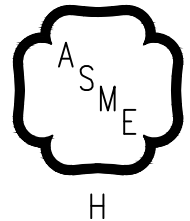


INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS CL™ SERIES CAST IRON OIL-FIRED BOILER



As an ENERGY STAR® Partner, New Yorker Boiler Co., Inc. has determined that the CL3-091, CL3-105, CL4-126 and CL5-168 water boilers meet the ENERGY STAR® guidelines for Energy efficiency established by the United States Environmental Protection Agency (EPA).



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

Boiler Model Number CL	Boiler Serial Number	Installation Date
Heating Contractor		Phone Number
Address		



IMPORTANT INFORMATION - READ CAREFULLY

All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made.

In all cases, reference should be made to the following Standards:

USA BOILERS

- A. Current Edition of American National Standard ANSI/NFPA 31, “Installation of Oil Burning Equipment”, for recommended installation practices.
- B. Current Edition of American National Standard ANSI/NFPA 211, “Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances”, For Venting requirements.
- C. Current Edition of American Society of Mechanical Engineers ASME CSD-1, “Controls and Safety Devices for Automatically Fired Boilers”, for assembly and operations of controls and safety devices.
- D. All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or Local Regulations.

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

DANGER

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

CAUTION

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

WARNING

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

NOTICE

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

NOTICE

This boiler has a limited warranty, a copy of which is printed on the back of this manual. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

Surface rust on cast iron sections may be attributed to the manufacturing process as well as condensation during storage. Surface rust is normal and does not affect the performance or longevity of a boiler.

DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other boiler.

WARNING

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

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual.

Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.

All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.

Installation is not complete unless a pressure relief valve is installed into the tapping located on top left corner of front section- Refer to Figures 1A thru 1D and Section III "Installation Instructions" for additional details.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when installation is complete including verifying that the limit sensor is fully installed (seated in bottom of Well).

Failure to properly install Limit Sensor may result in property damage, personal injury or loss of life due to elevated operating temperatures and/or pressures.

This boiler is suitable for installation on combustible flooring. **DO NOT** install boiler on carpeting.

DO NOT tamper with or alter the boiler or controls.

Inspect flueways at least once a year - preferably at the start of the heating season. The inside of the combustion chamber, the vent system and boiler flueways should be cleaned if soot or scale has accumulated.

When cleaning this boiler, **DO NOT** damage combustion chamber liner and/or rear target wall. If damaged, combustion chamber insulation must be replaced immediately.

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

DO NOT operate boiler with jumpered or absent controls or safety devices.

DO NOT operate boiler if any control, switch, component, or device has been subject to water.

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

WARNING

This boiler contains very hot water under 12 - 15 PSI pressure. **DO NOT** unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. **DO NOT** rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. **DO NOT** touch any components unless they are cool.

High water temperatures increase the risk of scalding injury. If this boiler is equipped with a tankless heater for domestic water supply, a flow regulator and automatic mixing valve must be installed properly in tankless heater piping. Refer to Section III "Installation Instructions" for additional details.

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

This boiler must be connected to an approved chimney or vent system in good condition. Serious property damage could result if the boiler is connected to a dirty or inadequate chimney or vent system. The interior of the chimney flue must be inspected and cleaned before the start of the heating season for any obstructions. A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency. **DO NOT** operate boiler with the absence of an approved vent system.

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

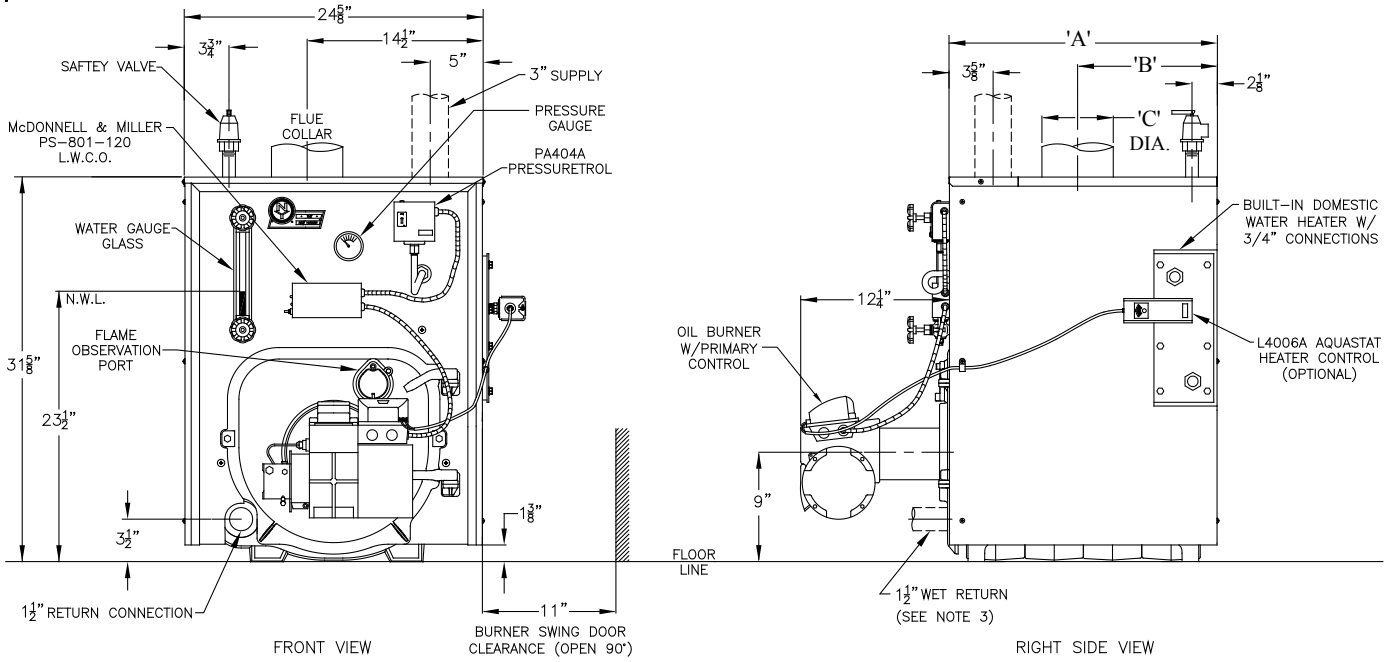
This boiler is designed to burn No. 2 fuel oil only. **DO NOT** use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. **DO NOT** convert to any solid fuel (i.e. wood, coal). **DO NOT** convert to any gaseous fuel (i.e. natural gas, LP). All flammable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

All boilers equipped with burner swing door have a potential hazard which if ignored can cause severe property damage, personal injury or loss of life. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

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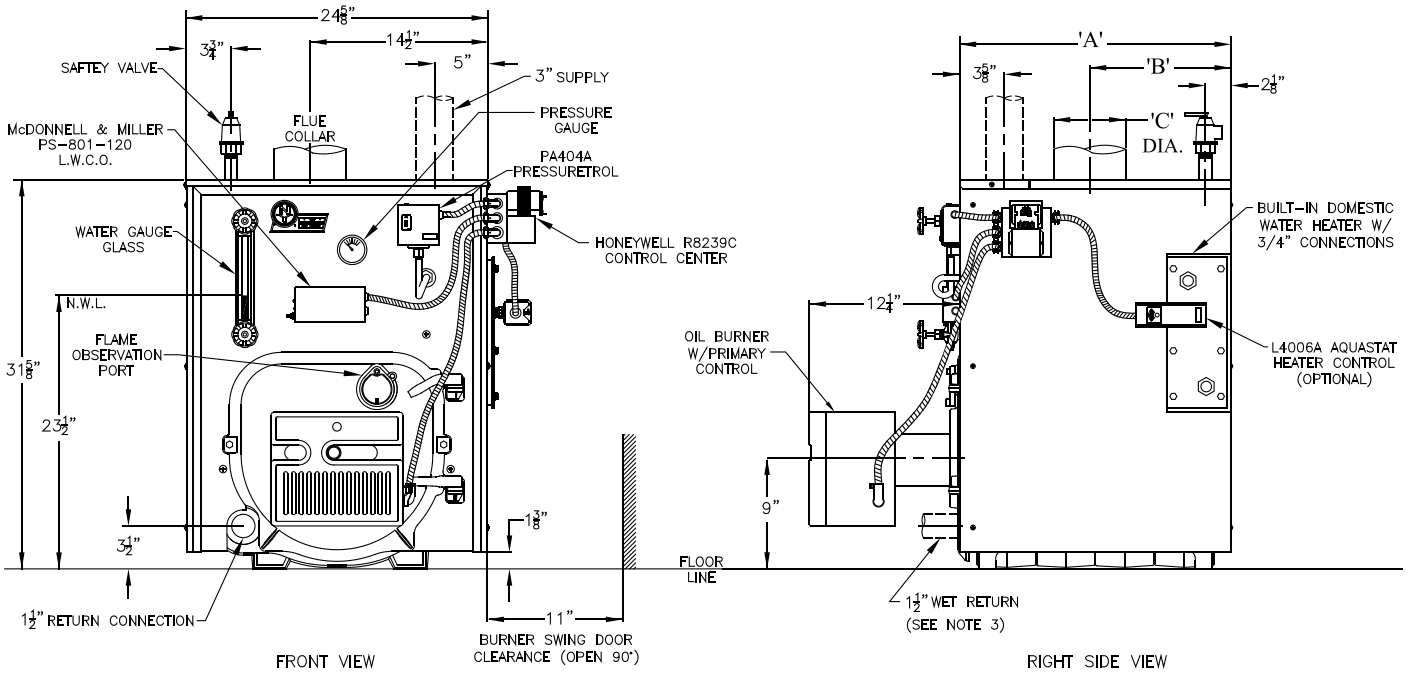
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I: GENERAL INFORMATION (continued)



- NOTES:
1. TANKLESS COIL OPENING NOT PRESENT ON LESS-COIL BOILERS.
 2. PIPING SHOWN HIDDEN NOT FURNISHED WITH BOILER.
 3. DRAIN VALVE SHIPPED LOOSE. (NOT SHOWN)

Figure 1C: CL3 Thru CL5 Steam Boiler with or without Tankless Heater, McDonnell & Miller PS-801, Beckett Burner



- NOTES:
1. TANKLESS COIL OPENING NOT PRESENT ON LESS-COIL BOILERS.
 2. PIPING SHOWN HIDDEN NOT FURNISHED WITH BOILER.
 3. DRAIN VALVE SHIPPED LOOSE. (NOT SHOWN)

Figure 1D: CL3 thru CL5 Steam Boiler with or without Tankless Heater, McDonnell & Miller PS-801, Riello Burner

I: GENERAL INFORMATION (continued)

TABLE 1: DIMENSIONAL DATA / GENERAL INFORMATION (SEE FIGURES 1A THRU 1D)

Boiler Model	Dimensions			Approx. Water Content - Gallons	Heat Transfer Surface Area - Sq. Ft.
	"A"	"B"	"C"		
CL3	17-3/8"	8-1/4"	5-7/8"	16	14.33
CL4	22-3/8"	10-7/8"	6-7/8"	20	20.90
CL5	27-3/8"	13-3/8"	7-7/8"	24	27.46

Maximum Working Pressure: Steam: 15 PSI; Water: 30 PSI Shipped Standard from Factory, 50 PSI Optional

TABLE 2: RATING DATA

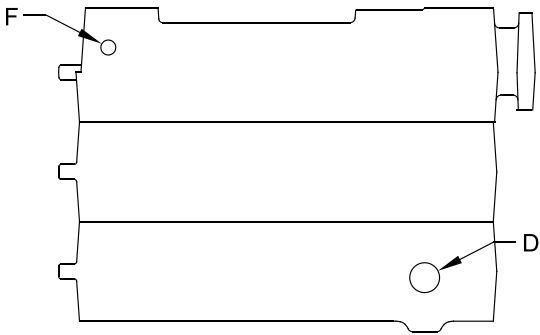
Boiler Model No. *	Burner Capacity		DOE Heating Capacity		AHRI NET Ratings			Minimum Chimney Requirements			AFUE %	
	GPH	MBH	Water MBH	Steam MBH	Water MBH	Steam MBH	Steam Sq. Ft.	Round In. Dia.	Rectangle In. x In.	Height Ft.	Water	Steam
CL3-091(W)	0.65	91	80	---	70	---	---	6	8 x 8	15	86.1	---
CL3-091(S)	0.65	91	---	78	---	56	233	6	8 x 8	15	---	84.1
CL3-105(W)	0.75	105	91	---	79	---	---	6	8 x 8	15	86.0	---
CL3-105(S)	0.75	105	---	90	---	68	283	6	8 x 8	15	---	83.8
CL3-140(W)	1.00	140	120	---	104	---	---	6	8 x 8	15	84.3	---
CL3-140(S)	1.00	140	---	119	---	89	370	6	8 x 8	15	---	82.7
CL4-126(W)	0.90	126	111	---	97	---	---	7	8 x 8	15	86.0	---
CL4-126(S)	0.90	126	---	108	---	81	338	7	8 x 8	15	---	84.1
CL4-175(W)	1.25	175	152	---	132	---	---	7	8 x 8	15	85.1	---
CL4-175(S)	1.25	175	---	149	---	112	467	7	8 x 8	15	---	83.5
CL4-210(W)	1.50	210	179	---	156	---	---	7	8 x 8	15	84.0	---
CL4-210(S)	1.50	210	---	177	---	133	554	7	8 x 8	15	---	82.6
CL5-168(W)	1.20	168	147	---	128	---	---	8	8 x 8	15	85.9	---
CL5-168(S)	1.20	168	---	144	---	108	450	8	8 x 8	15	---	83.7
CL5-245(W)	1.75	245	210	---	183	---	---	8	8 x 8	15	85.1	---
CL5-245(S)	1.75	245	---	207	---	155	646	8	8 x 8	15	---	82.5
CL5-280(W)	2.00	280	238	---	207	---	---	8	8 x 8	15	84.7	---
CL5-280(S)	2.00	280	---	235	---	176	733	8	8 x 8	15	---	82.3

* Boiler Model Suffix: (W) = Water, (S) = Steam

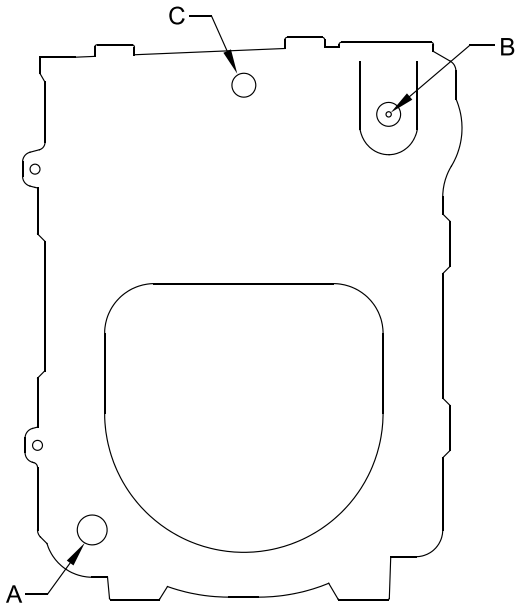
I: GENERAL INFORMATION (continued)

TABLE 3A: PURPOSE OF TAPPINGS (WATER)

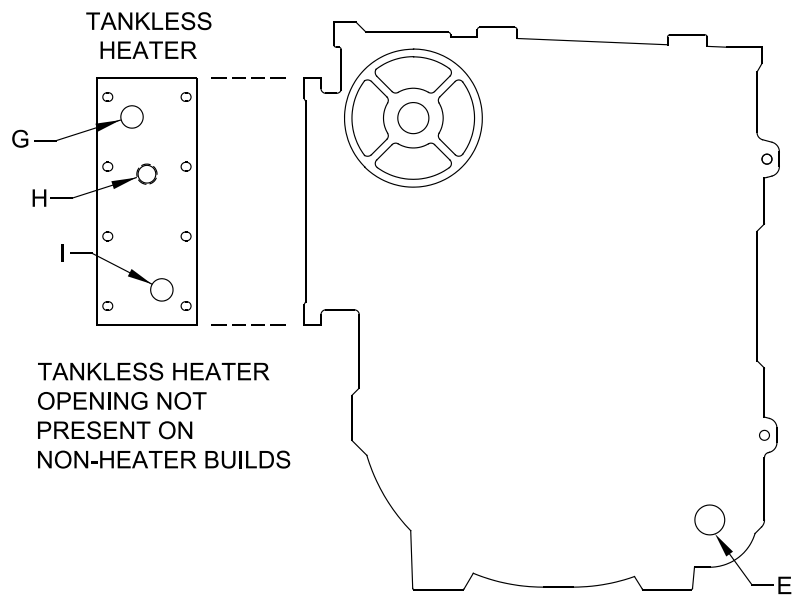
Tapping Location	Size, NPT	Purpose	
		Less Heater	With Heater
A	1½"	Return	
B	½"	Limit Well	Plug
C	¼"	Temperature/Pressure Gauge	
D	1½"	Supply	
E	1½"	Optional Return	
F	¾"	Relief Valve	
G	¾"	N/A	DHW Outlet
H	¾"	N/A	Limit Well
I	¾"	N/A	DHW Inlet



TOP VIEW



FRONT VIEW



REAR VIEW

Figure 2A: Purpose of Tappings (Water)

I: GENERAL INFORMATION (continued)

TABLE 3B: PURPOSE OF TAPPINGS (STEAM)

Tapping Location	Size, NPT	Purpose	
		Less Heater	With Heater
A	1½"	Return	
B	½"	Pressure Limit	
C	¼"	Pressure Gauge	
D	3"	Supply	
E	1½"	Optional Return	
F	¾"	Relief Valve	
G	¾"	N/A	DHW Outlet
H	¾"	N/A	Limit Well
I	¾"	N/A	DHW Inlet
J	¾"	Drain	
K	¾"	LWCO	
L	½"	Water Gauge Glass	
M	½"	Water Gauge Glass	
N	1"	Indirect Water Heater Supply	
O	½"	Indirect Water Heater Limit	
P	1½"	Surface Blowoff	

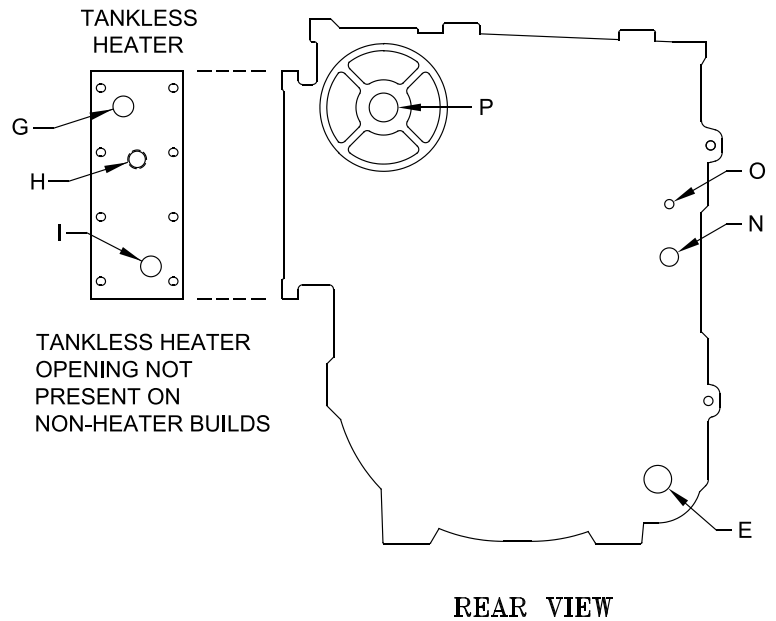
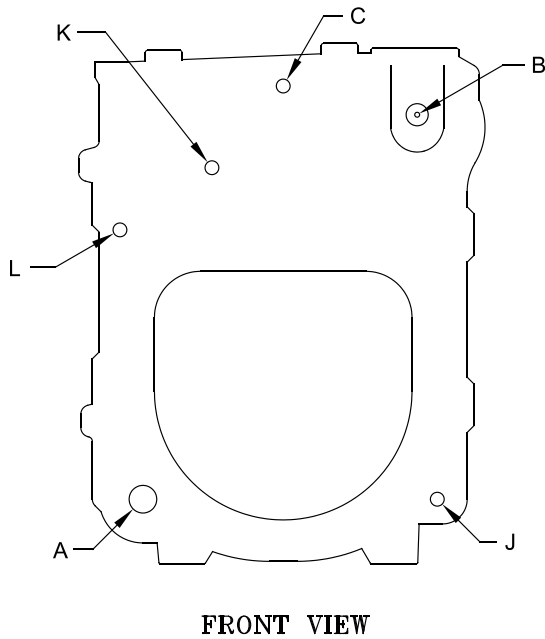
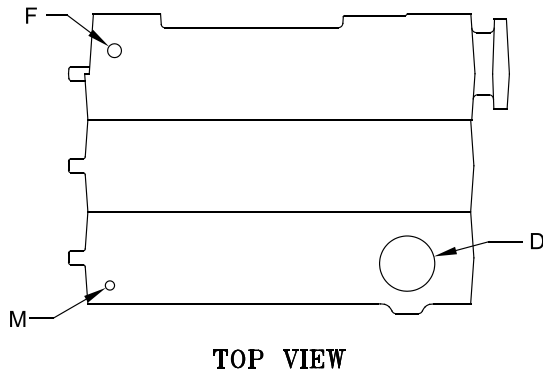


Figure 2B: Purpose of Tappings (Steam)

II: PRE-INSTALLATION

- A. INSPECT SHIPMENT** carefully for any signs of damage.
- All equipment is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated boiler to the carrier in good condition.
 - Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.
- B. LOCATE BOILER** near final position before removing crate. See Figures 1A thru 1D. Using hand truck or pipe rollers under skid, move boiler into position along side installation site.
- LOCATE so that vent pipe connection to chimney will be short and direct.
 - BOILER IS SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOOR. Boiler cannot be installed on carpeting.
 - FOR BASEMENT INSTALLATION, provide a solid elevated base, such as concrete, if floor is not level, or if water may be encountered on floor around boiler.

- PROVIDE SERVICE CLEARANCE of at least 24" clearance from front jacket panel for servicing and removal of front tankless heater. If boiler is equipped with a rear tankless heater, provide at least 24" service clearance on the right side of the boiler. Boiler flueways may be cleaned either from the top **or** from the right side. Provide at least 24" clearance from either the right side of the boiler **or** the top of the boiler for cleaning flueways.
- For minimum clearances to combustibles materials. See Figure 3.

NOTICE

Clearance to venting is for single wall vent pipe. If Type L vent is used, clearance may be reduced to the minimum required by the vent pipe manufacturer.

- C. PROVIDE COMBUSTION AND VENTILATION AIR.** Local and National Codes may apply and should be referenced.

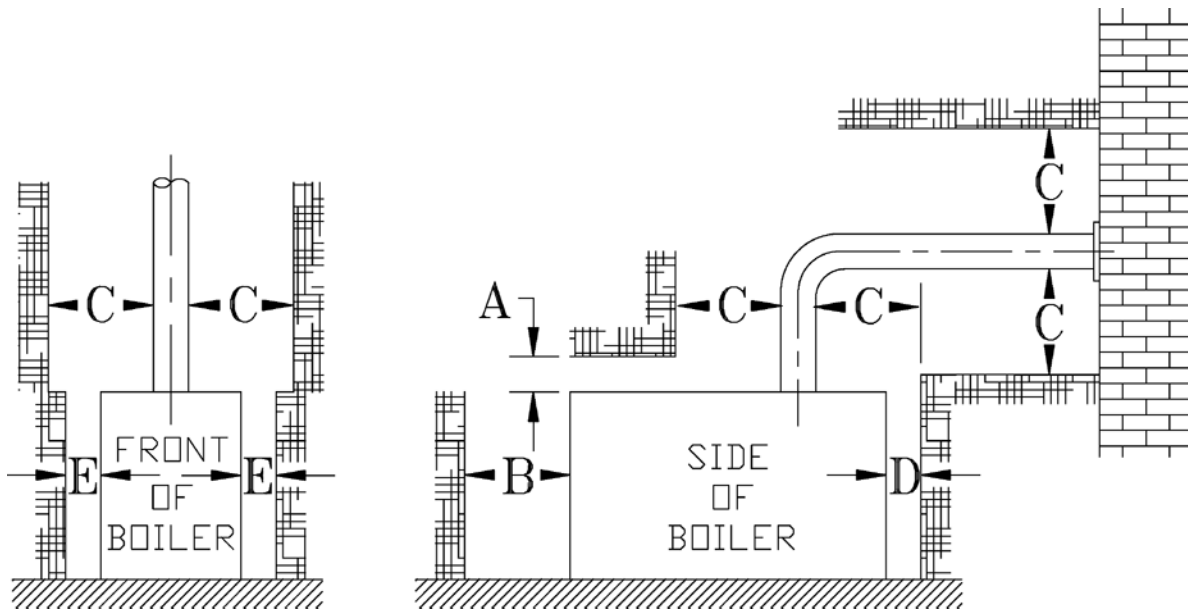


Figure 3: Minimum Installation Clearances To Combustible Materials (Inches)

A	B	C	D	E
Above	Front	Chimney Connector	Rear	Sides
6	24	18	6	6

NOTE 1: Listed clearances comply with American National Standard NFPA 31, Standard for the Installation of Oil Burning Equipment.

NOTE 2: CL Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.

NOTE 3: For reduced clearances to combustible material, protection must be provided as described in the ANSI/NFPA 31 standard.

II: PRE-INSTALLATION (continued)

WARNING

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

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

1. Determine volume of space (boiler room). Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the space.
$$\text{Volume}(\text{ft}^3) = \text{Length}(\text{ft}) \times \text{Width}(\text{ft}) \times \text{Height}(\text{ft})$$
2. Determine total input of all appliances in the space. Add inputs of all appliances in the space and round the result to the nearest 1000 BTU per hour.
3. Determine type of space. Divide Volume by total input of all appliances in space. If the result is greater than or equal to 50 ft³/1000 BTU per hour, then it is considered an *unconfined space*. If the result is less than 50 ft³/1000 BTU per hour then the space is considered a *confined space*.
4. For boiler located in an *unconfined space of a conventionally constructed building*, the fresh air infiltration through cracks around windows and doors normally provides adequate air for combustion and ventilation.
5. For boiler located in a confined space or an unconfined space in a building of unusually tight construction, provide outdoor air.
Outdoor air may be provided with the use of two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space.

Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:

- a. **Direct communication with outdoors.**
Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space.
 - b. **Vertical ducts.** Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
 - c. **Horizontal ducts.** Minimum free area of 1 square inch per 2,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
Alternate method for boiler located within confined space. Use indoor air if two permanent openings communicate directly with additional space(s) of sufficient volume such that combined volume of all spaces meet criteria for unconfined space. Size each opening for minimum free area of 1 square inch per 1,000 BTU per hour input of all equipment in spaces, but not less than 100 square inches.
6. Louvers and Grilles of Ventilation Ducts
 - a. All outside openings should be screened and louvered. Screens used should not be smaller than 1/4 inch mesh. Louvers will prevent the entrance of rain and snow.
 - b. Free area requirements need to consider the blocking effect of louvers, grilles, or screens protecting the openings. If the free area of the louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.
 - c. Louvers and grilles must be fixed in the open position, or interlocked with the equipment to open automatically during equipment operation.

III: INSTALLATION INSTRUCTIONS

A. REMOVE CRATE

1. Remove all fasteners at crate skid.
2. Lift outside container and remove all other inside protective spacers and bracing. Remove miscellaneous steam or water trim carton.

B. REMOVAL OF BOILER FROM SKID

1. Boiler is secured to base with 4 carriage bolts, 2 on left side and 2 on right side. See Figure 4. Remove all bolts.

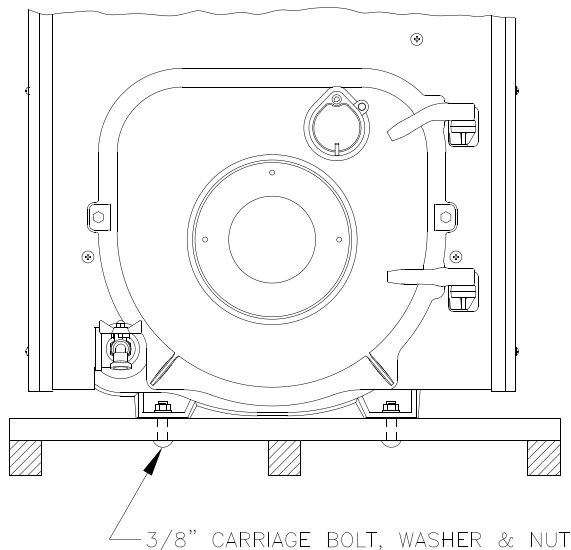


Figure 4: Removal of Boiler From Skid

2. Tilt boiler to right and to rear. Using right rear leg as pivot, rotate boiler 90° in a clockwise direction, and lower left side of boiler to floor. Tilt boiler and remove crate skid. Care should be exercised to prevent damage to jacket or burner.

C. MOVE BOILER TO PERMANENT POSITION by sliding or walking.

D. INSPECT COMBUSTION TARGET WALL AND COMBUSTION CHAMBER LINER

1. OPEN FLAME OBSERVATION DOOR AND/OR BURNER SWING DOOR on front of boiler. Use flashlight to inspect target wall secured to rear section with silastic sealant. Inspect ceramic fiber blanket secured to floor of boiler with water glass adhesive. If either is damaged they must be replaced.

E. INSPECT NOZZLE, ELECTRODES INSERTION DEPTH AND TURBULATOR SETTING/CHANGE FIRING RATE:

1. PACKAGED CL™ SERIES BOILERS are shipped with the highest input oil nozzle installed in the burner. Oil nozzles for lower firing rates are shipped loose for the CL3-091 and CL4-175

models, attached to the burner. Select the proper oil nozzle for the installation. The lower input nozzle will provide greater boiler efficiency. However, boiler output will be reduced. Refer to Table 2 for firing rates. **If the higher rate is desired**, inspect the installed nozzle and assure that the nozzle is the correct size and type as specified in Burner Specifications, Tables 14A and 14B (at the rear of this manual).

If a lower input is desired, remove the nozzle which was factory installed. Locate the lower firing rate nozzle that is supplied loose. Confirm the nozzle is the proper size and type for the lower firing rate as specified in Tables 14A and 14B (at the rear of this manual). Install the proper nozzle in the burner nozzle adaptor.

2. ON THE BECKETT AFG BURNER, use the following procedure to complete the inspection, check the settings and to change the nozzle to a lower firing rate:
 - a. Loosen two (2) igniter latching screws, rotate tabs and swing open igniter about hinge.
 - b. Loosen knurled nut and disconnect copper connector tube.
 - c. Remove nozzle line electrode assembly.
 - d. **If high firing rate is desired**, confirm the nozzle is the proper size and type, refer to Table 14A (at rear of this manual), then proceed to Item i. below.
 - e. **If a lower input is desired**, remove the nozzle that was factory installed.
 - f. Remove Beckett MB(L1) or MD(V1) head.
 - g. Locate the desired nozzle. Refer to Table 14A (at rear of this manual) for proper nozzle. The nozzle must be securely installed to assure leak free joints between the nozzle and adapter. When installing the nozzle, be careful not to bump or move the burner electrodes.

Note: On the CL3-091 (0.65 GPH) burner application, a low firing rate baffle is required. Baffle is shipped loose with nozzles. Install baffle per Beckett Instruction included with baffle.

 - h. Reinstall Beckett MB(L1) or MD(V1) Head.
 - i. Inspect and measure burner electrodes. Refer to Figure 26 for the proper electrode setting. Readjust electrode setting to the proper dimensions if necessary. Refer to Figure 26.
 - j. Reinstall nozzle line electrode assembly.
 - k. Connect copper connector tube.

III: INSTALLATION INSTRUCTIONS (continued)

- l. Inspect Beckett head setting on left side of burner by insuring the line on the label MB(L1) or the blue line MD(V1) are aligned, readjust if necessary. Refer to Figure 26.
 - m. Tighten knurled nut.
 - n. Swing igniter closed, rotate tabs and tighten two (2) igniter screws.
3. ON THE RIELLO 40 SERIES OIL BURNER, use the following procedure to complete the inspection, check the settings and to change the nozzle to a lower firing rate: Refer also to *Model F3 & F5 Installation Manual, Riello 40 Series Residential Oil Burners* (C6501010) or *Model F10 Installation Manual, Riello 40 Series Residential Oil Burners* No. 2902554.

a. **Installation/Removal of Drawer Assembly**, refer to Figure 5.

i. Removal:

- Disconnect oil delivery tube nut from pump.
- Loosen SCREW (3), and then unplug PRIMARY CONTROL (1) by carefully pulling it back and then up.
- Remove the AIR TUBE COVER PLATE (5) by loosening the retaining SCREW (4) (Two SCREWS-Model F5).
- Loosen SCREW (2), and then slide the complete drawer assembly out of the combustion head as shown.

ii. Installation:

To insert drawer assembly, reverse the procedure in Step *i* above.

b. **Nozzle Replacement**, refer to Figure 6.

- i. Remove the NOZZLE ADAPTER (2) from the DRAWER ASSEMBLY by loosening the SCREW (1).

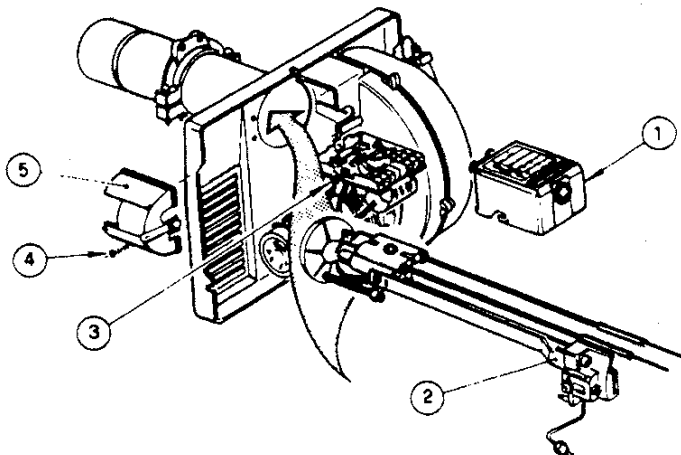


Figure 5: Installation/Removal of Riello Drawer Assembly

- ii. Remove existing nozzle from nozzle adapter.
 - iii. Insert the proper NOZZLE into NOZZLE ADAPTER and tighten securely (**DO NOT** cover tighten), refer to Table 14B (at rear of this manual).
 - iv. Replace adapter, with nozzle installed, into drawer assembly and secure with screw (1).
- c. **Inspect and measure burner electrodes.** Refer to Figure 7 for the proper electrode settings.
- d. **Re-install Drawer Assembly into Combustion Head** per Step 3a above.
- e. **Insertion Depth**, verify the distance between the tip of the end cone is equal to the distance specified in Table 14B (at rear of this manual).
- f. **Turbulator Setting**, refer to Figure 8.

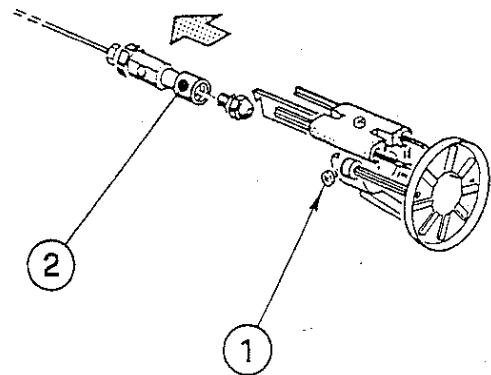


Figure 6: Riello Nozzle Replacement

IMPORTANT: THESE DIMENSIONS MUST BE OBSERVED AND VERIFIED.

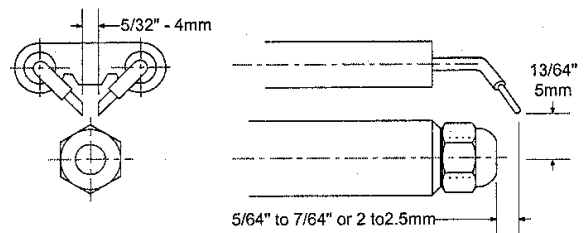


Figure 7: Riello Electrode Setting

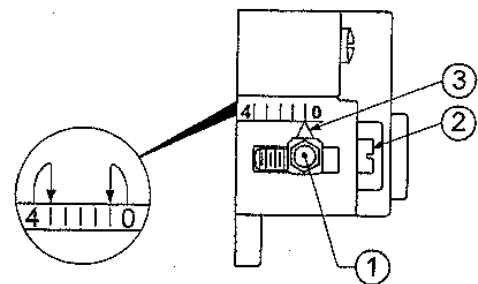


Figure 8: Riello Turbulator Setting

III: INSTALLATION INSTRUCTIONS (continued)

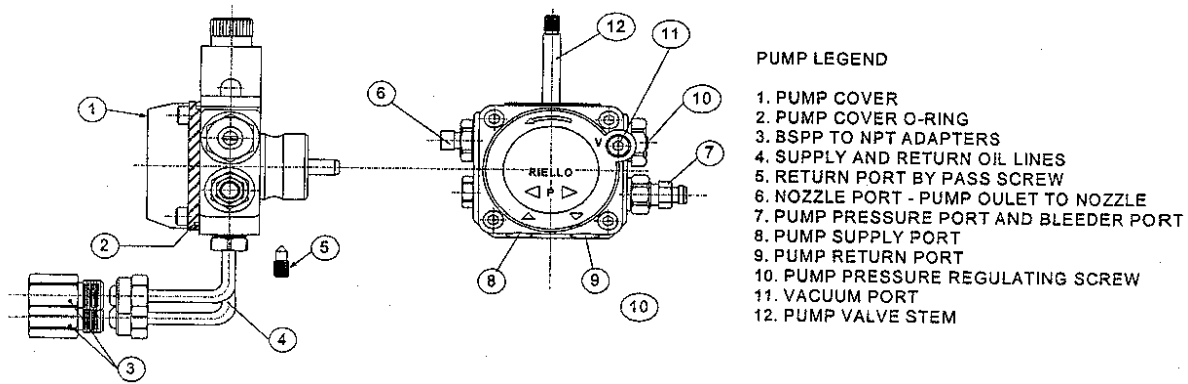


Figure 9: Riello Pump Connections and Port Identification

g. Pump Connections and Port Identification, refer to Figure 9.

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

WARNING: 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 was factory pre-set but must be checked at time of burner start-up. A pressure gauge is attached to the **PRESSURE/ BLEEDER PORT (7)** 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 1/4" NPT to adapt oil lines to burner pipe connectors. All pump port threads are **British Parallel Thread** design. Direct connection of NPT threads to the pump **will damage** the pump body.

Riello manometers and vacuum gauges **DO NOT** require any adapters, and can be safely connected to the pump ports. An NPT x metric adapter **must** be used when connecting other gauge models.

h. Replace Burner Cover and Tighten Burner Cover Screws.

F. INSTALL WATER BOILER TRIM AND CONTROLS, (see Figures 1A and 1B)

1. Install return piping supplied with boiler. Apply Teflon or Sealant to all joints prior to assembly. Thread 1/2" NPT x 5" Lg. return nipple into 1/2" NPT tapping located in lower left corner of front section. Thread 1/2" x 3/4" x 1/2" NPT tee onto 5" nipple. Thread 3/4" drain valve into 3/4" NPT connection on tee. Tighten all joints with wrench

until water tight and 1 1/2" NPT return connection on tee is facing away from boiler horizontally to allow for proper burner swing door clearance, see Figures 1A, 1B, 11A and 11B.

Note: Vertical piping will prevent door from opening fully for service and cleaning of boiler.

2. Thread relief valve onto factory installed 3/4" NPT x 7/4" nipple located in left rear corner on top of boiler as shown in Figures 1A and 1B. Valve spindle must be in vertical position. Tighten with wrench. Pipe discharge as shown in Figures 11A and 11B. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
3. **Connect Field Wiring**
Connect the field wiring to the Warm or Cold Start Intelligent Oil Boiler Control (Boiler Control). Make the wiring connections as shown in Figures 20 and 21.
 - a. On water boilers without rear tankless heater, connect the field wiring from the circulator to the Cold Start Boiler Control and from the Cold Start Boiler Control to the Burner Oil Primary Control. Make the wiring connections as shown on Figure 20.

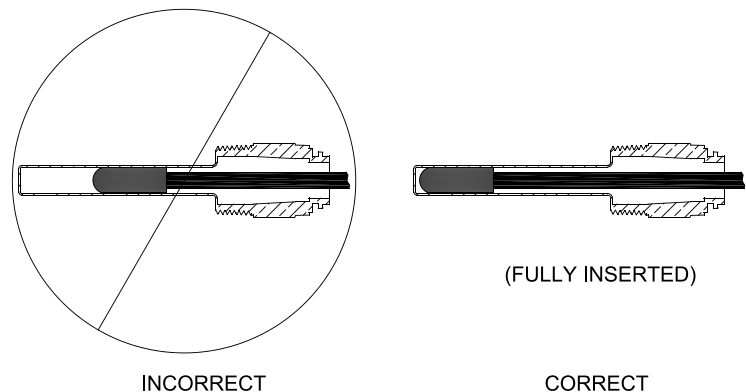


Figure 10: Limit Sensor Insertion

III: INSTALLATION INSTRUCTIONS (continued)

- b. On water boilers with rear tankless heater, the factory wired Warm Start Boiler Control was not installed in heater. Locate 3/4" NPT immersion well, apply sealant, thread into 3/4" NPT tapping on tankless heater and tighten with wrench. Apply heat transfer paste (not furnished) to limit sensor and fully insert limit sensor into immersion well such that the tip on the limit sensor touches the bottom of the immersion well. See Figure 10. Tighten clamp screws to secure Warm Start Boiler Control to immersion well. Secure Boiler Control conduit to jacket right side panel with 5/8" cable clamp provided, refer to Figure 1B. Make the wiring connections as shown on Figure 21.

G. INSTALL STEAM BOILER TRIM AND CONTROLS, (see Figures 1C and 1D).

1. Thread 3/4" MPT safety valve and 3/4" NPT coupling onto factory installed 3/4" NPT x 7/4" nipple located in left rear corner on top of boiler as shown in Figures 1C and 1D. Tighten with wrench. Pipe discharge as shown in Figure 12. Installation of the relief valve must be consistent with ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
2. Install 3/4" drain valve in wet return piping as shown in Figure 12.
3. On boilers with rear tankless heater, factory wired L4006A Aquastat Heater Control was not installed in heater. Locate 3/4" NPT Immersion Well, apply sealant and thread into 3/4" NPT tapping on heater. Apply heat transfer paste (not furnished) to control bulb and insert bulb into immersion well. Tighten clamping screws to secure Boiler Control to immersion well. Secure 18/2 Control Cable Wire to jacket right side panel with 5/16" cable clamp provided, refer to Figure 1C.
4. CONNECT FIELD WIRING
 - a. Connect the field wiring to the pressure limit, the R8239C Control Center, the LWCO and the burner or primary control. If equipped with tankless heater, connect field wiring from the Aquastat Control to the Oil Primary Control "TT" terminals (Beckett Burner) or the R8239C Control Center's "R-G" terminals (Riello Burner). Make the wiring connections as shown in Figure 22 or 23.

Note:

- The GeniSys 7505 Oil Primary Control has pre-installed "T-T" jumper. To activate "T-T" terminals, "T-T" jumper must be removed.
- **DO NOT** remove "T-T" jumper **unless** wiring diagram indicates a direct connection from

thermostat and/or tankless heater aquastat control to the oil burner primary control's "T-T" terminal. Refer to Figures 22 and 23.

H. CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM.

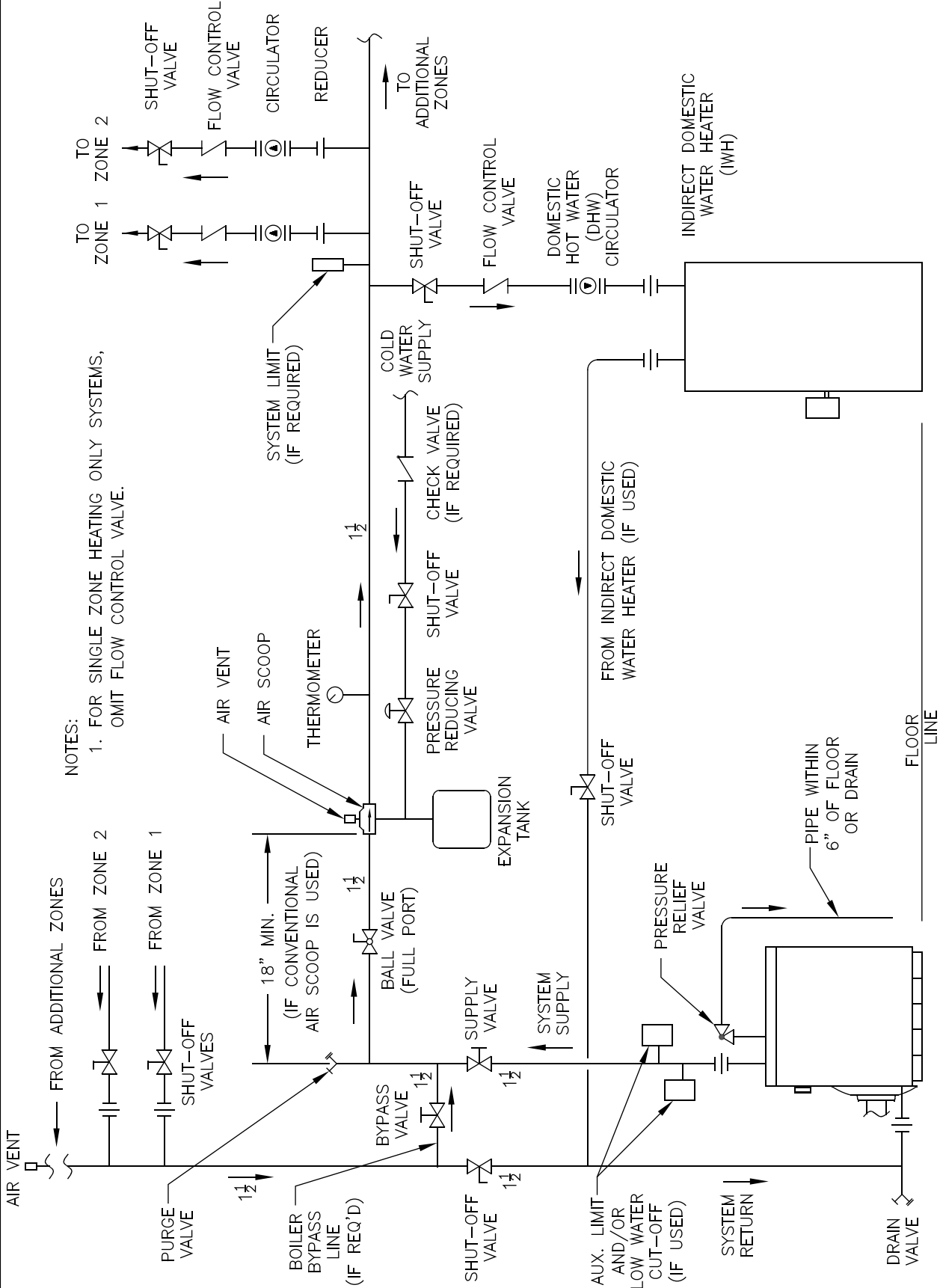
1. CLEARANCES — Steam and hot water pipes shall have clearances of at least 1/2" from all combustible construction.
2. WATER BOILER
 - a. For Forced Circulation HOT WATER HEATING. See Figures 11A and 11B. Consult I=B=R, "Residential Hydronic Heating Installation and Design Guide".
 - b. Use a boiler water bypass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperature may be encountered (i.e. converted gravity circulation system, etc.).

Install a pipe tee in the boiler return piping along with a second tee in the supply piping as shown in Figures 11A and 11B. The bypass should be the same size as the supply and return lines. Locate valves in the bypass and supply outlet as illustrated in Figures 11A and 11B for regulation of water flow to maintain higher boiler water temperature.

Set the by-pass and boiler supply valves to a half throttle position to start. Operate boiler until the system water temperature is a normal operating range.

Adjust the valves to provide 180° to 200°F supply water temperature. Opening the boiler supply valves will raise the system temperature, while opening the bypass valve will lower the system supply temperature.
 - c. If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.
 - d. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler, see Figure 13. Also, consult I=B=R, "Residential Hydronic Heating Installation and Design Guide".
 - e. A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation. See Appendix A, Low Water Cut-Off for additional details.

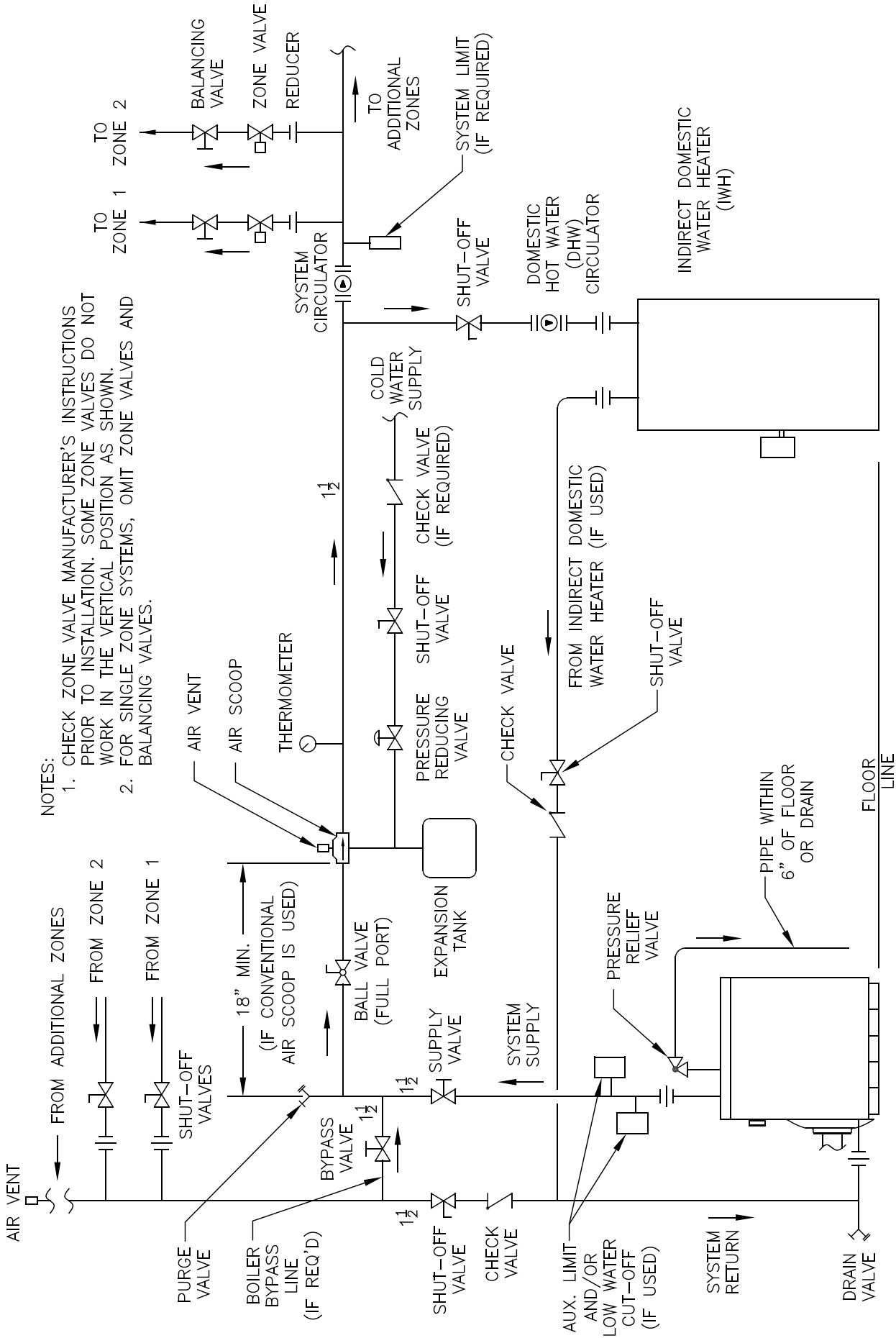
III: INSTALLATION INSTRUCTIONS (continued)



NOTES:
 1. FOR SINGLE ZONE HEATING ONLY SYSTEMS, OMIT FLOW CONTROL VALVE.

RIGHT SIDE VIEW
 Figure 11A: Recommended Water Piping for Circulator Zoned Heating System - Supply Side Circulator

III: INSTALLATION INSTRUCTIONS (continued)



- NOTES:
1. CHECK ZONE VALVE MANUFACTURER'S INSTRUCTIONS PRIOR TO INSTALLATION. SOME ZONE VALVES DO NOT WORK IN THE VERTICAL POSITION AS SHOWN.
 2. FOR SINGLE ZONE SYSTEMS, OMIT ZONE VALVES AND BALANCING VALVES.

RIGHT SIDE VIEW
Figure 11B: Recommended Water Piping for Zone Valve Zoned Heating System - Supply Side Circulator

III: INSTALLATION INSTRUCTIONS (continued)

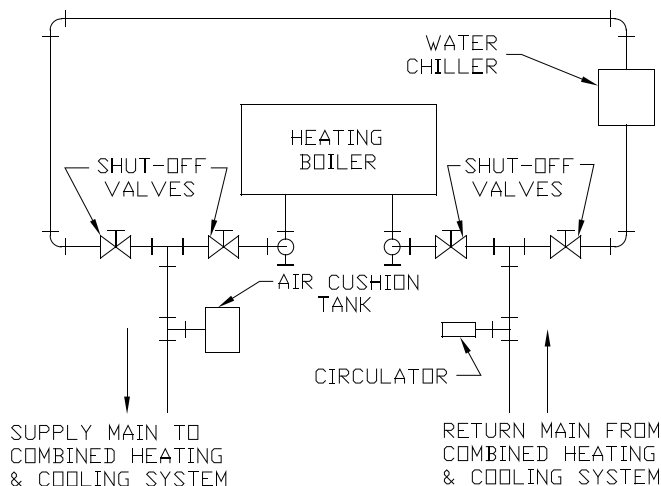


Figure 13: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems

3. STEAM BOILER

- a. For Recommended STEAM BOILER PIPING refer to Figure 12. Also, consult I=B=R, "Residential Hydronic Heating Installation and Design Guide".

- b. Evaluate the Existing Steam System.

The single most important factor in determining the expected life cycle of a steam boiler, is the amount of fresh water added to the boiler during operation. Fresh water brings minerals and oxygen into the boiler. These contaminants greatly accelerate corrosion of the cast iron boiler sections.

- i. Assure that all system radiators, piping and vents are absolutely leak tight.
 - When a steam boiler is installed in an existing system, ALL air vents should be replaced at the same time. This assures that the new boiler will not be compromised by existing system leaks.

- If the system contains hidden supply or return piping (hidden behind walls, buried in concrete, etc.) pressure test this piping to assure there are no leaks.
- ii. Repair any leaks in the system.
- iii. Install accurate water meter on the fresh water supply to the boiler.

NOTICE

DO NOT use softened water in steam boilers. Accelerated boiler corrosion will result. Tie in fresh water supply to the boiler upstream of a water softener.

4. OXYGEN CONTAMINATION:

- a. There are many possible causes of oxygen contamination such as:
 - i. Addition of excessive make-up water as a result of system leaks.
 - ii. Absorption through open tanks and fittings.
 - iii. Oxygen permeable materials in the distribution system.
- b. In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:
 - i. Repairing system leaks to eliminate the need for addition of make-up water.
 - ii. Eliminating open tanks from the system.
 - iii. Eliminating and/or repairing fittings which allow oxygen absorption.
 - iv. Use of non-permeable materials in the distribution system.
 - v. Isolating the boiler from the system water by installing a heat exchanger.

See Section VII, Paragraph B, Step 3 for additional details.

NOTICE

Before using copper for steam piping, consider the following characteristics of copper piping:

- 1) **High coefficient of thermal expansion can induce mechanical stresses and cause expansion/contraction noises if not accounted for in the piping system design and installation,**
- 2) **High heat transfer rate (heat loss) of un-insulated copper piping must be included in the normal piping and pickup factors used to size the boiler,**
- 3) **Soldering or brazing pastes and fluxes that end up in the system can cause poor heat transfer, surging, an unsteady water line and wet steam if not thoroughly removed during boil out procedure and,**
- 4) **Galvanic corrosion of the adjoining metal may occur due to dissimilar metals in certain water chemistries if dielectric unions are not used.**

III: INSTALLATION INSTRUCTIONS (continued)

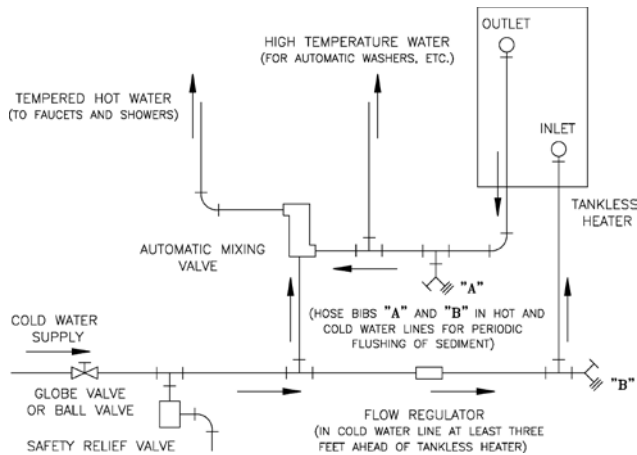


Figure 14: Schematic Tankless Heater Piping

TABLE 4: TANKLESS HEATER DATA

Boiler Model	Rating (Gal/Min)		Pressure Drop (PSI)	
	Steam	Water	Steam	Water
CL3-091	2.25	2.75	2.3	3.9
CL3-105	2.25	3.00	2.3	4.7
CL3-140	2.50	3.25	3.1	5.6
CL4-126	2.50	3.25	3.1	5.6
CL4-175	2.75	3.75	3.9	7.2
CL4-210	3.00	4.00	4.7	8.0
CL5-168	2.75	3.50	3.9	6.4
CL5-245	3.25	4.25	5.6	8.8
CL5-280	3.50	4.75	6.4	9.6

CAUTION

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

I. CONNECT TANKLESS HEATER PIPING AS SHOWN IN Figure 14. See Table 4 for Tankless Heater Ratings.

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

- 1. FLOW REGULATION** — If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a flow regulator matching the heater rating should be installed in the cold water line to the heater. The flow regulator should preferably be located below the inlet to the heater and a minimum

of 3' away from the inlet so that the regulator is not subjected to excess temperatures that may occur during "off" periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.

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

WARNING

Install automatic mixing valve at tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Adjust and maintain the mixing valve in accordance with the manufacturer's instructions.

- 3. FLUSHING OF HEATER** — All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.
- 4. HARD WATER** — A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer's recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

J. INDIRECT WATER HEATER PIPING

- 1. CONNECT Indirect Water Heater Piping** as shown in Figures 11A and 11B for water boilers and Figures 12 and 15 for steam boilers. Refer to Indirect Water Heater Instruction Manual for additional installation information.

III: INSTALLATION INSTRUCTIONS (continued)

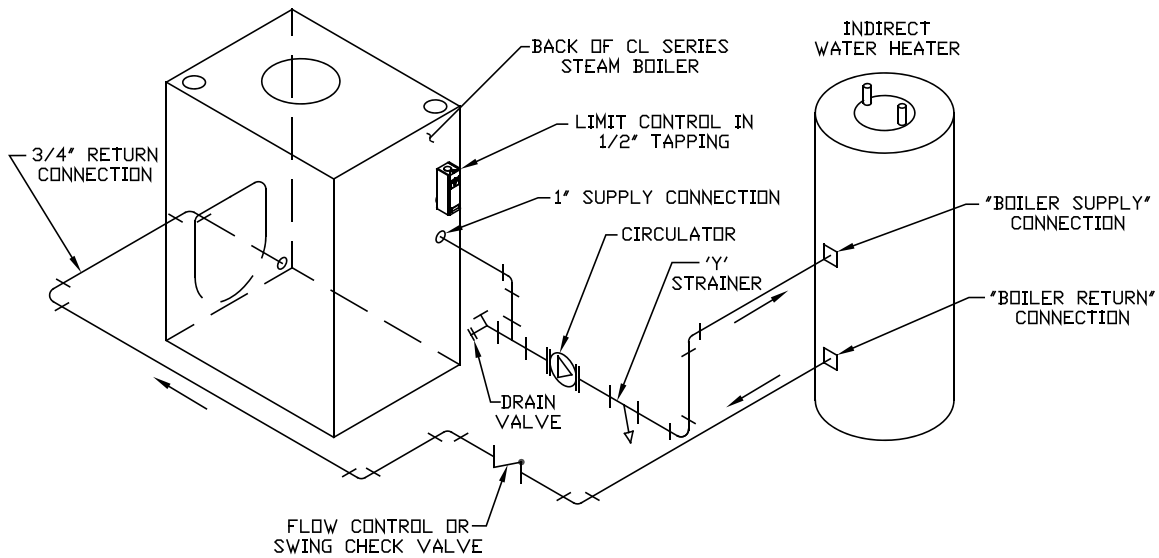


Figure 15: Indirect Water Heater Piping on CL Series Steam Boiler

- a. CL SERIES WATER BOILER - Figures 11A and 11B show indirect water heater piping on typical hot water heating system. Boiler piping is the same as for any two-zone system. Figures 11A and 11B show circulator zoning, which is usually preferred for indirect water heaters. Size the circulator and indirect water heater piping to obtain the boiler water flow through the indirect water heater called for by the indirect water heater manufacturer. Refer to the indirect water heater instruction manual for additional details.
- b. CL SERIES STEAM BOILER - All CL Series steam boilers are equipped with tapings to permit the connect of an indirect water heater, see Figures 2B and 15. In this type of system, hot boiler water is drawn from below the water

line and passed through the heat exchanger in the indirect water heater.

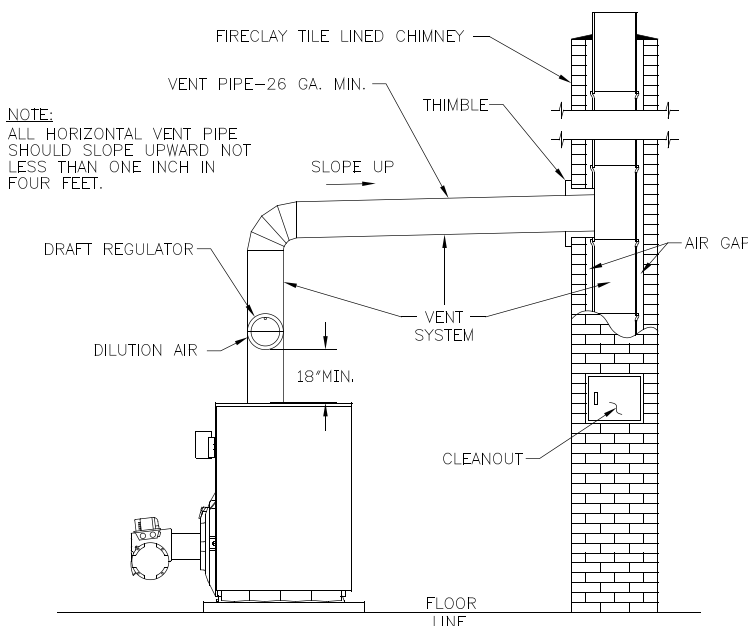
This section describes boiler-side piping only. Refer to the indirect water heater instruction manual for additional details.

K. INSTALL SMOKEPIPE — The CL Series boiler should be vented into a fireclay tile-lined masonry chimney or chimney constructed from type L vent or a factory built chimney that complies with the type HT requirements of UL103. The chimney and vent pipe shall have a sufficient draft at all times, to assure safe proper operation of the boiler. See Figure 16 for recommended installation.

1. Install a draft regulator (supplied by installer) following the instructions furnished with the regulator. See Figure 17 for draft regulator locations.

2. Consider the chimney overall. Chimneys that have a high heat loss may become less suitable as the heat loss of the home goes down and the efficiency of the boiler installed goes up. Most homes have a chimney appropriate for the fuel and the era in which the home was built. That may have been a coal fired or an inefficient oil fired boiler built into a home without insulation or storm windows. With increasing fuel prices that home probably has been insulated and fitted with storm windows so that the heat loss of the home has been reduced. This requires less fuel to be burned and sends less heat up the chimney.

A new boiler probably has a higher efficiency than the boiler being replaced. That probably means that the stack temperature from the new boiler will be lower than that from the old boiler and with less room air being drawn up the chimney to dilute the stack gases. The combination of a large uninsulated chimney, reduced firing rate, reduced firing time,



NOTE:
ALL HORIZONTAL VENT PIPE SHOULD SLOPE UPWARD NOT LESS THAN ONE INCH IN FOUR FEET.

Figure 16: Recommended Smokepipe Arrangement and Chimney Requirements

III: INSTALLATION INSTRUCTIONS (continued)

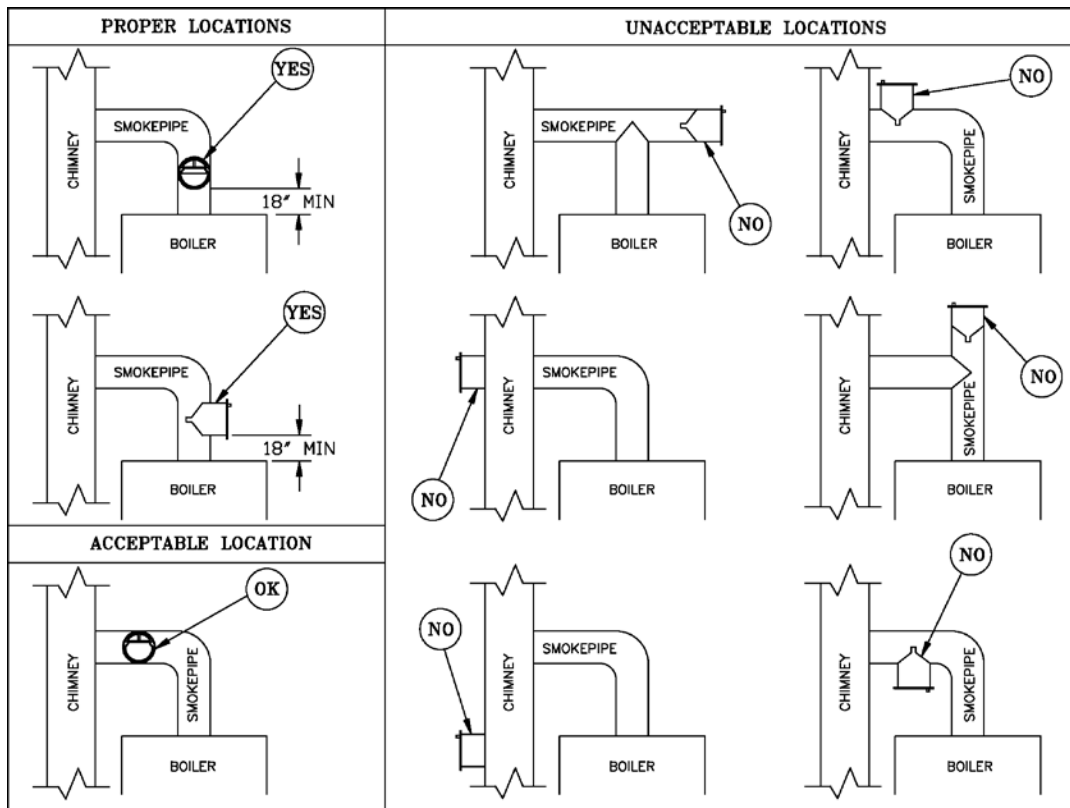


Figure 17: Proper and Improper Locations of Draft Regulator

lower stack temperature and less dilution air can, in some cases, contribute to the condensing of small amounts of water vapor in the chimney. Such condensation, when it occurs, can cause chimney deterioration. In extreme cases, condensed water may be visible on the outside of the breeching or chimney. In those extreme cases, the chimney may have to be lined to insulate the chimney and thus prevent the condensation. The addition of dilution air into the chimney may assist in drying the chimney interior surfaces.

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

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

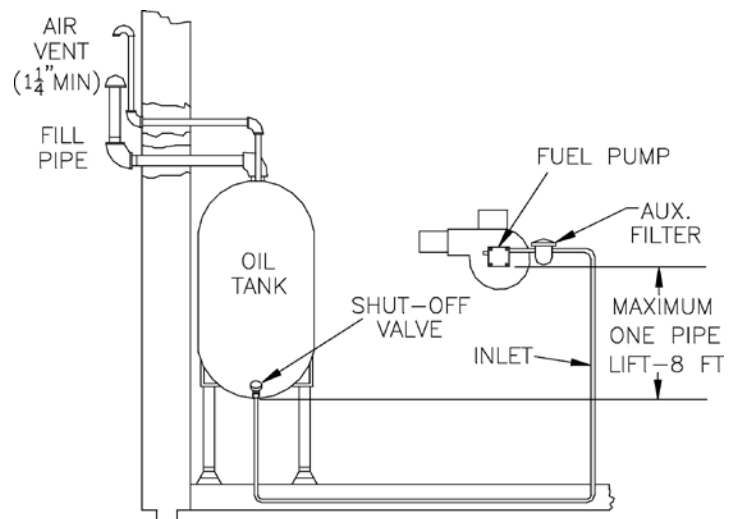


Figure 18: Single Pipe Oil Line

IMPORTANT

Single-pipe installations must be absolutely airtight or leaks or loss of prime may result. Bleed line and fuel unit completely.

III: INSTALLATION INSTRUCTIONS (continued)

**TABLE 5: SINGLE STAGE UNITS (3450 RPM)
TWO PIPE SYSTEMS**

Lift "H" (See Figure)	Maximum Length of Tubing "H" + "R" (See Figure)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	84'	100'
1'	78'	100'
2'	73'	100'
3'	68'	100'
4'	63'	100'
5'	57'	100'
6'	52'	100'
7'	47'	100'
8'	42'	100'
9'	36'	100'
10'	31'	100'
11'	26'	100'
12'	21'	83'
13'	---	62'
14'	---	41'

**TABLE 6: TWO-STAGE UNITS (3450 RPM)
TWO-PIPE SYSTEMS**

Lift "H" (See Figure)	Maximum Length of Tubing "H" + "R" (See Figure)	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	93'	100'
2'	85'	100'
4'	77'	100'
6'	69'	100'
8'	60'	100'
10'	52'	100'
12'	44'	100'
14'	36'	100'
16'	27'	100'
18'	---	76'

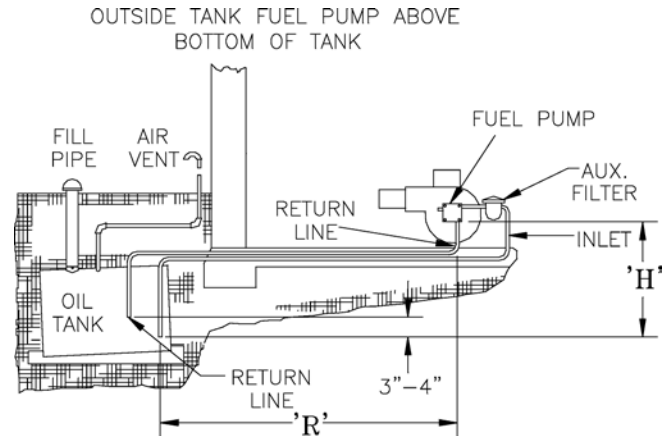


Figure 19: Two Pipe Oil Lines

L. FUEL UNITS AND OIL LINES

SINGLE-PIPE OIL LINES Standard burners are provided with single-stage 3450 rpm fuel units with the by-pass plug removed for single-pipe installations.

The single-stage fuel unit may be installed single-pipe with gravity feed or lift. Maximum allowable lift is 8 feet. See Figure 18.

TWO-PIPE OIL LINES For two-pipe systems where more lift is required, the two-stage fuel unit is recommended. Table 5 (single-stage) and Table 6 (two-stage) show allowable lift and lengths of 3/8-inch and 1/2-inch OD tubing for both suction and return lines. Refer to Figure 19.

Be sure that all oil line connections are absolutely airtight. Check all connections and joints. Flared fittings are recommended. **DO NOT** use compression fittings.

Open the air-bleed valve and start the burner. For clean bleed, slip a 3/16" ID hose over the end of the bleed valve and bleed into a container. Continue to bleed for 15 seconds after oil is free of air bubbles. Stop burner and close valve.

IV: ELECTRICAL

DANGER

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

WARNING

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

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

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

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

WARNING

The primary control may be damaged or may not function properly if 120 volt power supply is **NOT** wired into control as follows:

The 120V interrupted hot (black) wire must be connected to the primary control black wire, the 120V neutral (white) wire must be connected to the primary control white wire and the 120V constant hot (red) wire must be connected to the primary control red wire.

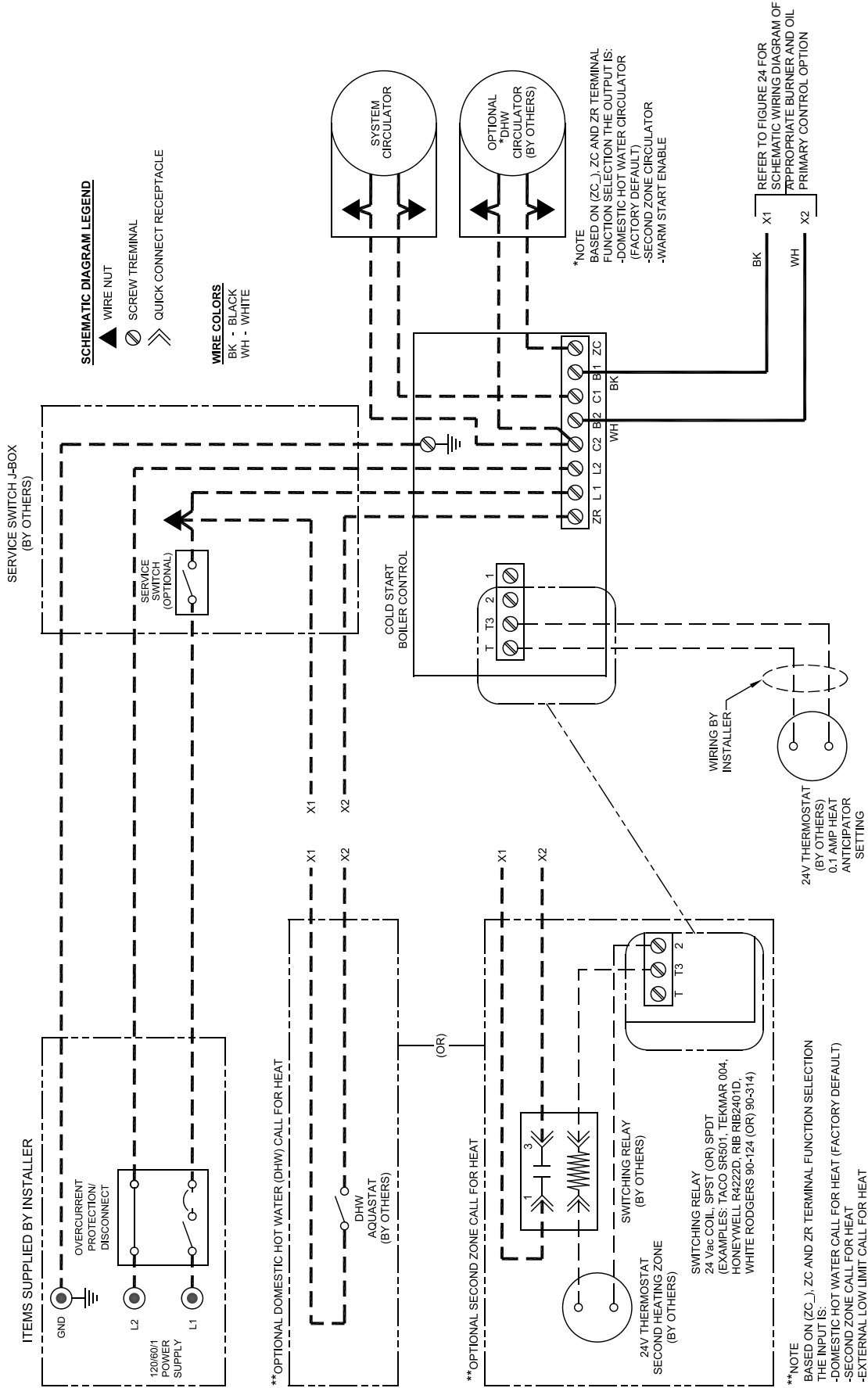
A. GENERAL

1. Install wiring and electrically ground boiler in accordance with requirements of the authority having jurisdiction, or in absence of such requirements the National Electrical Code, ANSI/NFPA 70, and/or the CSA C22.1 Electric Code.
2. Refer to National Electric Code or Local Electric Codes for proper size and type of wire required. Follow Code.
3. A separate electrical circuit must be run from the main electrical service with an over-current device/disconnect in the circuit. A service switch is recommended and may be required by some local jurisdictions.
4. Use anti-short bushings on all wiring passing through boiler jacket, junction boxes and/or control boxes.
5. Use armored cable (BX) over all exposed line voltage wiring.
6. If an indirect domestic water heater is used, use priority zoning. **DO NOT** use priority zoning for Hydro-Air Systems.

7. If boiler is installed in Canada, a blocked vent safety switch must be installed. Refer to Blocked Vent Safety Switch Instruction Supplement provided with boiler (Canada only).
8. Wiring should conform to Figures 20 through 24.

- B. INSTALL A ROOM THERMOSTAT** on an inside wall about four feet above floor. Never install thermostat on an outside wall or where it will be influenced by drafts, hot or cold water pipes, lighting fixtures, television, rays of the sun or near a fireplace. Keep large furniture away from thermostat so there will be free movement of room air around this control.
- Heat Anticipator in Thermostat should be set to match the requirements of the control to which it is connected. See Figures 20 thru 24 for desired system and heat anticipator setting. If system tends to overheat above the thermostat's temperature setting, reduce heat anticipator setting by .1 or .2 amps. If system tends to short cycle without reaching desired room temperature, increase heat anticipator setting by .1 or .2 amps.

IV: ELECTRICAL (continued)



- NOTES:**
- IF ANY ORIGINAL EQUIPMENT WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE HAVING THE SAME WIRE GAUGE (AWG), SAME WIRE TYPE, AND RATED FOR A MINIMUM OF 105°C.
 - DO NOT REMOVE JUMPER ON OIL PRIMARY CONTROL FOR THIS APPLICATION.

Figure 20: Schematic Wiring Diagram, without Tankless Heater, Cold Start Control (Beckett and Riello Burners)

IV: ELECTRICAL (continued)

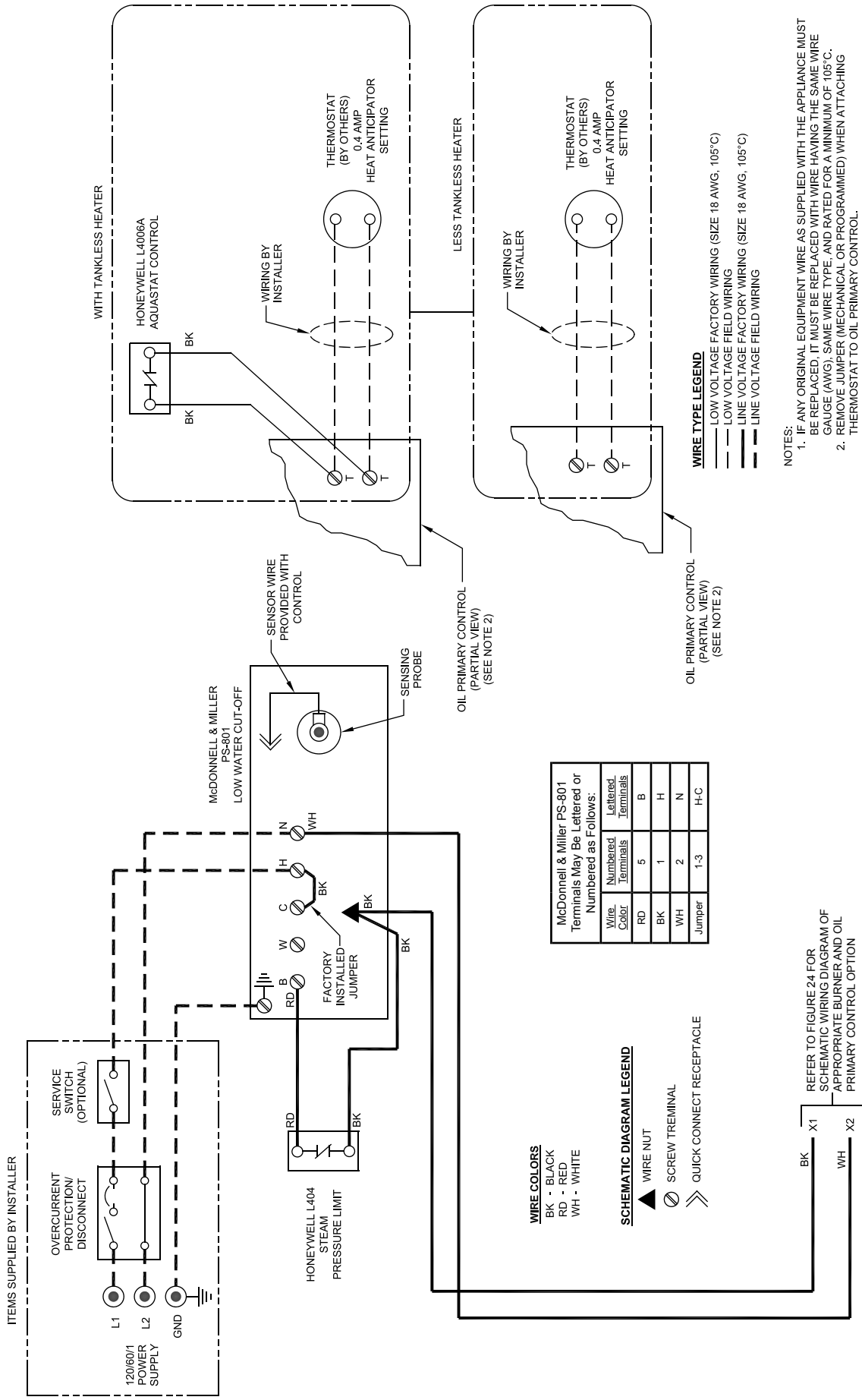


Figure 22: Schematic Wiring Diagram, Steam Boilers With or Without Tankless Heater, McDonnell & Miller PS-801 Probe LWCO, Beckett AFG Burner

IV: ELECTRICAL (continued)

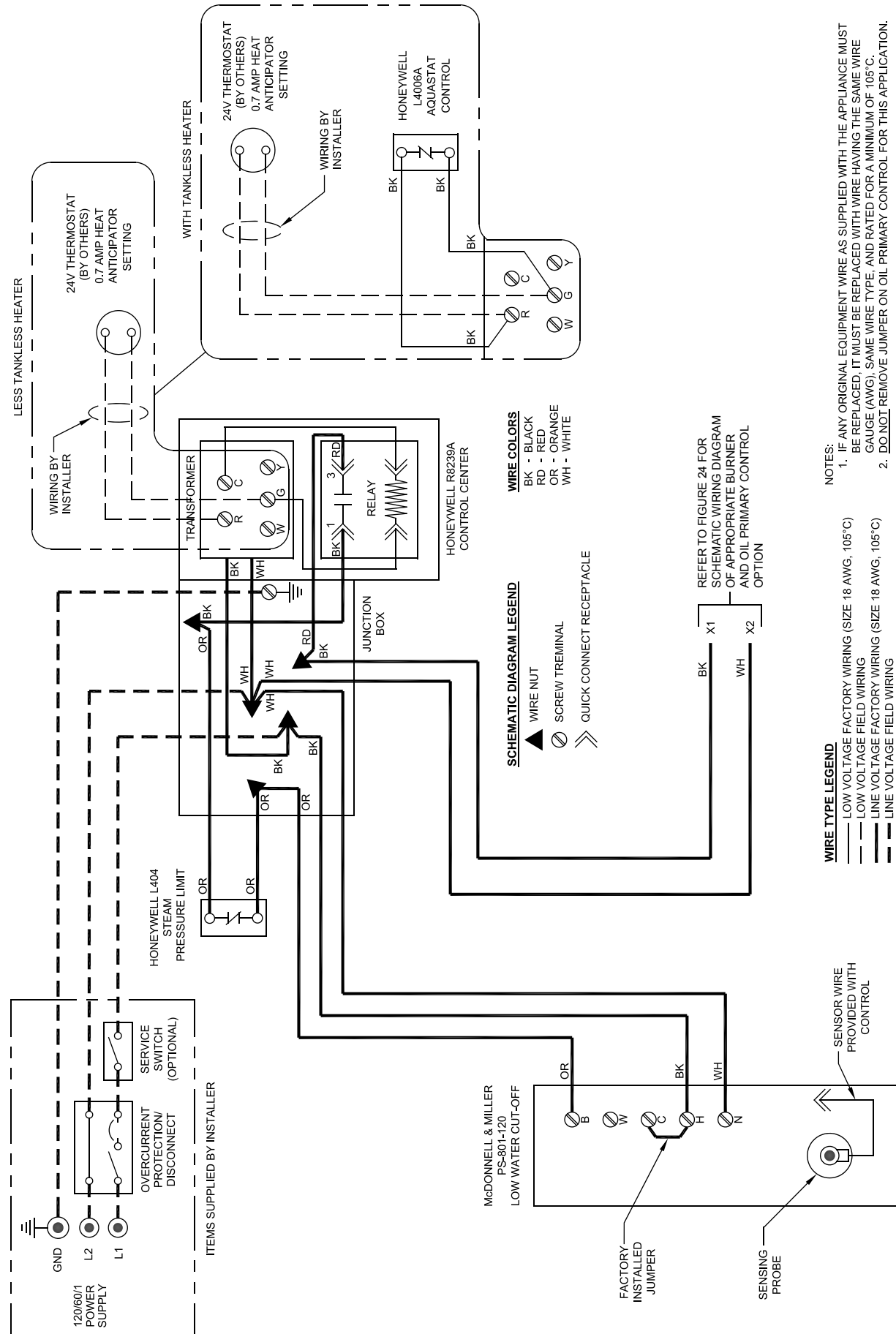
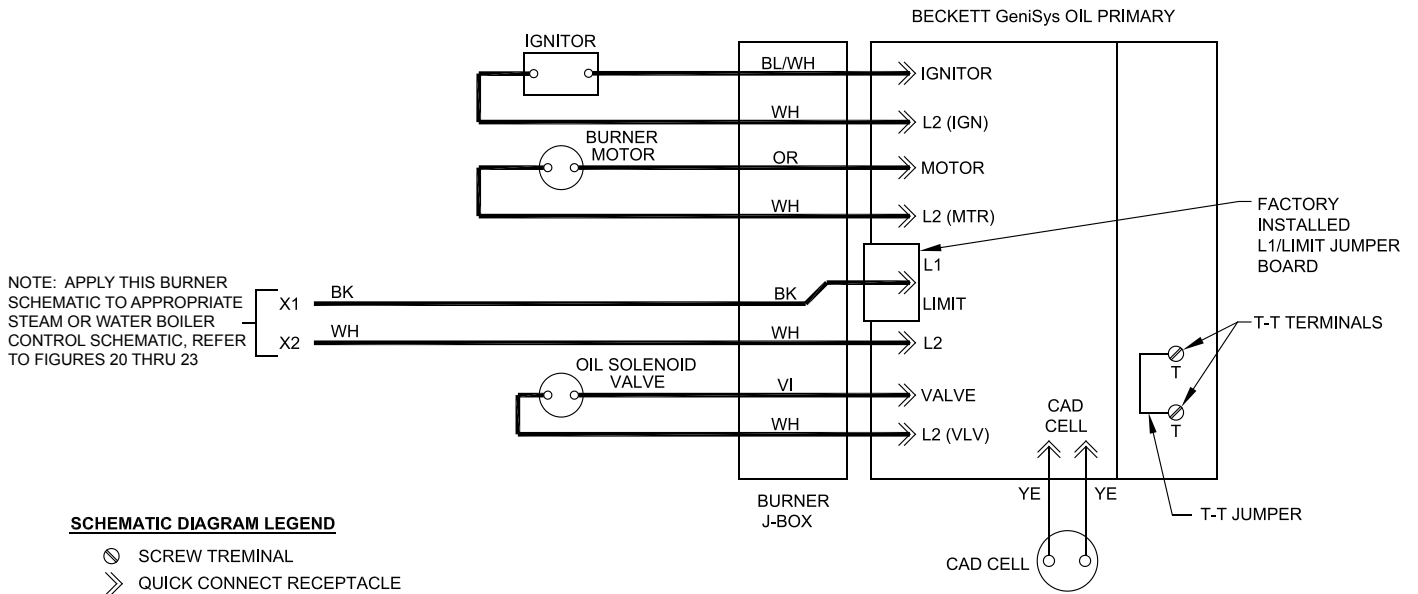


Figure 23: Schematic Wiring Diagram, Steam Boilers with or without Tankless Heater, McDonnell & Miller PS-801 Probe LWCO, Riello 40 Burner

IV: ELECTRICAL (continued)



WIRE TYPE LEGEND

- LOW VOLTAGE FACTORY WIRING (SIZE 18 AWG, 105°C)
- LOW VOLTAGE FIELD WIRING
- LINE VOLTAGE FACTORY WIRING (SIZE 18 AWG, 105°C)
- LINE VOLTAGE FIELD WIRING

NOTES:

- IF ANY ORIGINAL EQUIPMENT WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE HAVING THE SAME WIRE GAUGE (AWG), SAME WIRE TYPE, AND RATED FOR A MINIMUM OF 105°C.

NOTE: APPLY THIS BURNER SCHEMATIC TO APPROPRIATE STEAM OR WATER BOILER CONTROL SCHEMATIC, REFER TO FIGURES 20 THRU 23

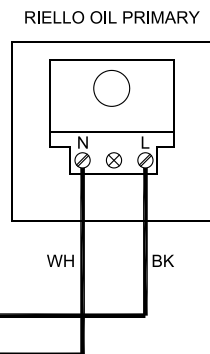


Figure 24: Schematic Wiring Diagrams For All Burner Options w/Variou Oil Primary Controls

V: SYSTEM START-UP

WARNING

All boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

1. Verify that the venting, water piping, oil piping, and electrical system are installed properly. Refer to Installation Instructions contained in this manual.
2. Confirm all electrical, water and oil supplies are turned off at the source and that the vent is clear from obstructions.

WARNING

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

B. FILL HEATING SYSTEM WITH WATER.

NOTICE

It is important, especially in a steam system, to properly remove the oil and dirt from the system. Failure to clean the system can result in erratic water lines and surging.

CLEAN HEATING SYSTEM if boiler water or condensate return water is dirty or if erratic water lines or surging exist after a few days of boiler operation. Refer to Maintenance and Service Instructions Section of this manual for proper cleaning instructions for steam and water boilers.

1. STEAM BOILERS — Fill boiler to normal water line. Refer to Figures 1C and 1D.
2. HOT WATER BOILERS. Fill entire heating system with water and vent air from system. Use the following procedure on a series loop or multi-zoned system installed as per Figures 11A, and 11B, to remove air from system when filling:
 - a. Close full port ball valve in boiler system piping.
 - b. Isolate all zones by closing zone valves or shut-off valves in supply and return of each zone(s).
 - c. Attach a hose to vertical purge valve in boiler system piping.
(Note - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
 - d. Starting with one zone at a time, open zone valve or shut-off valve in boiler supply and return piping.

- e. Open purge valve.
- f. Open shut-off valve in cold water supply piping located between the air scoop and expansion tank.
- g. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
- h. When zone is completely purged of air, close zone valve or shut-off valve. Open zone valve to the next zone to be purged. Repeat this step until all zones have been purged. At completion, open all zone valves.
- i. Close purge valve, continue filling the system until the pressure gauge reads 12 psi. Close shut-off valve in cold water supply piping.

WARNING

The maximum operating pressure of this boiler is posted on the ASME Data Label located on the top of the boiler. Never exceed this pressure. **DO NOT** plug safety or relief valve.

NOTICE

If make-up water line is equipped with pressure reducing valve, system will automatically fill to 12 psi. Follow fill valve manufacturer's instructions.

- j. Open full port ball valve in boiler system piping.
- k. Remove hose from purge valve.
- l. Confirm that the boiler and system have no water leaks.

C. CHECK CONTROLS, WIRING AND BURNER

to be sure that all connections are tight and burner is rigid, that all electrical connections have been completed and fuses installed, and that oil tank is filled and oil lines have been tested.

D. ADJUST CONTROL SETTINGS with burner service switch turned "ON".

1. SET ROOM THERMOSTAT about 10°F below room temperature.
2. PRESS RED RESET BUTTON on front of burner cover (Beckett, Riello burners) or Oil Primary Control with burner cover removed. Hold button for one (1) second and release to reset primary control.

V: SYSTEM START-UP (continued)

3. STEAM BOILERS:

With an PA404A Pressure Limit - set cut-out pressure (MAIN scale) on the pressure limit for (1) PSI and differential pressure (DIFF.) for .5 PSI. These pressures may be varied to suit individual requirements of the system.

4. STEAM BOILERS WITH TANKLESS

DOMESTIC WATER HEATERS, set boiler water temperature dial on L4006 operating control at 190°F (max.). Set differential at 10°.

5. WATER BOILERS WITHOUT TANKLESS

HEATERS are equipped with an Intelligent Oil Boiler Control (Boiler Control). The Boiler Control is factory programmed with a High Limit setpoint of 180°F. The High Limit setpoint is adjustable between 140°F and 240°F. This temperature may be varied to suit the installation requirements.

HIGH LIMIT DIFFERENTIAL is factory programmed at 15°F and is adjustable between 10°F and 30°F.

6. WATER BOILERS WITH TANKLESS HEATERS

are equipped with a Warm Start Intelligent Oil Boiler Control (Warm Start Boiler Control). The Warm Start Boiler Control is factory programmed with a High Limit setpoint of 180°F. The High Limit setpoint is adjustable between 140°F and 240°F. High Limit Differential is factory programmed at 10°F. Additionally, the Warm Start Boiler Control is factory programmed with a Low Limit setpoint of 110°F. The Low Limit setpoint is adjustable between 110°F and 220°F. These temperatures may be varied to suit the installation requirements.

7. CHECKOUT

Put the system into operation and observe at least one complete cycle to make sure that the controller operates properly. See Troubleshooting Section to use LED to assist in determining system operation.

E. ADJUST OIL BURNER BEFORE STARTING.

1. CHECK BURNER SETTINGS and readjust if necessary, see Burner Specifications, Tables 14A and 14B at rear of manual.

2. Beckett Burners

- Inspect Beckett head setting on left side of burner housing by insuring the blue line MD(V1) or the line on the label MB(L1) are aligned, readjust if necessary. Refer to Figure 26 and Table 14A at the rear of this manual.
- Check burner air band and air shutter settings. Readjust if necessary, see Burner Specifications Table 14A at the rear of this manual.

c. OPEN ALL OIL LINE VALVES.

d. Attach a plastic hose to fuel pump vent fitting and provide a pan to catch the oil.

e. OPEN FLAME OBSERVATION PORT COVER on burner swing door.

3. Riello Burners

a. Inspect Riello head setting on left side of burner by reading the scale embossed on the housing cover. Refer to Figure 8.

b. Inspect Riello burner air damper and turbulator setting. Readjust if necessary, see Table 14B at the rear of this manual.

c. OPEN ALL OIL LINE VALVES.

d. Provide a pan to catch oil.

e. Remove pressure port/bleeder plug from fuel pump and install Riello Combination Pressure Gauge and Bleeder Valve Assembly.

f. OPEN FLAME OBSERVATION PORT COVER on burner swing door.

F. START OIL BURNER.

1. Open vent fitting on fuel pump.

2. TURN 'ON' BURNER service switch and allow burner to run until oil flows from vent fitting in a SOLID stream without air bubbles for approximately 10 seconds.

3. Close vent fitting and burner flame should start immediately after prepurge is completed. Prepurge prevents burner flame until 10 seconds has elapsed after initial power is applied to burner. During prepurge the motor and igniter will operate but the oil valve will remain closed. Refer to Oil Primary Control Instructions for more details.

4. Adjust oil pressure.

a. When checking a fuel unit's operating pressure, a reliable pressure gauge may be installed in either the bleeder port or the nozzle port. For Beckett burner refer to Figure 25. Refer to Figure 9 for Riello burner.

b. Locate oil pressure adjusting screw and turn screw to obtain proper pump pressure, refer to Tables 14A and 14B at the rear of this manual.

c. To check the cutoff pressure, deadhead a reliable pressure gauge onto the copper connector tube attached to the nozzle port. Run the burner for a short period of time. Shut the burner off. The pressure should drop and hold.

d. Remove the gauge and install bleeder port and/or reconnect the nozzle port line.

V: SYSTEM START-UP (continued)

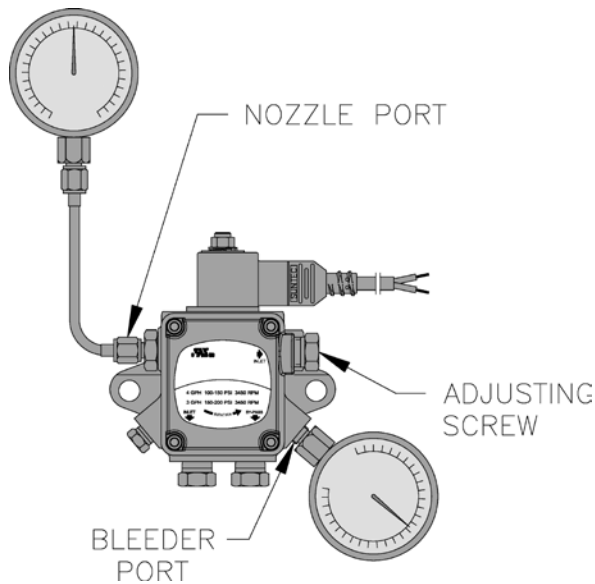


Figure 25: Adjusting Fuel Pump Pressure

G. ADJUST OIL BURNER WHILE OPERATING.

(flame present)

1. SET ROOM THERMOSTAT about 10°F below room temperature.
2. PRESS RED RESET BUTTON on Oil Primary Control and release.
3. **Beckett Burners** - READJUST THE HEAD SETTING only if necessary.
 - a. CL3-091 thru CL4-126:
Beckett MB(L1) Head burners have a fixed head which are non-adjustable.
 - b. CL4-175 thru CL5-280:
Beckett MD(V1) (variable) Head burners have the ability to control air by moving the head. It might be necessary to move the head forward or back one position at a time to optimize the smoke and CO₂ readings. See Figure 26 and Table 14A at the rear of this manual.
4. **Riello Burners** - READJUST THE TURBULATOR SETTING only if necessary.
 - a. CL3 through CL5 (All Models)
Move the turbulator setting forward or back one position at a time to optimize the smoke and CO₂ readings. Refer to Figure 8 and Table 14B at the rear of this manual.
5. ADJUST DRAFT REGULATOR for a draft of -0.02" (water gauge) over the fire after chimney has reached operating temperature and while burner is running.
6. READJUST THE AIR DAMPER SETTING (air Band/Air Shutter/Air Gate) on the burner for a light orange colored flame while the draft over

the fire is -0.02". Use a smoke tester and adjust air for minimum smoke (not to exceed #1) with a minimum of excess air. Make final check using suitable instrumentation to obtain a CO₂ of 11.5 to 12.5% with draft of -0.02" (water gauge) in fire box. These settings will assure a safe and efficient operating condition. If the flame appears stringy instead of a solid fire, try another nozzle of the same type. Flame should be solid and compact. After all adjustments are made, recheck for a draft of -0.02" over the fire.

7. ONLY READJUST THE HEAD/TURBULATOR SETTING if necessary.
 - a. CL3 through CL5 (All Models)
Move the setting forward or back one position at a time to optimize the smoke and CO₂ readings.
 - b. Steps outlined in Paragraph 5 and 6 above must be repeated every time the Head/Turbulator or Air Damper Setting is readjusted.
8. Turn "OFF" burner and remove Riello Combination Pressure Gauge and Bleeder Valve Assembly. Install pressure port/bleeder plug and tighten. Start burner again.

WARNING

DO NOT loosen or remove any oil line fittings while burner is operating.

9. FLAME FAILURE

The CL boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control has tripped, the burner has experienced ignition failure. Refer to Oil Primary Control features, Paragraph I, Step 2 of this Section and Section IX, Troubleshooting, Paragraph B. If the failure re-occurs, call your heating contractor immediately before pressing the reset button.

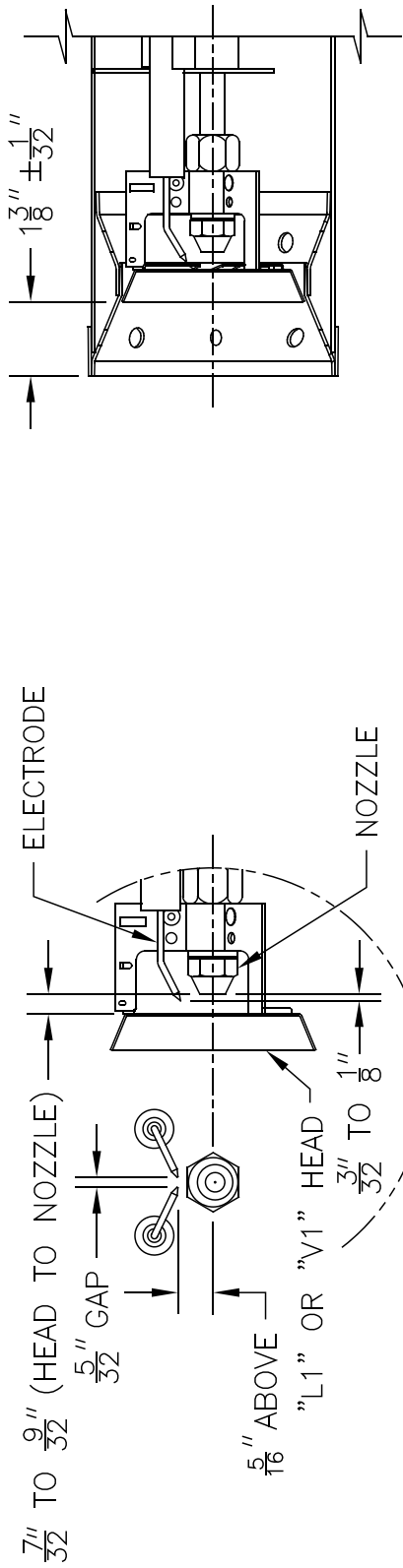
WARNING

DO NOT attempt to start the burner when excess oil has accumulated, when the boiler is full of vapor, or when the combustion chamber is very hot.

10. CAD CELL LOCATION AND SERVICE

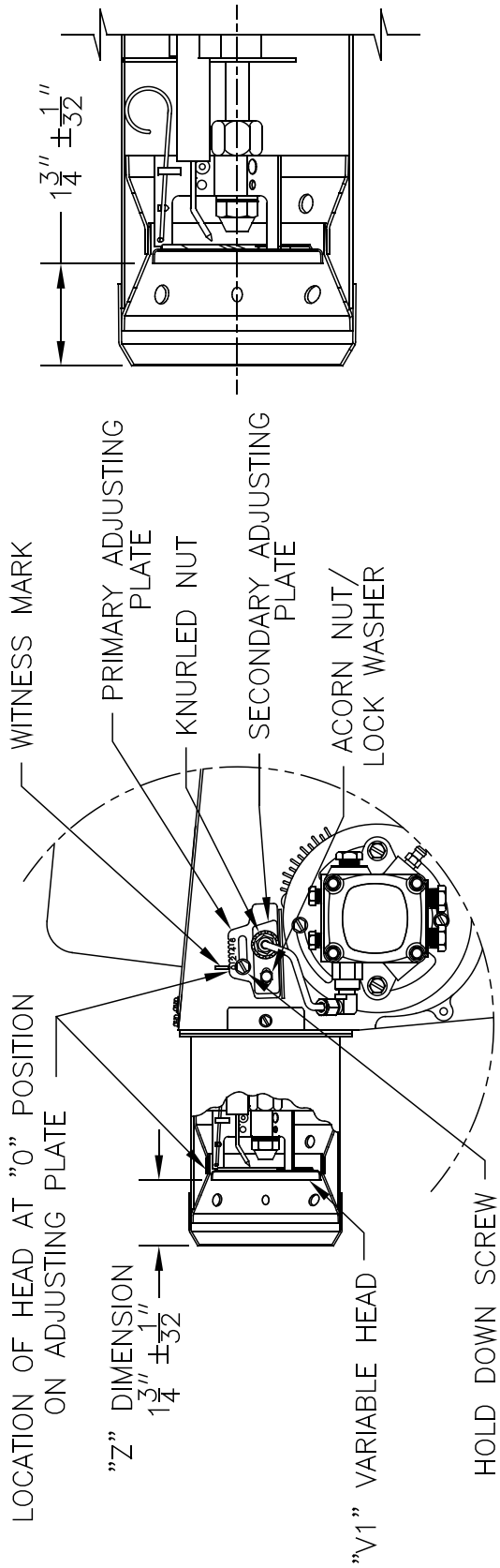
The burner is supplied with a cadmium sulfide flame detector mounted at the factory, mounted on the bottom of the electronic ignitor. See Figure 27. To service cad cell or to replace the plug in portion, swing open the ignitor. After service is complete, be sure to fasten down the ignitor.

V: SYSTEM START-UP (continued)



**ELECTRODE ADJUSTMENT
"L1" OR "V1" HEAD**

L1 HEAD



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

V1 HEAD

Figure 26: "L1" and "V1" Head Electrode Positioning and Gun Setting (Beckett AFG)

V: SYSTEM START-UP (continued)

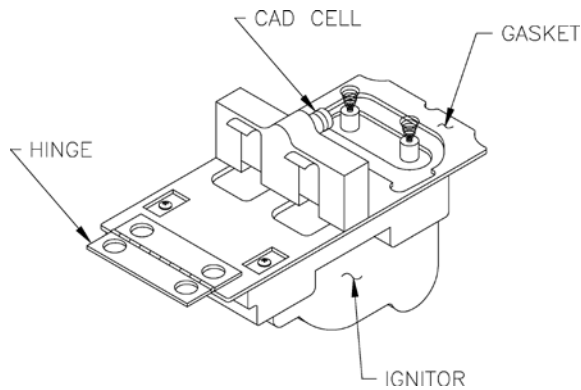


Figure 27: Cad Cell Location

H. CHECK FOR CLEAN CUT OFF OF BURNER.

1. AIR IN THE OIL LINE between fuel unit and nozzle will compress when burner is on and will expand when burner stops, causing oil to squirt from nozzle at low pressure as burner slows down and causing nozzle to drip after burner stops. Usually cycling the burner operation about 5 to 10 times will rid oil line of this air.
2. IF NOZZLE CONTINUES TO DRIP, repeat Paragraph H, Step 1 above. If this does not stop the dripping, remove cut-off valve and seat, and wipe both with a clean cloth until clean, then replace and readjust oil pressure. If dripping or after burn persist replace fuel pump.

I. TEST CONTROLS.

1. Check thermostat operation. Raise and lower thermostat setting as required to start and stop burner.

WARNING

Before installation of the boiler is considered complete, the operation of all boiler controls must be checked, particularly the primary control and high limit control.

2. VERIFY OIL PRIMARY CONTROL

FEATURES using procedures outlined in Instructions furnished with control or instructions as follows:

- a. **GeniSys 7505 Control Features**, see Figure 28
 - i. The GeniSys 7505 is a microprocessor-based control. The indicator light provides diagnostic information for lockout, recycling and cad cell status. There is a manual reset button to exit the Lockout Mode.
 - ii. Pump Priming Cycle: To facilitate purging air from the oil lines and filters, the 7505 can be placed in a purge routine by:

- After the burner starts, press and hold the reset button for 15 seconds until the yellow light turns on. This indicates that the button has been held long enough.
- Release the reset button. The yellow light will turn off and the burner will start up again.
- At burner start up, click the reset button while the igniter is still on. This will transition the control to a dedicated Pump Prime mode, during which the motor, igniter, and valve are powered for four (4) minutes. The yellow light will be on.
- At the end of four (4) minutes, the yellow light will turn off and the control will automatically return to standby mode.

- iii. Limited Recycle: This feature limits the number of recycle trials (for each call for heat) to a maximum of three trials. If the flame is lost three times and does not successfully satisfy a call for heat, the 7505 locks out.
- iv. Limited Reset (Restricted Mode): In order to limit the accumulation of unburned oil in the combustion area, the control can only be reset three times. The reset count returns to

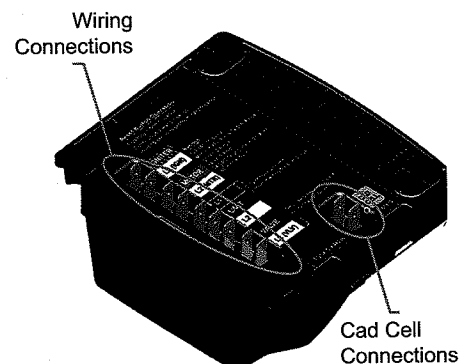
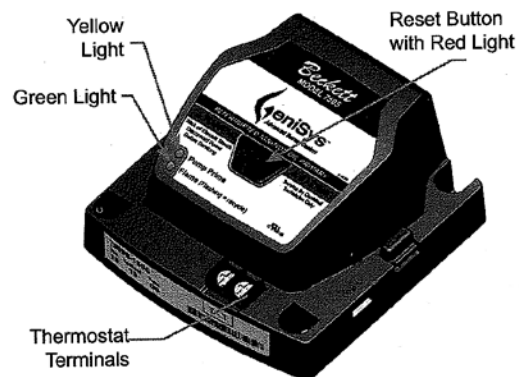


Figure 28: GeniSys 7505 Oil Primary Terminals, LED's and Reset Button

V: SYSTEM START-UP (continued)

zero each time a call for heat is successfully completed.

- v. T-T Jumper: Select models have pre-installed T-T jumper. **DO NOT** remove jumper.

Note: **DO NOT** remove "T-T" jumper **unless** wiring diagram indicates a direct connection from thermostat and/or tankless heater aquastat control to the oil burner primary control's "T-T" terminal. Refer to appropriate wiring diagram, see Figure 20, 21, 22 or 23.

- vi. Diagnostic LED: The indicator light on oil primary control provides lockout, recycle and cad cell indications as follows:
 - Flashing at 1 Hz (½ second on, ½ second off): system is locked out or in Restricted Mode.
 - Flashing at ¼ Hz (2 seconds on, 2 seconds off): control is in Recycle Mode.
 - On: cad cell is sensing flame.
 - Off: cad cell is not sensing flame.
- vii. Cad Cell Resistance Check: For proper operation it is important that the cad cell resistance is below 1600 ohms. During a normal call for heat, the cad cell leads can be unplugged from the control and the resistance measured with a meter in the conventional way. Conduct these tests with flame present, see chart below.

Flame Detection Range
Normal (0 - 1600 ohms)
Limited (1600 ohms to lockout)

3. CHECK OIL PRIMARY CONTROL

CAUTION

Due to the potential hazard of line voltage, only a trained, experienced service technician should perform the following safety checks.

This control contains no field-serviceable parts. DO NOT attempt to take it apart. Replace entire control if operation is not as described.

- a. Preliminary Steps
 - Check wiring connections and power supply.
 - Make sure power is on to the controls.
 - Make sure limit control is closed.

- Check contacts between ignitor and the electrodes.
 - Check the oil pump pressure.
 - Check the piping to the oil tank.
 - Check the oil nozzle, oil supply and oil filter.
- b. Check Safety Features
 - Safe Start:
 - Place a jumper across cad cell terminals.
 - Follow procedure to turn on burner. Burner must not start, indicator light turns on and control remains in Idle Mode.
 - Remove jumper.
 - c. Simulate Ignition or Flame Failure:
 - Follow procedure to turn on burner.
 - Check cad cell resistance. If resistance is below 1600 OHMS and burner runs beyond safety cut-out time, cad cell is good.
 - If safety switch shuts down burner and resistance is above 1600 OHMS, open line switch to boiler. Access cad cell under ignitor, clean face of cad cell and see that cell is securely in socket. Check gasket around perimeter of ignitor lid for proper seal. If gasket is missing or damaged, replace gasket. Room light can effect cad cell resistance. Reset safety switch.
 - Close line switch to boiler. If burner starts and runs beyond safety switch cut-off time, cell is good. If not, install new cell.
 - Close hand valve in oil supply line.
 - Failure occurs, device enters Recycle Mode.
 - Device tries to restart system after approximately 60 seconds.
 - After third Recycle Mode trial, safety switch locks out within safety switch timing indicated on label and control enters Restricted Mode. Ignition and motor stop and oil valves closes.
 - d. Power Failure Check: After Flame is established, turn the power off to the control/burner. The burner should shut down safely. When power is restored a normal ignition sequence should be started.

WARNING

Cad Cell Jumper must be removed after this check.

V: SYSTEM START-UP (continued)

4. CHECK HIGH LIMIT

- a. Adjust system thermostat(s) to highest setting.
- b. Allow burner to run until boiler water temperature exceeds high limit setting. The burner should shut down and circulators continue running.
- c. Allow the temperature to drop below control setting. The burner must restart.
- d. Boiler installation is not considered complete until this check has been made.

5. CHECK LOW WATER CUT-OFF CONTROL

a. Steam Boiler

Check Low Water Cut-off Control with water level at normal water line (see Figure 1D). Raise thermostat setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut-down by low water cut-off.

Close boiler drain and refill to normal water line. Burner should automatically restart during fill. Lower thermostat setting.

b. Water Boiler

Refer to Appendix "A" at the rear of this manual.

6. CHECK OPERATING CONTROL on boiler applications equipped with tankless heater(s). With burner off, draw hot water until burner starts, then turn off hot water and check burner shut-down.

J. **IF CONTROLS MEET REQUIREMENT** outlined in Paragraph I.

1. Allow boiler to operate for approximately 30 minute, confirm the boiler and system have no leaks.

K. **IF CONTROLS DO NOT MEET REQUIREMENTS** outlined in Paragraphs I-1 thru I-6, replace control and repeat checkout procedures.