a. Input: Call for Heat from Hydrostat 3250-H2L Control
 - b. Input: Firing Rate from HydroStat 3250-H2L Control
 - c. Input: Oil Temperature Feedback from Sensor
 - d. Output: Activates Oil Heater for LO/HI Fire
 - e. Output: Call for Heat to 60200 Primary Ignition Control
 - f. Output: Provides Diagnostic Information in Fault Condition
2. Indicator Lights:
 - a. HEATER – On when Oil Heater is Active
 - b. MANUAL – Indicates Control is in Manual Mode
 - c. MOTOR – On when Motor is On
 - d. FAULT – Pulses to Indicate Fault Condition
 - e. LOW FIRE CALL – On when Burner is in Low Fire
 - f. POWER – On when Control is Powered
3. Switches:
 - a. MANUAL/AUTO – Allows Manual Control of Firing Rate
 - b. LOW/HIGH – Allows User to Set Input Rate

F. CARLIN 60200 PRIMARY IGNITION CONTROL

1. Functions:
 - a. Input: Call for Heat from 65000 control
 - b. Input: Flame Sensing from Cad Cell
 - c. Safety: Timing for Ignition and Lockouts
 - d. Output: Activates Ignition Source
 - e. Output: Start or Stop Blower/Fuel Unit Motor
 - f. Output: Open or Close Oil Valves
 - g. Output: Provides Diagnostic Information in Fault Conditions
2. Indicator Lights:
 - a. Amber Light
 - On alone – Call for heat initiated and control is performing initial self testing
 - Flashing or On with red light – Burner fault
 - b. Red Light
 - On or Flashing – Burner Fault

ELECTRICAL CONNECTIONS & CONTROLS

Component status:		Components					60200		65000					
		Motor	Ignitor	Blocking oil valve	High-fire oil valve	Oil heater	AMBER	RED	HEATER (amber)	MANUAL (amber)	MOTOR (amber)	FAULT (red)	LOW FIRE CALL (amber)	POWER (green)
● = ON blank = OFF * = Varies with conditions														
Light status:														
● = ON * = Varies with conditions														
⦿ = Flashing uniformly on/off														
● x = Flash code (off 4 seconds, then flashes on/off "x" times)														
Power turned on	60200 and 65000 perform initialization tests (all 65000 lights flash for 1 second)												*	●
	After 4-second boot-up test, 60200 continues test for another 6 seconds; if successful, amber light is on, or else the control continues trying.						●						*	●
Standby	No call for heat from appliance												*	●
Call for heat	65000 starts oil heater.					●			●				*	●
	When oil temp reaches setpoint, 65000 closes T-T terminals on 60200. 60200 tests cad cell circuit – amber light will be on, but blink off 3 to 4 seconds if cad cell test fails and will continue trying. 60200 checks for voltage on motor contacts and enters lockout if test fails.						●		●				*	●
	PREPURGE — 60200 starts ignitor, then powers motor lead 1 second later.		●						●				*	●
	65000 starts motor when it detects power on motor lead of 60200. Motor will run at high speed.	●	●						●		●		*	●
	65000 cycles the oil heater as needed to maintain oil temperature at setpoint.	●	●		*				*		●		*	●
	TRIAL FOR IGNITION — After prepurge, the 60200 powers the blocking oil valve and the high fire oil valve, allowing oil to flow to the nozzle at high fire rate.	●	●	●		●			●		●		*	●
	RUN PERIOD — If the 60200 senses flame within the limit of 15 seconds, TFI is successful. The 60200 continues ignition for another 10 seconds, then turns the ignitor off. (If low fire operation is called for, motor speed will drop to low-fire speed and the high fire valve will be deactivated.)	●		●							●			
	If MANUAL light is on and LOW FIRE CALL light is on, motor runs at low speed.	●		●					*	●	●		●	●
	If MANUAL light is on and LOW FIRE CALL light is off, motor runs at high speed.	●		●	●					●	●			●
	If MANUAL light is off, motor will cycle between high and low based on input from appliance. LOW FIRE CALL light will be on when low fire is called for.	●		●	*				*		●		*	●
End CFH	POSTPURGE — 65000 opens T-T terminals of 60200. The 60200 deactivates the blocking oil valve (and high fire valve, if on) and continues power to the blower until postpurge is complete.	●									●		*	●
	When the 65000 detects blower power off at 60200, the motor shuts down.												*	●

60200 fault lights	FLAME FAILURE — If the 60200 loses flame signal during run, the red light flashes. The blocking oil valve is deactivated within 2 seconds. Power is supplied to the motor for the delay off period. The 60200 will RECYCLE by attempting a new firing cycle after waiting 65 seconds.													
	LOCKOUT — Due to motor contact sensed closed or trial for ignition failure — reset by holding reset button for 1 second. 60200 alarm contacts are closed.						●							
	LATCH-UP — Due to 3 lockouts occurring during the same heating cycle — see instructions on page 22 for serviceman reset procedure. 60200 alarm contacts are closed.						●	●						
	CAD CELL — Cad cell circuit sensing light — 60200 continues to try indefinitely.						⦿							
65000 fault lights	x = 1 flash: FUEL TEMP SENSOR — Sensor shorted or open; burner will switch to high fire, continuing to fire; no lockout or alarm												● 1	
	x = 2 flashes: FUEL HEATER — Fuel heating rate or fuel temp failure; burner will switch to high fire, continuing to fire; no lockout or alarm												● 2	
	x = 3 flashes: NO MOTOR CALL FROM 60200 — The 60200 has not called for motor within time limit; the 65000 will wait 60 seconds and retry; if failure occurs again, lockout and alarm activation will occur												● 3	
	x = 4 flashes: LIMIT, HI-LO OR MOTOR — An input did not occur as required; lockout and alarm activation will occur												● 4	
	x = 5 flashes: INTERNAL CONTROL FAILURE — Lockout and alarm activation will occur												● 5	

Figure 7.5: EZ-H₂L Sequence of Operation

8. MAINTENANCE

WARNING

Product Safety Information Refractory Ceramic Fiber Product

This appliance contains materials made from refractory ceramic fibers (RCF). Airborne RCF fibers, when inhaled, have been classified by the International Agency for Research on Cancer (IARC), as a possible carcinogen to humans. After the RCF materials have been exposed to temperatures above 1800°F, they can change into crystalline silica, which has been classified by the IARC as carcinogenic to humans. If particles become airborne during service or repair, inhalation of these particles may be hazardous to your health.

Avoid Breathing Fiber Particulates and Dust

Suppliers of RCF recommend the following precautions be taken when handling these materials:

Precautionary Measures:

Provide adequate ventilation.

Wear a NIOSH/MSHA approved respirator.

Wear long sleeved, loose fitting clothing and gloves to prevent skin contact.

Wear eye goggles.

Minimize airborne dust prior to handling and removal by water misting the material and avoiding unnecessary disturbance of materials.

Wash work clothes separately from others. Rinse washer thoroughly after use.

Discard RCF materials by sealing in an airtight plastic bag.

First Aid Procedures:

Inhalation: If breathing difficulty or irritation occurs, move to a location with fresh clean air. Seek immediate medical attention if symptoms persist.

Skin Contact: Wash affected area gently with a mild soap and warm water. Seek immediate medical attention if irritation persists.

Eye Contact: Flush eyes with water for 15 minutes while holding eyelids apart. Do not rub eyes. Seek immediate medical attention if irritation persists.

Ingestion: Drink 1 to 2 glasses of water. Do not induce vomiting. Seek immediate medical attention.

A. GENERAL

1. The entire heating system, including the boiler, burner and venting system, **MUST** be inspected at least once per year by a qualified heating service professional.
2. It is extremely important to follow these instructions to prevent damage to the boiler and/or building structure.

B. CLEANING HEATING SURFACES

1. Turn off all electrical power to the boiler before beginning the cleaning operation. Note that the service switch on the side of the boiler does not disconnect power from the courtesy outlet on the boiler.

CAUTION

The courtesy outlet on the boiler jacket and several terminals in the electrical compartment remain powered when the boiler service switch is OFF. All power to the boiler should be disconnected before accessing these electrical components.

2. Turn off oil supply valves to the boiler. Be sure to have clean, dry containers suitable for collecting all fuel beyond the shutoff valve that may drain from the line. Keep in mind that both sides of the connection may contain oil.
3. Disconnect oil lines from the burner. If flexible oil lines are used, this step may be skipped.
4. Disconnect Molex plug in the "heat demand" harness to the boiler (1/2" Flexible conduit) between burner junction box and the Carlin 65000 Motor Speed Control).
5. Disconnect air inlet hose (if applicable) from the burner.
6. Remove the top jacket panel (Item #36 on Figure 10.2) and flue collector cover plate (Item #11 on Figure 10.1).
7. Remove stainless steel flue baffles (shown in Figure 8.1).
8. Brush the flue passages thoroughly from the top with a wire boiler brush. If the boiler is extremely dirty, brushing up from the combustion chamber area may also be necessary. The target wall is made of refractory ceramic fiber. Care must be taken not to damage this material during cleaning.

WARNING

Use appropriate eye protection, dust mask and gloves. Avoid breathing dirt and dust that is present with cleaning. Also avoid prolonged contact with skin.

9. Remove scale or soot from the combustion chamber area by vacuum cleaning or other available means.

NOTICE

The burner door must be opened to allow access to the combustion chamber for removing dirt and debris.

10. Re-insert the flueway baffles making sure the rear baffle with the threaded spacer does not interfere with the cover plate.
11. Inspect the burner head from inside the burner door. Look for signs of soot build-up on the nozzle and combustion head. If soot is building up in areas where it impedes the flow of air and/or oil repeat the burner setup procedures outlined in section 5.D after completing these instructions.
12. Re-attach the flue collector cover plate and the burner door making sure all gaskets and seals are in place. The combustion chamber of the WB90™ boiler is often under positive pressure when the burner is operating. If the burner door and flue collector cover plate are not completely sealed, products of combustion can escape causing discomfort and property damage.

CAUTION

Be sure that the flue collector cover plate and burner door are completely sealed before leaving the burner in operation. Failure to comply may cause discomfort or property damage.

13. Attach the jacket top panel.
14. Connect oil lines and open the fuel shut-off valve.
15. Connect the Molex plug in the "Heat Demand" harness.
16. Re-connect electrical power and be sure that the service switch is in the ON (ON=closed =1) position.
17. Re-attach combustion air pipe if applicable.

C. INSPECT VENTING SYSTEM

1. Check venting system for signs of external corrosion
2. Disassemble exhaust vent and air inlet (if applicable) connections to check for blockage and/or corrosion.
3. Assure that the barometric damper swings freely.

D. WATERSIDE INSPECTION

1. Connect a suitable drain hose to the boiler drain valve. Have a 5 gallon bucket available to catch boiler water.
2. Be sure that the system temperature is below 125°F before draining water from the system.

**WARNING**

Water in excess of 125°F can cause severe burns instantly. DO NOT drain water in excess of 125°F from the boiler. Failure to comply may cause severe personal injury or death.

3. Drain water from the boiler into the bucket. If there is evidence of excessive sediment/sludge in the system, contact a qualified water treatment company for appropriate compounds such as Sentinel X-400 or Rhomar Hydro-Solve 9100.

**CAUTION**

The Peerless® Warranty does not cover sediment or corrosion related damage. Excessive sediment may cause a failure of boiler's cast iron heat exchanger.

E. INSPECT HEAT DISTRIBUTION SYSTEM

1. Check all visible water piping for signs of water leaks (corrosion or scale staining).
2. Check the boiler system pressure to be sure it is at the required pressure. Open the city water inlet valve to assure required system pressure (usually about 12 psi). Close the inlet valve (if it is necessary to open the inlet water valve frequently, a substantial leak may be the cause).
3. Repair any leaks to the system to prevent corrosion and scale in the boiler.

9. DIMENSIONS & RATINGS

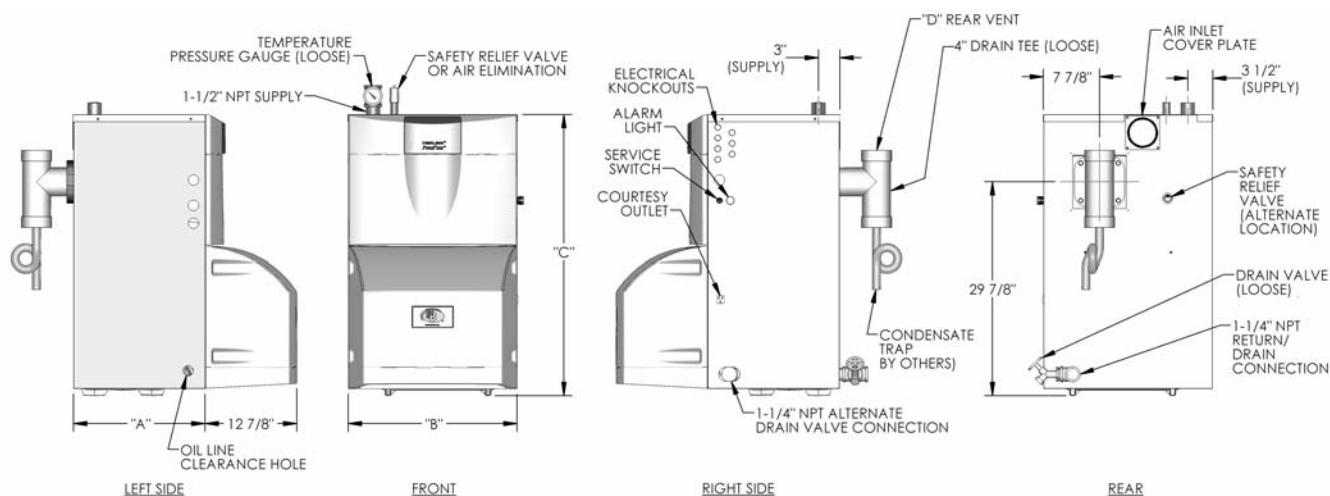



Figure 9.1: Dimensional Drawing – WB90™

Table 9.1: Series WB90™ Boiler Dimensions

SERIES WB90™ BOILER DIMENSIONS				
Boiler Model Number	Jacket Depth "A"	Jacket Width "B"	Jacket Height "C"	Vent Size Diameter "D"
WB90-03	18-3/8"	23-5/8"	39-1/4"	4"
WB90-04	22-3/8"	23-5/8"	39-1/4"	4"

Table 9.2: Series WB90™ Boiler Ratings

Series WB90™ BOILER RATINGS								
Series WB90™								
Boiler Model Number	Input Rate ¹				Heating Capacity ⁴ , MBH	Net Ratings ^{2,3}	AFUE ⁴ , %	
	Maximum		Minimum					
	GPH	MBH	GPH	MBH				
	WB90-03	0.90	126	0.50				
WB90-04	1.30	182	0.75	105	160	139	90.0	

1 Burner input based on No. 2 fuel oil with a heating value of 140,000 Btu per gallon.

2 Net ratings based on an allowance of 1.15 for piping losses.

3 Consult factory before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

4 Heating Capacity and Annual Fuel Utilization Efficiency (AFUE) ratings are based on U.S. Government tests, with 13% CO₂. Before purchasing this appliance, read important information about its estimated annual energy consumptions or energy efficiency rating that is available from your retailer.



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10. REPAIR PARTS

Repair parts are available from your local PB Heat, LLC distributor or from Parts To Your Door at 1 (610) 916-5380 (www.partstoyourdoor.com).

Note: Remember to include the boiler model number and serial number when ordering parts.

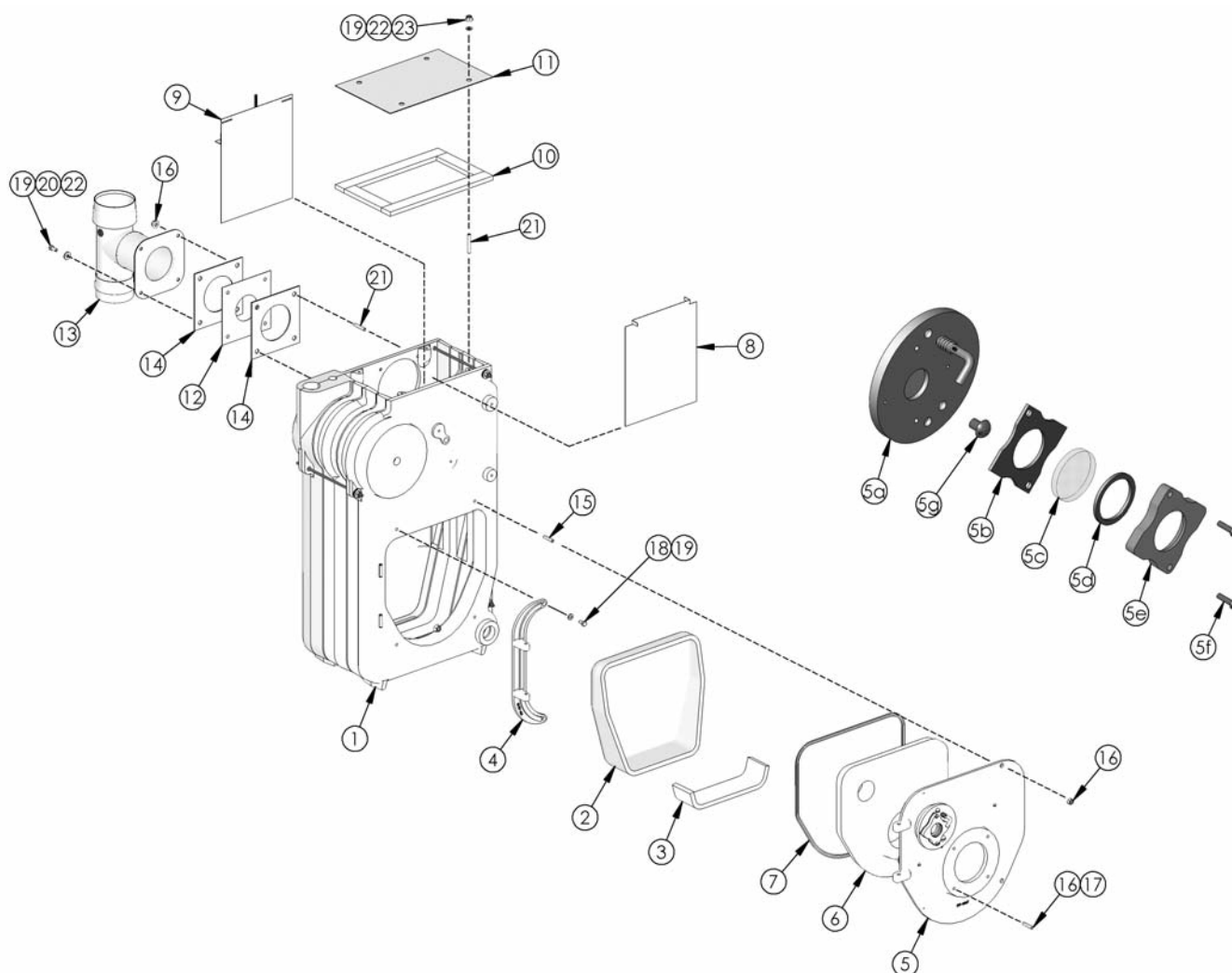


Figure 10.1: WB90™ Repair Parts – Block & Vent

Table 10.1: WB90™ Repair Parts – Block & Vent

	Description	Quantity Required (WB90-03)	Quantity Required (WB90-04)	Stock Code
1	Cast Iron Block Assembly – WB90-03	1	N/A	90806
	Cast Iron Block Assembly – WB90-04	N/A	1	90813
2	Target Wall (Included with Block)	1	1	50795
3	Base Liner Blanket	N/A	1	50857
4	Burner Mounting Plate Hinge Assembly	1	1	90538
5	Burner Mounting Plate Assembly	1	1	91040
–	Flame Observation Cover Assembly	1	1	90754
5a	Flame Observation Cover Plate	1	1	SC1007P
5b	Observation Window Face Gasket	1	1	50230
5c	Flame Observation Window	1	1	51681
5d	Observation Window Ring Gasket	1	1	50229
5e	Observation Glass Retainer	1	1	X1138P
5f	Screw #10-32 Round Slotted Head x 3/4" Long	2	2	–
5g	Screw 3/8-16 Round Slotted Head x 1/2" Long	1	1	–
6	Burner Mounting Plate Insulation	1	1	50796
7	Burner Mounting Plate Rope Seal 3/8" Medium Density	4.25 Ft	4.25 Ft	51210
8	Flue Baffle – WB90	1	2	51611
9	Flue Baffle – WB90 Rear	1	1	51612
10	Flue Collector Plate Blanket Seal	1	1	90999
11	Flue Collector Cover Plate – WB90-03	1	N/A	90828
	Flue Collector Cover Plate – WB90-04	N/A	1	90829
12	Restrictor WB90-03 (Vertical Vent)	1	N/A	54538
	Restrictor WB90-04 (Vertical Vent)	N/A	1	54542
13	4" Vent Tee with Sample Ports	1	1	54543
14	Vent Restrictor Gasket	2	2	54541
15	Burner Plate Stud – 5/16-18 x 2-1/4"	2	2	51747
16	5/16-18 Hex Flange Nut	6	6	5037
17	Burner Mounting Stud – 5/16-18 x 1"	4	4	51748
18	5/16-18 x 5/8" Hex Head Bolt	2	2	91588
19	5/16" Flat Washer	8	8	–
20	5/16-18 x 3/4" Hex Head Bolt	2	2	91450
21	5/16-18 x 1-3/4" Stud	6	6	51754
22	5/16" Lock Washer	4	4	–
23	5/16-18 Stainless Steel Hex Nut	4	4	–

Part numbers may be subject to change without notice.

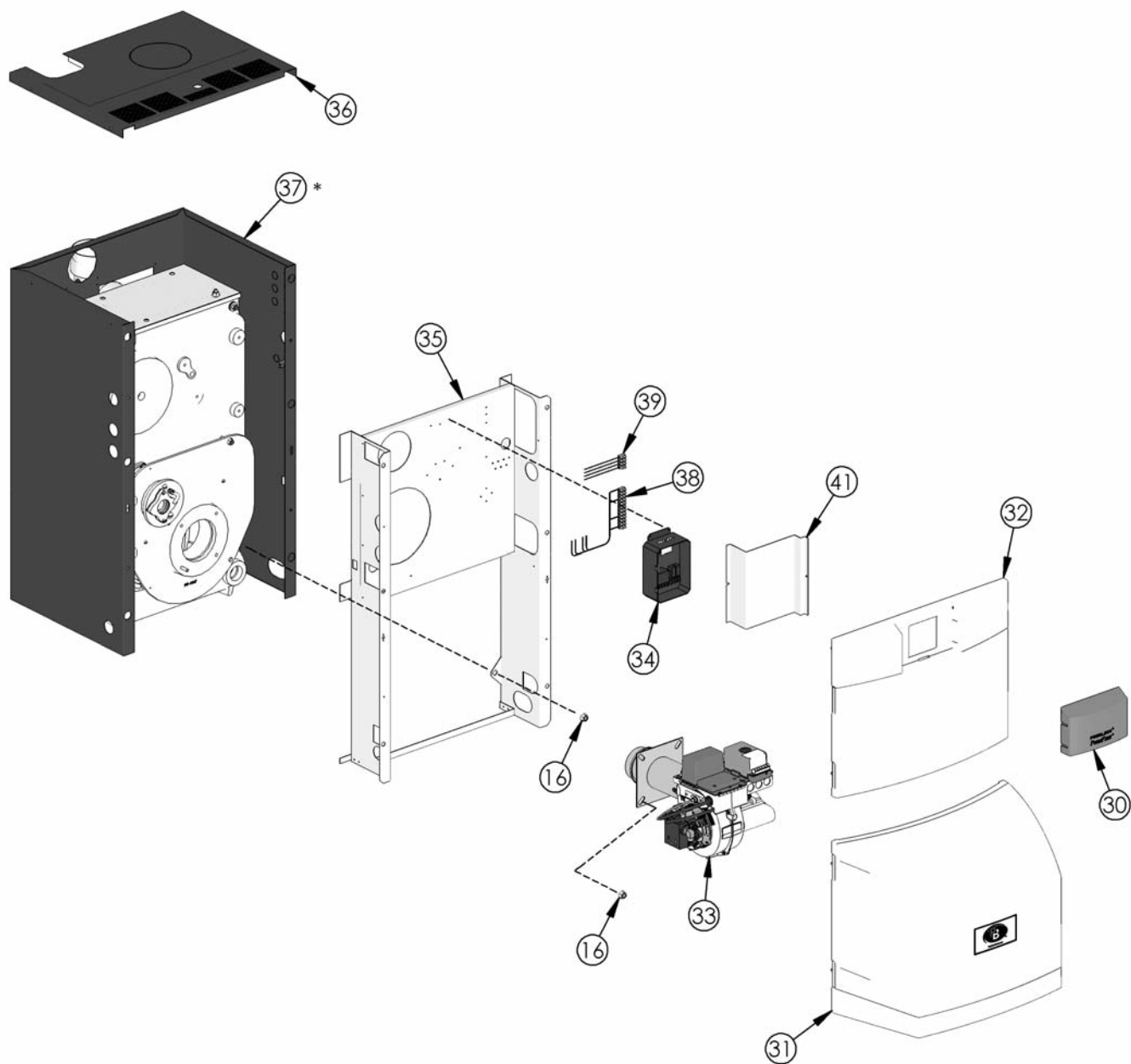


Figure 10.2: WB90™ Repair Parts – Jacket/Burner/Controls

Table 10.2: WB90™ Repair Parts – Jacket/Burner/Controls

	Description	Quantity Required (WB90-03)	Quantity Required (WB90-04)	Stock Code
30	Control Lens Cover – Smoked Polycarbonate	1	1	54508
31	Boiler Lower Front Panel (PCABS)	1	1	54480
32	Boiler Upper Front Panel (PCABS)	1	1	54479
33	Burner – Carlin H2L WB90-03	1	N/A	8051
	Burner – Carlin H2L WB90-04	N/A	1	8052
34	Limit Control with Reset	1	1	54540
35	Boiler Jacket Support Frame	1	1	54524
36	Boiler Jacket Top – WB90-03	1	N/A	54527
	Boiler Jacket Top – WB90-04	N/A	1	54528
37*	Boiler Jacket Right Side – WB90-03	1	N/A	54533
	Boiler Jacket Left Side – WB90-03	1	N/A	54530
	Boiler Jacket Right Side – WB90-04	N/A	1	54534
	Boiler Jacket Left Side – WB90-04	N/A	1	54531
	Boiler Jacket Rear	1	1	54536
38	Wiring Harness – LIMIT/LWCO	1	1	54547
39	Wiring Harness – Thermostat & OD Sensor	1	1	54545
41	Electrical Cover	1	1	54537
42	Indicator Light – Red	1	1	5730
43	Service Toggle Switch	1	1	6050

*Replacement side and rear panel are to be ordered together to replace the factory assembled wrapper. These are not intended to connect individually.

Table 10.3: DuraVent Venting Components

	Description	PB Heat Stock Code	DuraVent Part Number
–	Concentric Sidewall Vent Termination (4")	54086	47PVP-OKA
–	Vertical Vent Cap (4")	54564	4PVP-VC
–	Storm Collar	54565	4PVP-SC
–	Chimney Cover Plate	54566	5TKP
–	Male Flex Adapter (4")	54567	4PVP-ADFM
–	Female Flex Adapter (4")	54568	4PVP-ADFF
–	Draft Regulator Tee (4")	54569	4PVP-TAD
–	90 Degree Elbow (4")	54570	4PVP-E90
–	45 Degree Elbow (4")	54571	4PVP-E45
–	4" Vent Pipe x 6" Long	54572	4PVP-6
–	4" Vent Pipe x 12" Long	54573	4PVP-12
–	4" Vent Pipe x 24" Long	54574	4PVP-24
–	4" Vent Pipe x 36" Long	54575	4PVP-36
–	4" Vent Pipe x 60" Long	54576	4PVP-60
–	4" Vent Extension Pipe x 12" Long	54577	4PVP-12A
–	4" Vent Extension Pipe x 18" Long	54578	4PVP-18A
–	4" Vent Extension Pipe x 48" Long	54579	4PVP-48A
–	4" Flexible Chimney Liner x 15 Feet Long	54580	4PVP-15BF
–	4" Flexible Chimney Liner x 20Feet Long	54581	4PVP-20BF
–	4" Flexible Chimney Liner x 25 Feet Long	54582	4PVP-25BF
–	4" Flexible Chimney Liner x 30 Feet Long	54583	4PVP-30BF
–	4" Flexible Chimney Liner x 35 Feet Long	54584	4PVP-35BF
–	4" Flexible Chimney Liner x 100 Feet Long	54585	4PVP-100BF

Table 10.4: Carlin H2L Burner Components

	Description	PB Heat Stock Code	Carlin Part Number
–	Burner Primary Ignition Control – H2L	54589	6020013S
–	H2L Motor Speed Control – WB90-03	54590	65000PR1S
–	H2L Motor Speed Control – WB90-04	54591	65000PR2S
–	H2L Combustion Head Assembly 7"	54592	50551CS
–	H2L Suntec OT245A Fuel Unit	54593	50050S
–	Nozzle WB90-03 DANFOSS 0.55 GPH 60° H	54519	50820
–	Nozzle WB90-04 DANFOSS 0.85 GPH 60° AB	54594	98994

Table 10.5: Optional Boiler Components

	Description	PB Heat Stock Code
–	Combustion Air Inlet Kit	54557
–	Barometric Draft Regulator	50251
–	Vertical Venting Kit – Canada (Includes Barometric Draft Regulator & Blocked Vent Switch)	50344

Series WB90™

Oil Boilers

Installation, Operation & Maintenance Manual

TO THE INSTALLER:

This manual is the property of the owner and must be affixed near the boiler for future reference.

TO THE OWNER:

This boiler should be inspected annually by a Qualified Service Agency.



PeerlessBoilers.com

PB HEAT, LLC

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