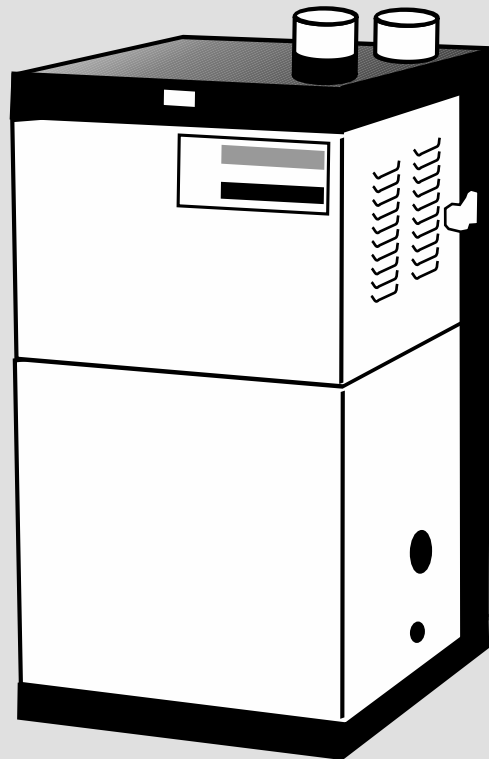


Installation, Operation and Maintenance Instructions for

9600 CB

Models **CB-M2-150**
 CB-M2-175
 CB-M2-200
 CB-M2-250



FOR YOUR SAFETY: This product must be installed and serviced by a professional service technician, qualified in hot water boiler installation and maintenance. Improper installation and/or operation could create carbon monoxide gas in flue gases which could cause serious injury, property damage, or death. Improper installation and/or operation will void the warranty.

⚠ WARNING

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

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

WHAT TO DO IF YOU SMELL GAS

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

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

⚠ AVERTISSEMENT

Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- Ne pas tenter d'allumer d'appareils.
- Ne touchez à aucun interrupteur. Ne pas vous servir des téléphones dans le bâtiment où vous vous trouvez.
- Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur.
- Si vous ne pouvez rejoindre le fournisseur de gaz, appelez le service des incendies.

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

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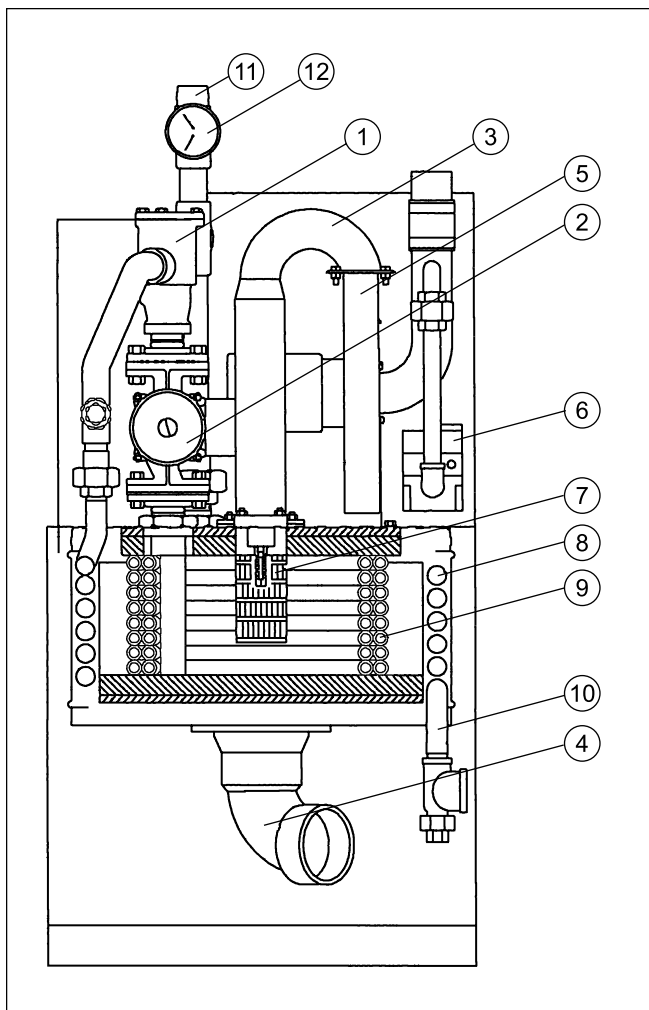


Figure 1. Assembly view of the unit.

- (1) Mixing Valve
- (2) Circulator
- (3) Mixer Tube
- (4) Exhaust Pipe
- (5) Blower
- (6) Gas Valve
- (7) Burner
- (8) Economizer
- (9) Combustion Coil
- (10) Return (from primary loop)
- (11) Supply (to primary loop)
- (12) Air Vent

Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.

SECTION 1. Introduction and Unpacking

1.1 General Instructions

It is important for you to take a few minutes to review this Installation and Operating Instructions manual before you begin installation. This will make installing and operating the unit easier and faster.

Direct vent-sealed combustion:

The 9600 CB boiler does not and should not take combustion air from inside the building. All of the air is drawn in from outdoors through a 3-inch diameter plastic pipe. 3" PVC, ABS or CPVC pipe is used for air intake and exhaust venting. (PVC, ABS not permitted for CB-M2-250 exhaust).

No chimney....flue....or draft inducer required. Because this is a sealed combustion, forced draft unit, it does not require, and must not be connected to a chimney, existing venting system, or draft inducer.

Caution

Connection of this vent to a chimney, existing venting system, or draft inducer will result in poor and possibly dangerous operation.

The supplied vent terminations are designed to be installed through the nearest outside wall.

The CB boiler is protected against over pressurization. A 50 PSI pressure relief valve is fitted to all units and a 125 PSI valve is optional. It is installed in the dedicated fitting on the back of the boiler.

IMPORTANT: The inlet gas pressure to the appliance must not exceed 13" WC.

A high quality circulator is built into the CB boiler and will provide sufficient head to circulate water to the supply and return headers. An external circulator is required to circulate water to and from baseboard or fan coil units (secondary loop).

All installations must be made in accordance with the 1). American National Standard Z223.1-Latest Edition "National Fuel Gas Code" or 2). CSA B149.1 "Installation Codes for Gas Burning Appliances and Equipment" and with the requirement of the local utility or other authorities having jurisdiction. Such applicable requirements take precedence over the general instructions contained herein.

All electrical wiring is to be done in accordance with the local codes, or in the absence of local codes, with: 1). The National Electrical Code ANSI/NFPA No. 70-latest Edition, or 2). CSA STD. C22.1 "Canadian Electrical Code - Part 1". This appliance must be electrically grounded in accordance with these codes. Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for

Automatically Fired Boilers, ANSI/ASME CSD-1.

In the Commonwealth of Massachusetts, this appliance must be installed by a licensed plumber or gas fitter.

1.2 Materials Installer Must Provide

Acceptable Intake Pipe Material	
Models 150-200	Model 250
3-inch or 4-inch PVC schedule 40 pipe per ASTM D-1785 std.	3-inch or 4-inch PVC schedule 40 pipe per ASTM D-1785 std.
3-inch or 4-inch PVC DWV pipe per ASTM D-2665 std.	3-inch or 4-inch PVC DWV pipe per ASTM D-2665 std.
3-inch or 4-inch ABS-DWV pipe per ASTM D-2661 std. or ASTM F-628 std.	3-inch or 4-inch ABS-DWV pipe per ASTM D-2661 std. or ASTM F-628 std.
3-inch or 4-inch CPVC schedule 40 or 80 pipe per ASTM F441 std.	3-inch or 4-inch CPVC schedule 40 or 80 pipe per ASTM F441 std.
3-inch or 4-inch AL29-4C stainless steel complying with UL std. 1738.	3-inch or 4-inch AL29-4C stainless steel complying with UL std. 1738.
Acceptable Exhaust Vent Pipe Material	
Models 150-200	Model 250
3-inch or 4-inch PVC schedule 40 pipe per ASTM D-1785 std.	3-inch or 4-inch CPVC schedule 40 or 80 pipe per ASTM F441 std.
3-inch or 4-inch PVC DWV pipe per ASTM D-2665 std.	3-inch or 4-inch AL29-4C stainless steel complying with UL std. 1738.
3-inch or 4-inch ABS-DWV pipe per ASTM D-2661 std. or ASTM F-628 std.	
3-inch or 4-inch CPVC schedule 40 or 80 pipe per ASTM F441 std.	
3-inch or 4-inch AL29-4C stainless steel complying with UL std. 1738.	

- Total combined feet allowed for intake and exhaust vent pipe per instructions. The following are acceptable materials for intake and exhaust vents:
- Electrical connection to a 120VAC/15Amp service.
- Gas connection that will provide 250 cubic feet/hour at 4 to 13 inch water gauge pressure.
- Condensate drainage: a floor drain is preferred, a condensate pump can be used if required.
- Miscellaneous copper fittings and bronze valves will be required to complete the piping system.

1.3 Unpacking

The CB boiler is shipped in a single carton with the following standard components on top of the unit.

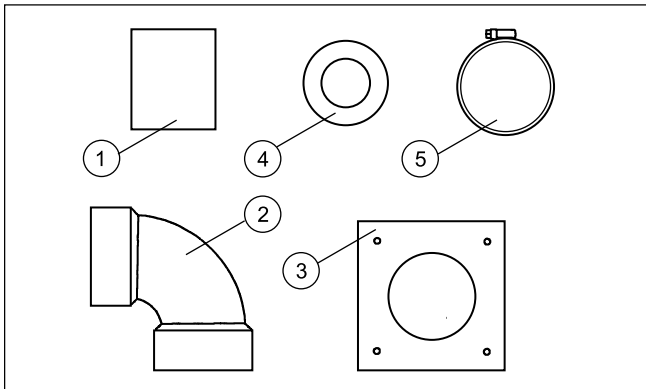


Figure 2. Contents of shipping package.

1. Exhaust terminal
2. Intake terminal
3. Backing plates (4)
4. Hubless coupling reducer
5. Hubless couplings (2)

- a. Remove all packing and tie-down materials.
- b. Check contents of the carton against items shown above.

1.4 Locating the CB Boiler

The appliance should be located in an area where leakage of any connections will not result in damage to the area adjacent to the appliance or to lower floors of the structure.

When such a location is not available, it is recommended that a suitable drain pan, adequately drained, be installed under the appliance.

The unit is design certified by CSA for installation on combustion flooring; in basements; in closets, utility rooms or alcoves. It must not be installed on carpeting.

The location for the unit should be chosen with regard to the vent pipe lengths, external plumbing, ventilation of operating components and accessibility for service and cleaning.

The unit shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during operation and service (circulator replacement, control replacement, etc.).

If there is potential for snow accumulation in your area, both vent terminals should be installed at an appropriate level above grade.

The following dimensions and requirements should be met when choosing the locations for the unit:

- a. Minimum clearance from combustible materials to meet CSA requirements.
- b. Recommended clearance for accessibility and venting.

Surface	Clearance from Combustible Material		Service Access Clearance	
	U.S. / Canada	U.S.	U.S.	Canada
Left Side	1" 2.5cm	6" 15 cm	24" 61cm	
Right Side	1" 2.5cm	12" 30 cm	24" 61cm	
Top	1" 2.5cm	14" 36 cm	24" 61cm	
Back	1" 2.5cm	9" 23 cm	24" 61cm	
Front	1" 2.5cm	24" 61 cm	24" 61cm	
Vent	0"			

Table 1. Clearances.

* **NOTE:** Roof terminations for air intake terminal must prevent entry of rain water.

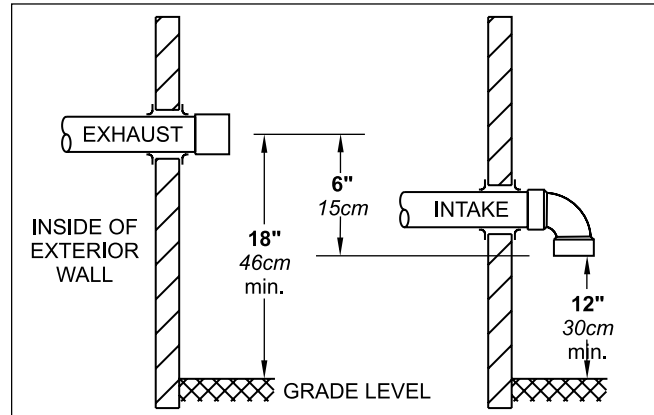


Figure 3. Suggested vent terminal installations.

1.5 Locating Unit for Correct Vent Distance from Outside Wall or Roof Termination

The forced draft combustion blower in the 9600 CB boiler has sufficient power to vent properly when the following guidelines are followed.

Intake	Exhaust
Maximum run:	Maximum run:
3" pipe size	3" pipe size
55 equivalent feet	55 equivalent feet
4" pipe size	4" pipe size
105 equivalent feet	105 equivalent feet
85 ft. for Model 250	85 ft. for Model 250
Minimum run:	Minimum run:
11 equivalent feet	21½ equivalent feet
Intake Terminal is P/N 2400-102.	Exhaust Terminal is P/N 2400-104.

Equivalent feet is determined by adding 10 linear feet for each 90° elbow and 5 linear feet for each 45° elbow to be installed to the actual linear feet of pipe required.

Example: 8' of pipe, 2 x 45° elbows and a 90° elbow.

Equivalent Feet: 8' + (2 x 5') + (1 x 10') = 28.

If a 4" pipe size is used to permit longer vent runs the installer must supply 4" hubless couplings (2) and 3 x 4 bushings (2) to adapt to the unit fittings. The supplied vent terminals may be used with 3" diameter pipes through the outside wall. Reducing couplings

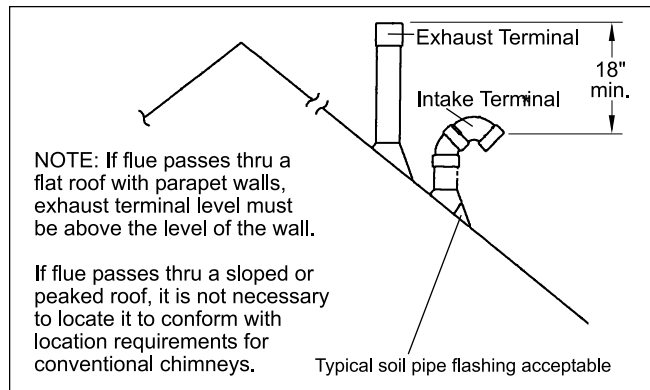


Figure 4. Alternate vent terminal installations.

should be located inside the outside wall to increase to the 4" pipe size. A reducing coupling and 1' of 3" pipe must be considered as 5 equivalent feet.

NOTE: It is required that a minimum separation of 18" be maintained between the intake and exhaust terminals and that both terminals be installed on the same wall of the building. The intake terminal must not be installed above the exhaust terminal since this would tend to pull exhaust gases back into the intake.

1.6 Locating Vent Openings on Outside Wall

1.6.1 Exhaust Terminal Location

The appropriate Laars side wall vent terminal is included with the appliance. The terminal must be located in accordance with ANSI Z223.1/NFPA 54 and applicable local codes. In Canada, the installation must be in accordance with CSA B149.1 or .2 and local applicable codes. Consider the following when installing the terminal:

1. The exhaust terminal fitting requires a 4" (10cm) diameter hole through the outside wall. The center line of this opening must be at least 18" (46cm) above grade and at least 12" (3' in Canada) from any other building opening such as doors, windows, etc. Figure 5A shows the requirements for direct vent terminal clearances for the U.S. and Canada.
2. Vent terminals for condensing appliances or appliances with condensing vents are not permitted to terminate above a public walkway, or over an area where condensate or vapor could create a nuisance or hazard.
3. Locate the vent terminal so that vent gases cannot be drawn into air conditioning system inlets.
4. Locate the vent terminal so that vent gases cannot enter the building through doors, windows, gravity inlets or other openings. Whenever possible, locations under windows or near doors should be avoided.
5. Locate the vent terminal so that it cannot be

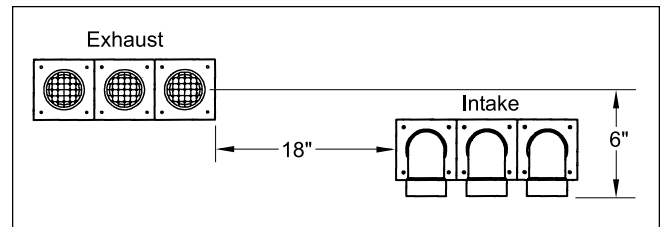


Figure 5. Multiple units minimum vent terminal separation.

blocked by snow. The installer may determine that a vent must be higher than the minimum shown in the codes, depending upon local conditions.

6. Locate the terminal so the vent exhaust does not settle on building surfaces or other nearby objects. Vent products may damage such surfaces or objects.
7. Minimum clearance of 4 feet (1.22m) horizontally from and in no case above or below, unless a 4-foot (1.22m) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

Important Note: Massachusetts Code Requirement. For Sidewall Vented Appliances with Vent Terminals Located Less Than 4 Feet above grade:

1. Massachusetts Code requires that a CO Detector and Alarm, listed by an approved third party inspection agency to ANSI/UL 2034 and complying with NFPA 720 (2005 Edition) be installed on each floor level in which there are bedroom(s), if there is not one already present. The location shall be in the living space outside the bedroom(s).
2. An additional CO Detector and Alarm, as indicated above, shall be located in the room that houses the appliance and shall be powered by the same electrical supply as the appliance such that one service switch serves both the appliance and the CO detector. The CO detector shall have a battery backup.
3. The vent terminal and if applicable the air intake terminal shall be the approved Laars terminals. A copy of this manual shall remain with the appliance at the completion of the installation.
4. The plate "Gas Vent Directly Below" provided with the vent terminal shall be mounted at the exterior of the building, four feet directly above the location of the vent terminal.

For Sidewall Vented Appliances with Vent Terminal Located More Than 4 Feet above grade:

Items 1, 2 and 3 above shall apply. Follow the Installation Instructions provided with the CO Detectors when installing them. For issues with the CO Detectors, contact the installing contractor.

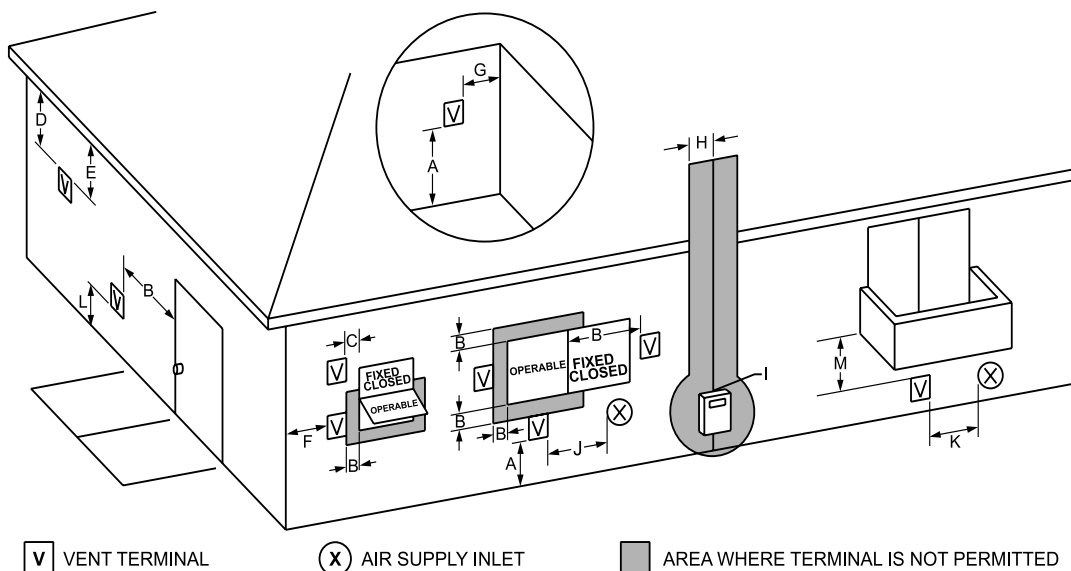
1.6.2 Intake Terminal Location

The intake terminal requires a separate 4" (10cm) diameter hole to install the the intake fitting.

	U.S. Installations (see note 1)	Canadian Installations (see note 2)
A= Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B= Clearance to window or door that may be opened	12 inches (30 cm)	36 inches (91 cm)
C= Clearance to permanently closed window	See note 4	See note 5
D= Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61cm) from the center line of the terminal	See note 4	See note 5
E= Clearance to unventilated soffit	See note 4	See note 5
F= Clearance to outside corner	See note 4	See note 5
G= Clearance to inside corner	See note 4	See note 5
H= Clearance to each side of center line extended above meter/regulator assembly	See note 4	3 feet (91 cm) within a height 15 feet above the meter/regulator assembly
I= Clearance to service regulator vent outlet	See note 4	3 feet (91 cm)
J= Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	12 inches (30 cm)	36 inches (91 cm)
K= Clearance to a mechanical air supply inlet	3 feet (91 cm) above if within 10 feet (3 m) horizontally	6 feet (1.83 m)
L= Clearance above paved sidewalk or paved driveway located on public property	Vent termination not allowed in this location for category IV appliances.	Vent termination not allowed in this location for Category IV appliances.
M= Clearance under veranda, porch, deck, or balcony	See note 4	12 inches (30 cm) (see note 3)

Notes:

1. In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code.
2. In accordance with the current CAN/CGA-B149 Installation Codes.
3. Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
4. For clearances not specified in ANSI Z223.1 / NFPA 54, clearance is in accordance with local installation codes and the requirements of the gas supplier.
5. For clearances not specified in CAN/CGA-B149, clearance is in accordance with local installation codes and the requirements of the gas supplier.

**Figure 5A. Vent terminal clearances.**

Copper tube or pipe size	Maximum allowable tubing length	Amount deducted for each 90° elbow	Amount deducted for each 45° elbow
1¼"	40'	2'	1½'
1½"	120'	2'	1½'
2"	270'	2'	1½'

Table 2. Water Pipe and Tube Sizing.

The center line of the hole should be at least 16" (24cm) above grade outdoors. The inlet opening of the intake fitting must be 6" (15cm) below the center line for the exhaust vent, and 18" (27cm) away from the exhaust vent outlet. The intake fitting should never be located above the exhaust vent terminal. Refer to Figures 3, 4, and 5 for acceptable configurations.

1.7 Locating Unit for Proper Vent Height

The vent locations you select must permit direct pipe runs to the terminal from the boiler. Since the CB boiler is designed to drain any water that collects in the vent, it is important that you do not build any traps or low points into the vent where water could collect and restrict the vent. It is recommended that 1/4 inch per foot of vent be built into the vent system to direct any water in the vent back toward the boiler. Note that standard DWV elbows have a built in allowance for the required 1/4 per foot pitch.

1.8 Locating Unit with Respect to Ventilation

While the CB boiler requires no indoor air for combustion, adequate airflow around the unit must be provided for proper cooling of electrical components.

Locating unit with respect to the return/supply header. For the best results the CB boiler should be located within 10 feet of the supply and return headers.

If the unit must be installed with longer piping runs, then the larger diameter tubing must be used. Table 1 is used to calculate the necessary pipe size for your installation.

1.9 Installing Vent Piping Terminal

The boiler is provided with intake and exhaust terminals for use with 3" diameter plastic pipe.

The installer is responsible for obtaining the vent pipe and fittings. The maximum combined length of the intake and exhaust pipe and maximum number of elbows are determined by using the guidelines on Page 4.

The following steps are recommended for vent installation:

- Obtain the necessary 3" or 4" diameter plastic piping and fittings as determined beforehand.
- Position unit at previously selected location.
- Unpack vent terminals and vent terminal backing plates located beneath lower front panel.

Length of Pipe	Capacity of Pipe in MBTU/HR (.6 Specific Gravity)		
	¾"	1"	1¼"
10'	278	520	1,050
20'	190	350	730
30'	152	285	590
40'	130	245	500
50'	115	215	440
75'	93	175	360
100'	79	150	305
150'	64	120	250
Additional length to be added for each tee or bend	1.7'	2.2'	2.7'

Table 3. Gas Supply Piping.

- Cut holes in outside wall for vent terminals in previously selected locations.
- Mount the vent terminals backing plates.
- Fit all of the vent pipes together without cementing. Make sure that there are no water traps and that any pitch is inclined back towards the boiler.
- Make sure that the flexible vent connections at the unit fit properly.
- Begin cementing the intake and exhaust pipes, start at the vent terminals and work back towards the appliance. Note that the intake terminal is a 90 degree elbow fitting that is designed to face down.
- Support both horizontal vent pipes with pipe hangers every 5'. Weight of venting must not be supported by unit connectors.
- Tighten the flexible couplings to connect the boiler to the vent.

Heating System Piping. Note: This unit must be installed in a closed pressure system with a minimum of 10 psi static pressure.

1.10 Connecting Gas to the CB Boiler

- The boiler requires gas at an inlet gas pressure of at least 4" WC and no greater than 13" WC. Check with your local gas utility or supplier for availability of these delivery pressures.
- Referring to Table 2, size supply piping to keep flow capacity to the unit above 250 cubic feet per hour (CFH) per unit installed.
- Run gas supply line in accordance with all applicable codes.
- Locate and install manual shutoff valves in accordance with state and local requirements.
- Install drip leg and ground joint union (Figure 4).
- All threaded joints should be coated with piping

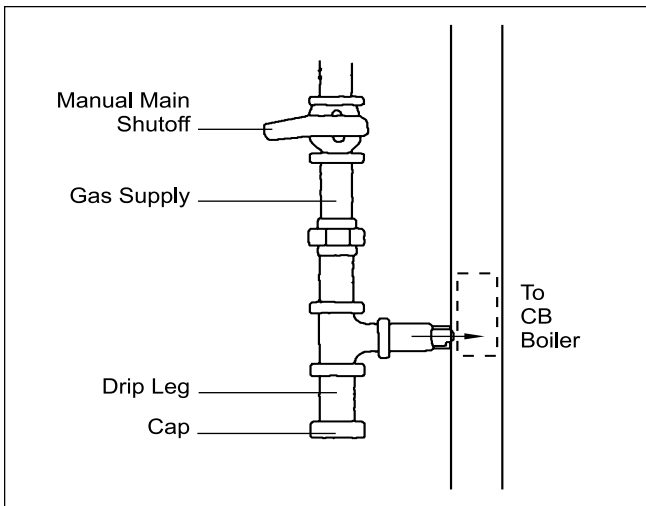


Figure 6. Gas supply piping.

- compound resistant to action of liquefied petroleum gas.
- g. The CB unit and its individual shutoff valve must be disconnected from the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 psig (3.45kpa). It must be isolated from the gas supply system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG (3.45kpa).
 - h. The CB boiler and its gas connection must be leak tested before placing the unit in operation.
 - i. Purge all air from gas lines

⚠ Caution

Do not use open flame to check for leaks.

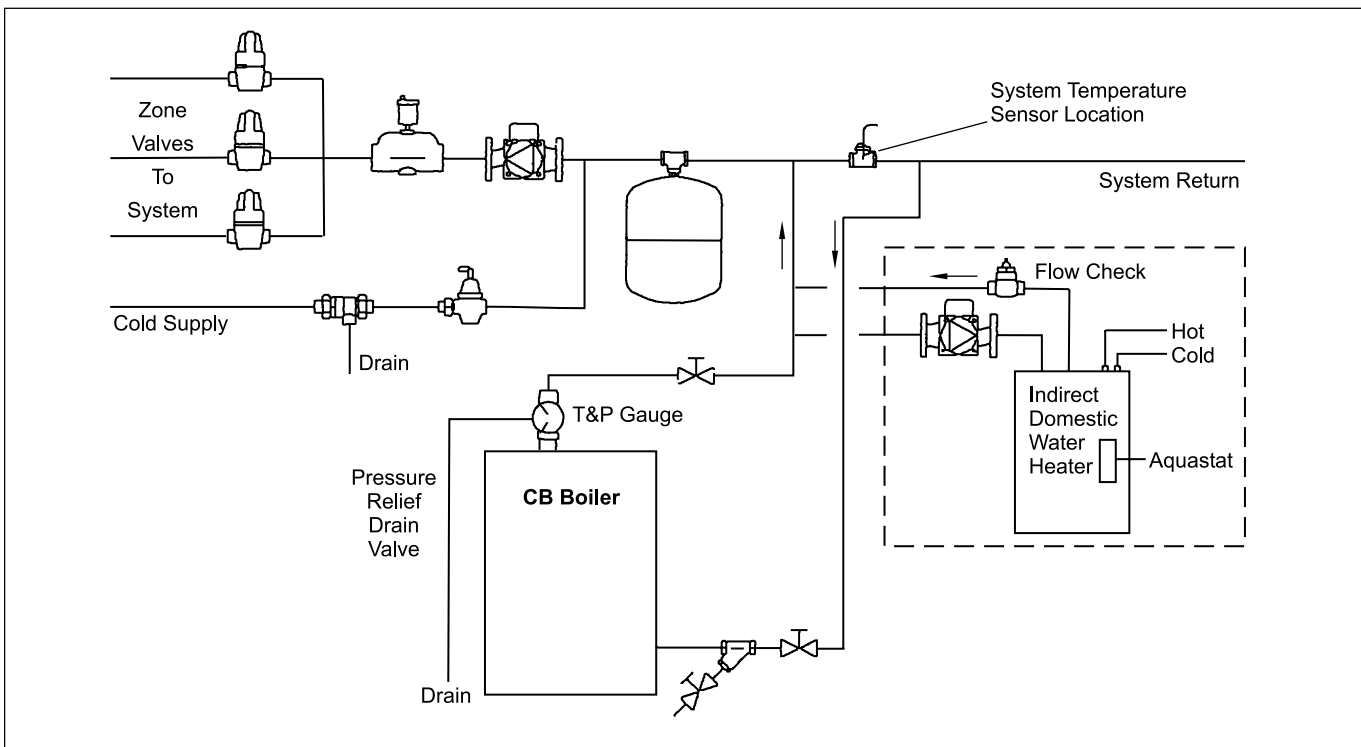


Figure 7. Piping for heating and optional domestic water.

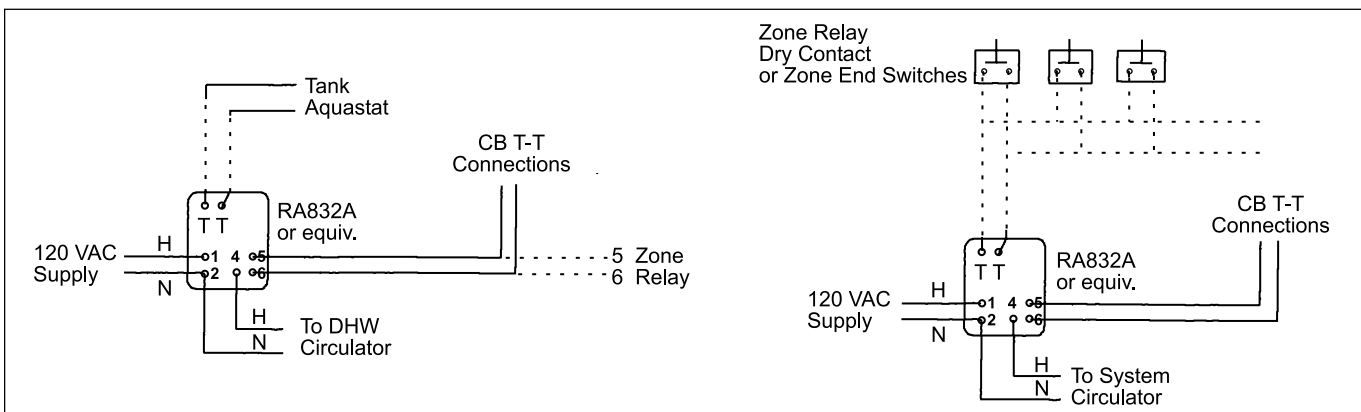


Figure 8. Wiring diagrams.

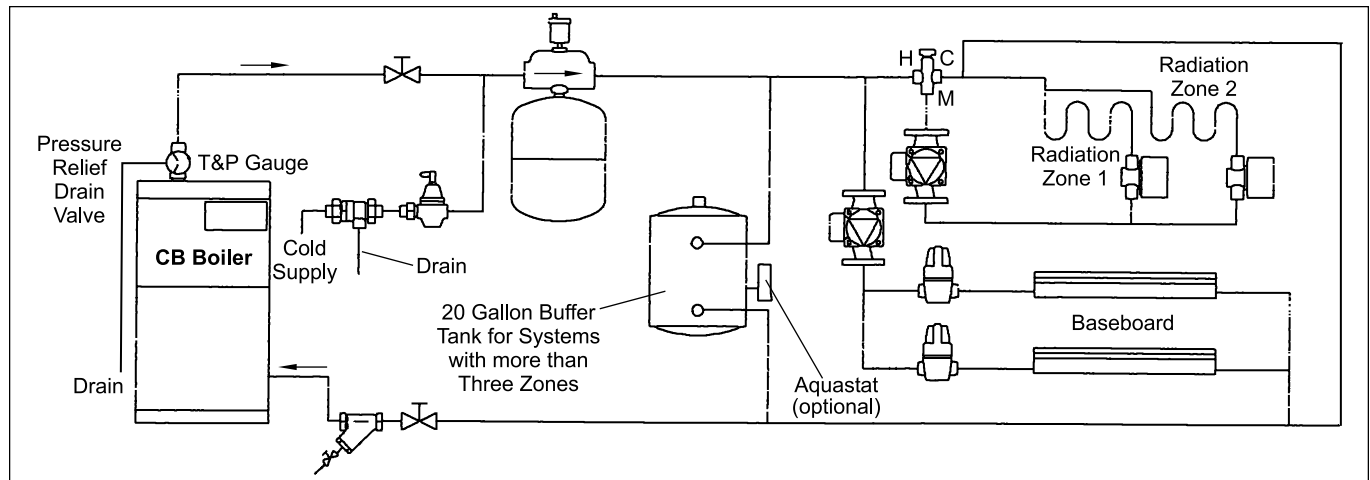


Figure 9. Radiant and baseboard heat with more than three zones.

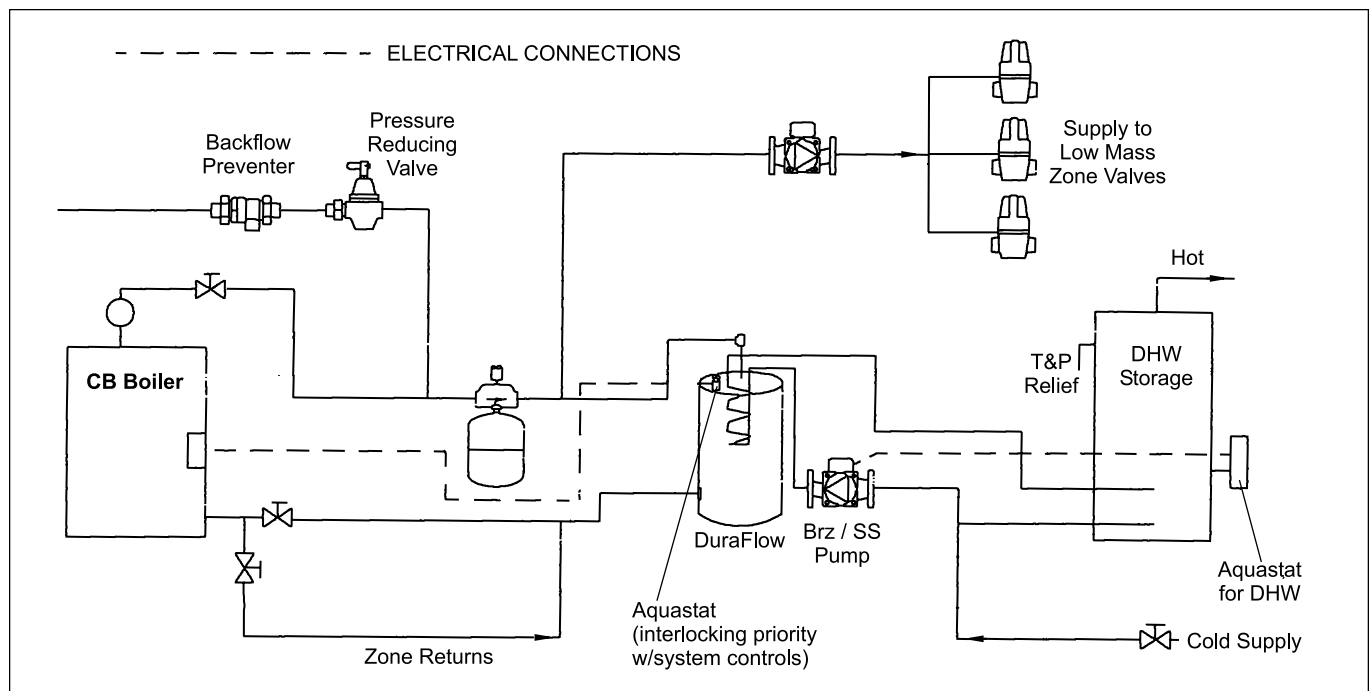


Figure 10. Indirect tank as buffer with potable water storage tank.

1.11 Heating System Piping Hot Supply Connections

THE CB MUST BE CONNECTED IN A PRIMARY/SECONDARY TYPE SYSTEM OR WITH A FULL SIZED BYPASS.

- Connect the 1¼" supply connection on the unit to the system bypass. Size the combined length of supply and return to the loop using Table 2.
- Pipe the discharge of the relief valve, full size, to a drain or in a manner to prevent injury in the event of pressure relief.
- Install an air purger, an air vent, a diaphragm type expansion tank, and a hydronic flow check in the system supply loop. Minimum fill pressure must be 12psig.
- Install shutoff valves where required.
- A hot water boiler installed above radiation level or as required by the Authority having jurisdiction, must be provided with a low water cutoff device either as a part of the boiler or at the time of boiler installation.
- The boiler when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler with appropriate valves to prevent the chilled medium from entering the boiler.
- The boiler piping system of a hot water boiler connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler during the cooling cycle.

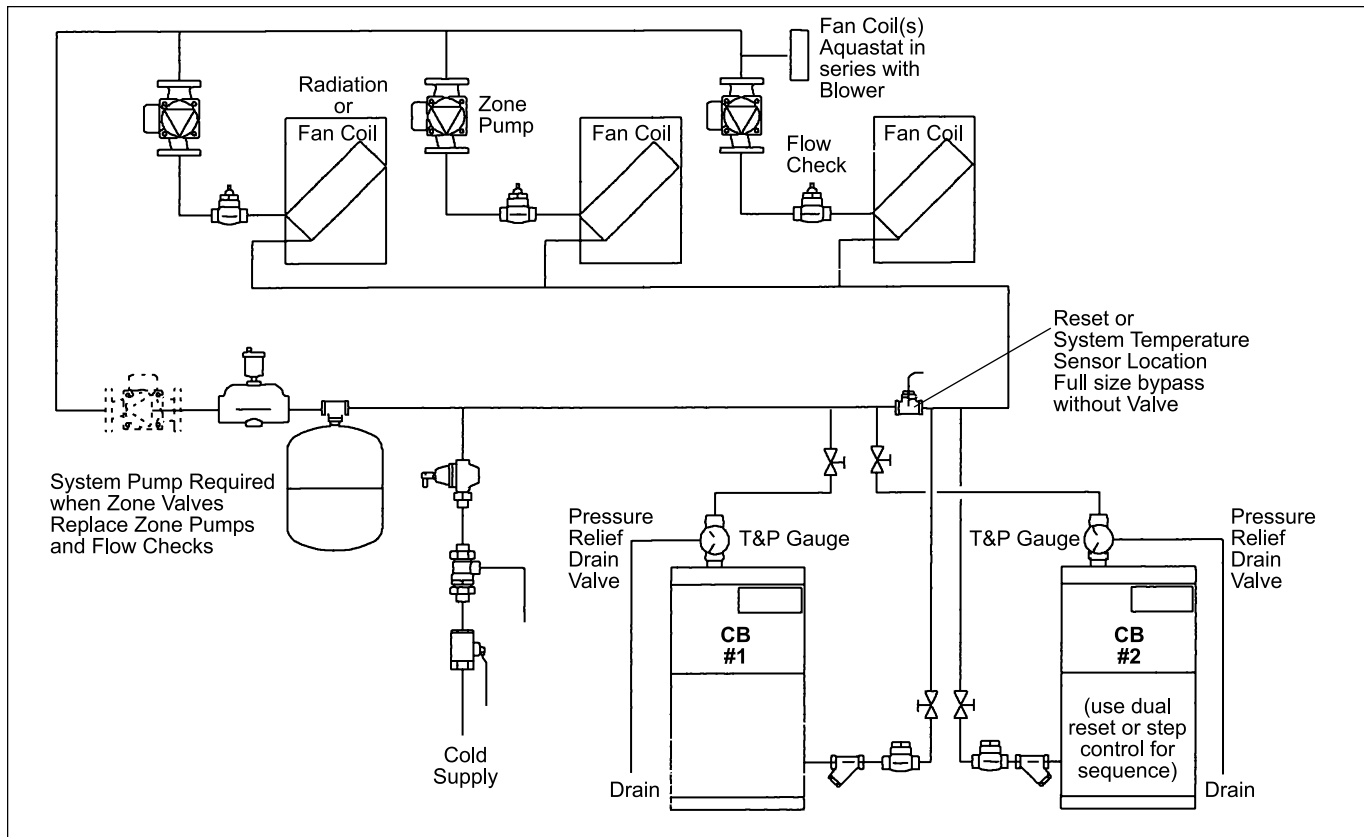


Figure 11. Piping diagram for modular units and/or hydro air systems.

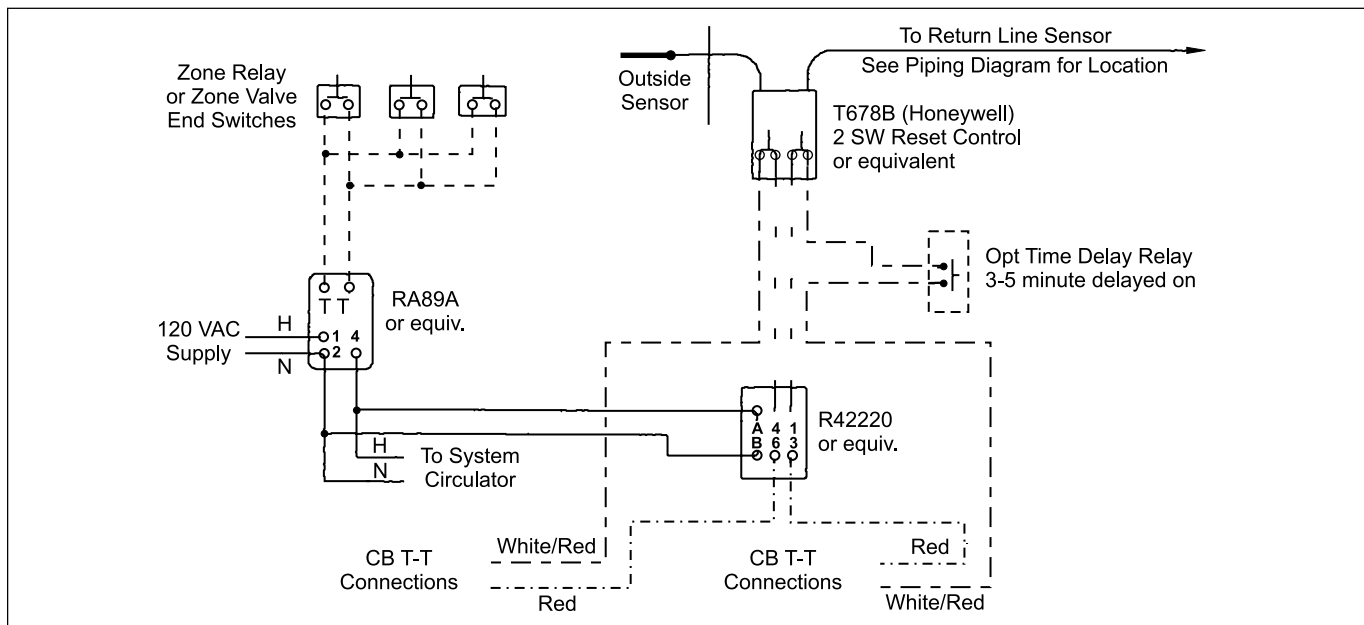


Figure 12. Wiring diagram.

1.12 Return Connections

- Install a strainer between CB and system.
- Connect the 1¼" return connection on the unit to the return side of the system circulating loop.
- Install a check valve (multiple units only), a shutoff valve and a drain valve near the unit in the return line.

- Install a properly sized circulator in the system loop.

1.13 Cold Water Make-Up

- Connect the cold water supply to the inlet connection of an automatic fill valve.
- Install a suitable back flow preventer between the

automatic fill valve and the cold water supply.

- c. Install shut off valves where required.

NOTE: The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler with appropriate valves to prevent the chilled medium from entering the boiler.

The boiler piping system of a hot water heating boiler connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

The boiler when installed above the radiation level must be provided with a low water cutoff device at the time of boiler installation.

1.14 Condensate Drain Connection

NOTE: Connecting tubing must run DOWNWARDS from the level of the fitting (see Figure 11).

- a. Black plastic tube between the fitting and the floor drain or optional condensate pump (P/N A2110100) if a floor drain is not accessible.
- b. Above the fitting is a hole in the cabinet. Behind this hole is a 1/2" OD tube which serves as a condensate relief if the lower drain becomes blocked.
- c. Run this condensate relief tube through hole in cabinet and to a drain pan. DO NOT pipe in common with Condensate drain fitted in Step 1 above.

1.15 Electrical Connections

All electrical wiring must conform to local codes and/or:

- a. the National Electrical Code ANSI/NFPA No. 70-Latest Edition or

- b. the CSA standard C22.1 "Canadian Electrical Code Part - 1".

Single pole switches, including those of safety controls and protective devices must not be wired in a grounded line.

All electrical connections are made in the field wiring box which is located on the left side of the unit.

NOTE: All internal electrical components have been prewired. No attempt should be made to connect electrical wires to any other location except the wiring box designated above.

Wiring connections are indicated on the following wiring diagram (see Figure 14).

1.16 Main Power

Connect a 15 amp. fused, 120-volt supply to the main power switch (hot leg is connected directly to switch). Neutral leg is connected directly to the white wire. Ground wire can be connected to the grounding screw in the box or on the switch.

1.17 Temperature Control

NOTE: Connect boiler T-T wires to isolated contacts on zone valves, circulating relays, sequencing controls (multiple unit applications) or other temperature controlled devices. **DO NOT JUMPER.** If connected to a room thermostat set heat anticipator at 0.9 amps.

1.18 Start Up - Filling the System

- a. Open all supply valves and return valves.
- b. Fill CB boiler and the system completely.
- c. Set thermostat to call for heat, turn on power at main switch for 30 seconds, then turn off.
- d. After system is fully purged, the CB boiler is ready for firing.

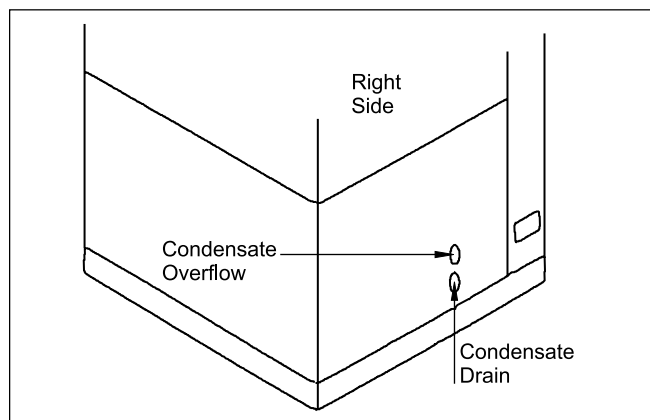


Figure 13. Condensate drain tube outlet.

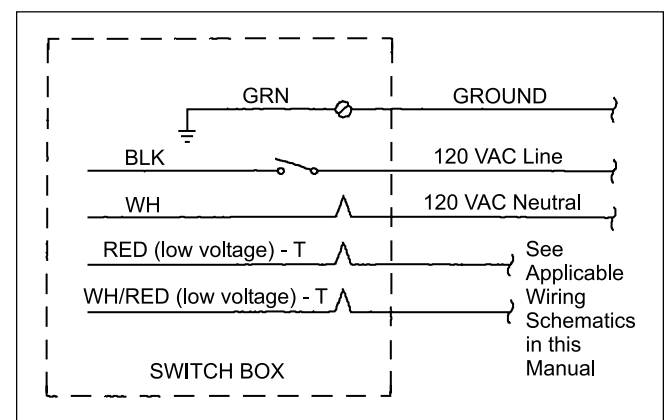


Figure 14. Electrical connections.

1.19 Operating Checklist (also see page 19)

- a. Be sure that system has been filled properly (see above) and is leak tight.
- b. Open gas cock(s) and open manual gas shutoff valve by turning to “on” position (see Figure 15).
- c. Turn on main switch, set thermostat to call for heat.
- d. Blower should come on (blower will come on immediately if system has no zone valves).
- e. **NOTE: Burner** may not ignite on first attempt because of air contained in gas lines. In this case blower will stop after 4 minutes. Should this happen, turn off main switch. Wait five minutes and turn on switch again.
- f. After placing the boiler in operation, the burner safety shutoff device must be tested. To test, disconnect ignitor plug at ignitor. Attempt to start appliance. After the burner control has completed three complete cycles the gas valve must not open again and the VALVE / FLAME light on the burner control must flash. Failure to operate in this manner must be corrected by a qualified service contractor or gas company.

Caution

Should any pronounced odor of gas be detected or if the gas burner does not appear to be functioning in a normal manner, close main shut off valve and contact your heating contractor, gas company or factory representative.

- g. Check burner input (natural gas). Unit should be in operation for 5 minutes before checking input and all other appliances served by the gas meter should be shut off. Determine the time required for meter to deliver one cubic foot (CF) and compare to Table 4.

*Most propane installations do not have a gas meter. If CO₂ or O₂ is adjusted, input will be correct.

- h. If the input rate is in this range proceed to 9. Due to the effects of altitude and other minor variations, it is possible the input will not fall within this range and the gas orifice should be replaced.

Changing Gas Orifice:

A CB tune-up kit is available from your supplier. It contains a larger (marked +) and smaller orifice (marked -). If the firing rate is low, install the larger (+) diameter orifice. Shut off electricity and gas to the unit. Loosen the gas orifice union (Figure 16) and move the lower half of the union far enough to the side to

Model Number	Input/Rate (BTU/HR)	Elapsed Time/CF (Sec) (Based on 1000 BTU/CF Gas)
CB 150	150,000/147,000 to 153,000	23.5 to 24.5
CB 175	175,000/171,500 to 178,500	20.2 to 21.0
CB 200	199,900/195,900 to 203,900	17.7 to 18.4
CB 250	250,000/245,000 to 255,000	14.1 to 14.7

Table 4. Input Rate.

remove the orifice. Change orifice. Reassemble, turn on gas and power and recheck the burner input.

- i. It is recommended that the unit be checked with a standard CO₂ or oxygen tester. Insert tester probe into the test port provided at the front of the boiler in the exhaust vent pipe. Readings should be:

CO₂ - 8% to 8.75% (natural gas)

O₂ - 6.9% to 5.5%

CO₂ - 9.25% to 9.75% (propane gas)

NOTE: This is a sealed combustion unit with the air orifice and gas valve factory set. They must not be altered or adjusted. If the firing rate cannot be obtained with the orifices supplied or if CO₂ or O₂ readings do not fall within the above ranges, contact the factory.

- j. Using the temperature and pressure gauge, check the unit outlet temperature after three to four minutes of operation. Minimum operating temperature is 160° F.

*If the unit will not stay on this long, open all zone valves.

k. Shutdown Instructions:

Turn off all Electrical power to the unit at reset switch.

Turn gas cock dial to “off” position.

1.20 Anti-Freeze and Corrosion Protection

Proper precautions for freeze protection are recommended for boiler installations in areas where the danger of freezing exists.

Power outage, interruption of gas supply, failure of system components, activation of safety devices, etc., may prevent a boiler from firing. **Any time a boiler is subjected to freezing conditions, and the boiler is not able to fire, and/or the water is not able to circulate, there is a risk of freezing in the boiler or in the pipes in the system.** When water freezes, it expands. This can result in bursting of pipes in the system, or damage to the boiler, which could result in leaking or flooding conditions.

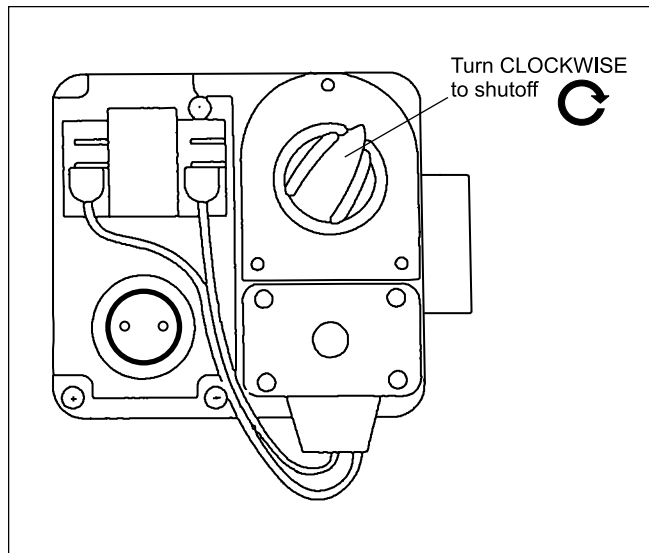


Figure 15. Manual gas shutoff.

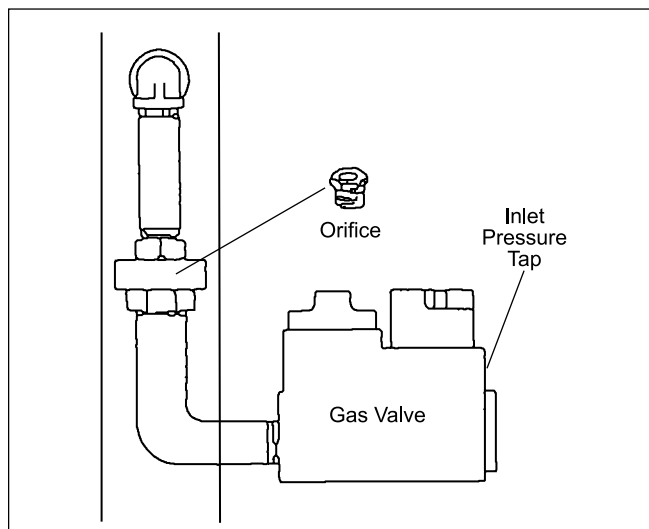


Figure 16. Gas orifice union.

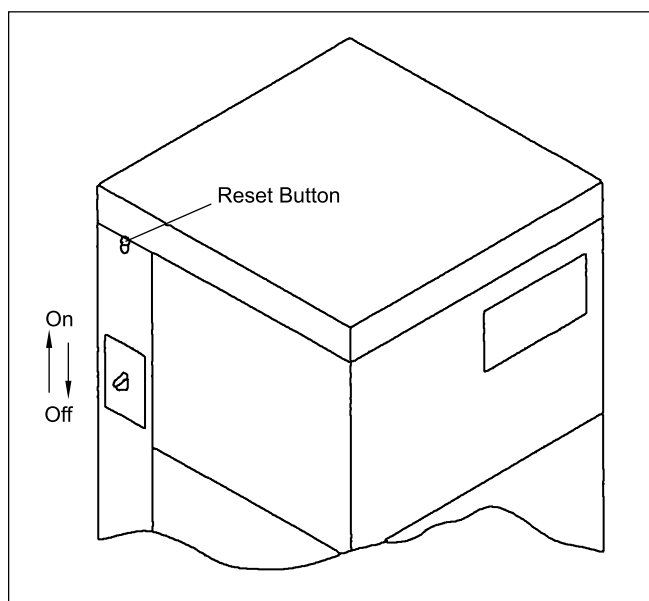


Figure 17. Switch location.

Do not use automotive anti-freeze. Maintaining a mixture of minimum 65% water and maximum 35% properly inhibited HVAC glycol, which contains an antifoamant, is the preferred method of freeze protection for CB boilers. **Percentage of glycol used in the CB boiler must not exceed 35%.** Typically, this mixture will serve as burst protection for temperatures down to approximately -35°F (-30°C).

IMPORTANT NOTES: Different glycol products may provide varying degrees of protection. Glycol products must be maintained properly in a heating system, or they may become ineffective. Consult the glycol specifications, or the glycol manufacturer, for information about specific products, maintenance of solutions, and set up according to your particular conditions.

CB boilers must not be directly connected to a heating system utilizing oxygen permeable tubing, (see warranty). Provide a water-to-water heat exchanger between systems to prevent corrosion of tank or other components.

1.21 Common Vent Test

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

- Seal any unused openings in the common venting system.
- Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which would cause an unsafe condition.
- Insofar as practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
- Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

- f. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to the previous conditions of use.
 - g. Any improper operations of the common venting system should be corrected so the installation conforms with 1). the National Fuel Gas Code, ANSI Z223.1-latest edition or 2). CSA B149.1. When re-sizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in 1). Appendix G in the National Fuel Gas Code, ANSI Z223.1-latest edition or 2). CSA B149.1.
- indiquée ci-dessus, que chaque appareil raccordé au système d'évacuation est mis à l'air libre de façon adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.
- g. Tout mauvais fonctionnement du système d'évacuation commun devrait être corrigé de façon que l'installation soit conforme au *National Fuel Gas Code, ANSI Z223.1/NFPA 54* et (ou) aux codes d'installation *CSA B149.1*. Si la grosseur d'une section du système devrait être modifiée pour respecter les valeurs minimales des tableaux pertinents de l'appendice F du *National Fuel Gas Code, ANSI Z223.1/NFPA 54* et (ou) des codes d'installation *CSA B149.1*.

1.21 Common Vent Test

Au moment du retrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours raccordé au système d'évacuation commun et qui fonctionne alors que d'autres appareils toujours raccordés au système d'évacuation ne fonctionnent pas:

- a. Sceller toutes les ouvertures non utilisées du système d'évacuation.
- b. Inspecter de façon visuelle le système d'évacuation pour déterminer la grosseur et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement, de fuite, de corrosion et autres défaillances qui pourraient présenter des risques.
- c. Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace, où les appareils toujours raccordés et les autres espaces du bâtiment. Mettre en marche les sècheuses, tous les appareils non raccordés au système d'évacuation commun et tous les ventilateurs d'extraction comme les hottes de cuisinière et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.
- d. Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon continue.
- e. Faire fonctionner le brûleur principal pendant 5 min ensuite déterminer si le coupe-tirage déborde à l'ouverture de décharge. Utiliser la flamme d'une allumette ou d'une chandelle ou la fumée d'une cigarette, d'une cigare ou d'une pipe.
- f. Une fois qu'il a été déterminé, selon la méthode

SECTION 2. Maintenance

2.1 Owner Care and Maintenance

NOTE: Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been immersed.

- a. Inspect venting system-annually inspect the outside vent terminal fittings to make sure that they are free of obstructions. Clean if necessary. Ensure all vent-air intake parts are reassembled and resealed properly.
- b. Inspect the condensate drainage system-this can be done by removing the screws that secure the bottom panel to the unit. There should be no signs of water leakage from any of the visible fittings or hose.
- c. The pressure relief valve should be operated manually at least once a year. To do this place a suitable container under the relief valve drain pipe. The discharge from this valve will be at high pressure. Make sure that overspray of hot water will not cause damage or bodily harm. Use the relief valve handle to discharge water into the container.

Keep appliance area clear and free from combustible materials, gasoline and other flammable vapors and liquids.

NOTE: There are no moving parts requiring any lubrication in this unit.

Keep appliance area clear and free of items that could obstruct ventilation air around the boiler.

2.2 Service Maintenance

To be done by a qualified service person.

- Vent and Condensate drain inspection (performed annually). Clean or replace if necessary.
- Inspect the vent terminals for blockage or restrictions.
- Check the condition of the internal vent fittings and hose and replace as necessary.
- Check the condensate drain lines for blockage and optional condensate pump for proper operation.
- Cleaning combustion chamber coil and/or burner.

NOTE: In normal operation this procedure is never required. Should it prove necessary, the following procedure is used to access the coil for cleaning:

- Turn off the gas and electrical power to unit and remove covers to the unit.
- Remove plastic boiler exhaust assembly by undoing the four nuts that hold the plastic flange to the lower head. Disconnect one or more of the rubber vent couplings above the tee, and pull the elbow and tee out from under unit.
- Shut off water to the system and disconnect and remove the supply and return pipe.
- Separate the union on the economizer pipe and

remove the lower half of the union from the economizer outlet.

- Undo the four economizer retainer nuts (see Figure 18). Remove the boiler drain valve.
- Undo the four clamps that hold the outer shroud to the upper head (see Figure 18).
- Drop the economizer, inner shroud and outer shroud together by separating the upper head and outer shroud.

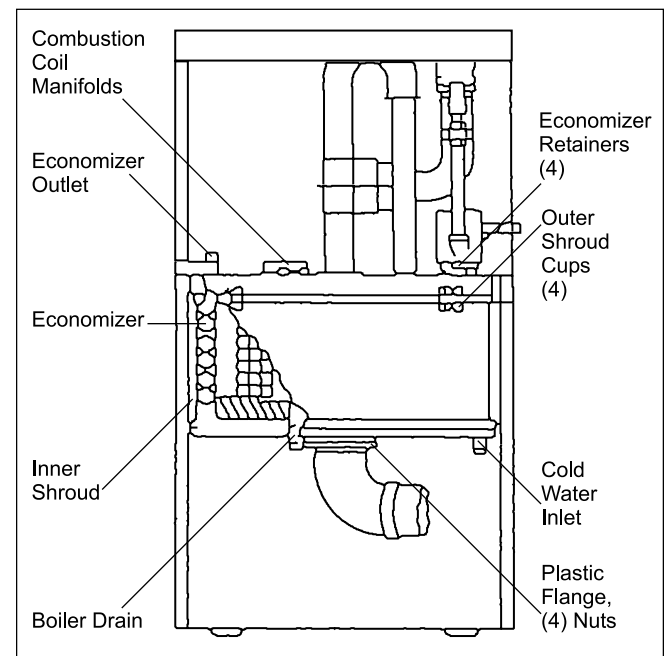


Figure 18. Cutaway view.

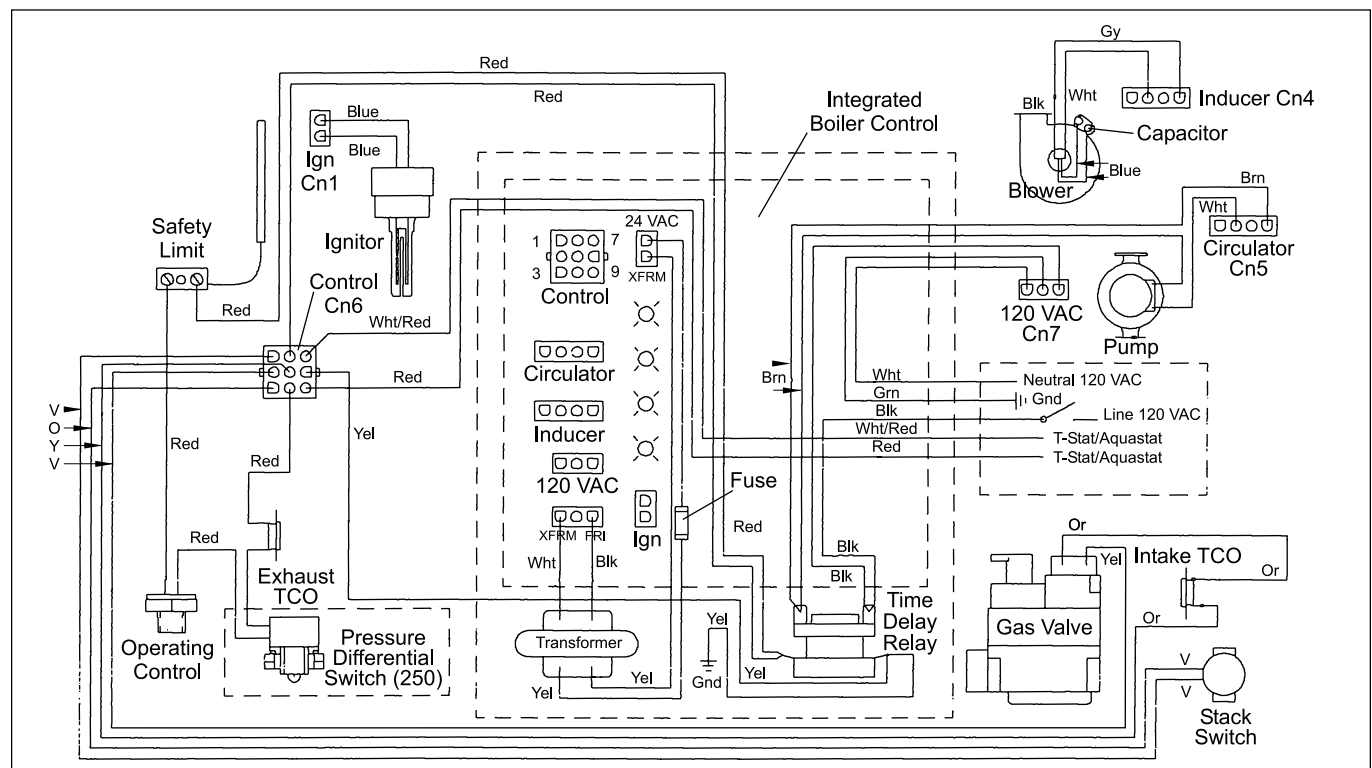


Figure 19. Wiring diagram.

- h. Clean combustion coil with a wire brush.
- i. Remove burner, inspect and clean, if necessary.
- j. Reassembly is done in reverse order.
- k. If a low water cutoff is installed, inspect it annually.

⚠ Caution

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after operation servicing.

⚠ Attention

Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. Les erreurs de câblage peuvent nuire au bon fonctionnement et être dangereuses.

S'assurer que l'appareil fonctionne adéquatement une fois l'entretien terminé.

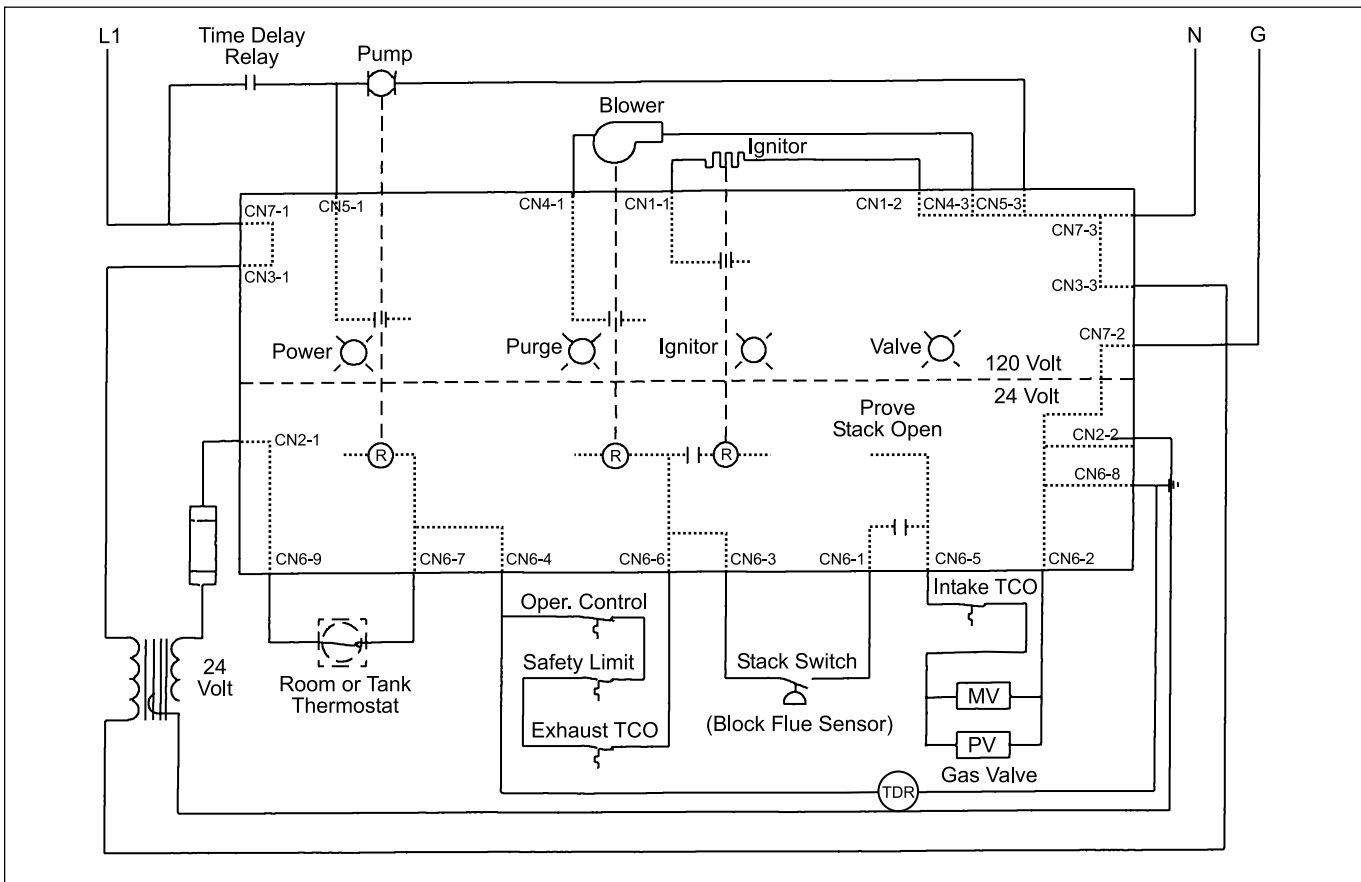


Figure 20. Ladder diagram.

NOTE: CB-M2-250 includes Differential Pressure Switch in series with Operating Control, Safety Limit and Exhaust TCO.

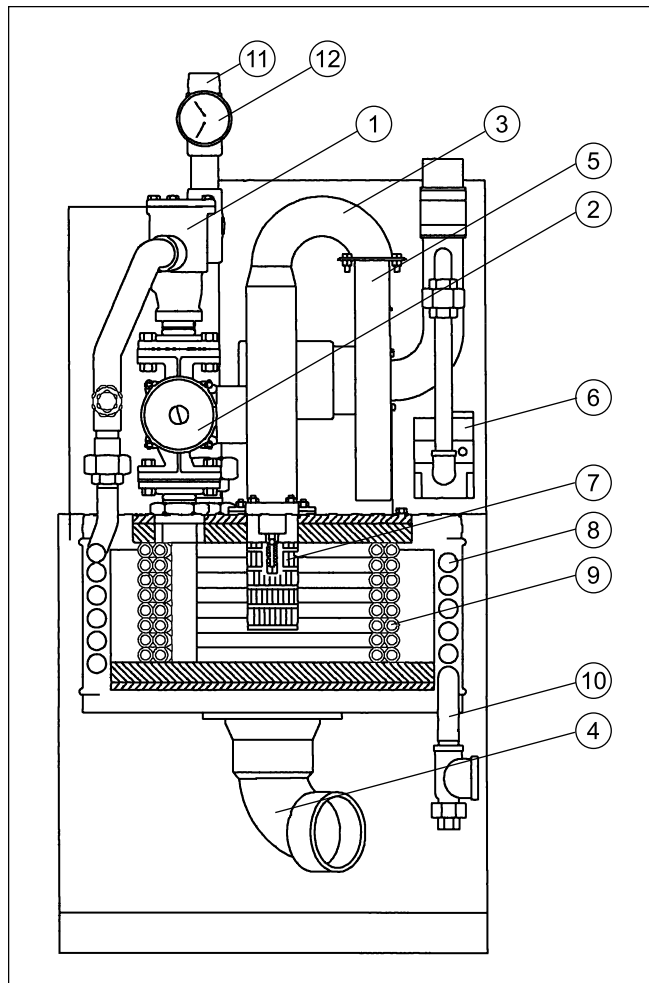


Figure 21. Assembly view of the unit.

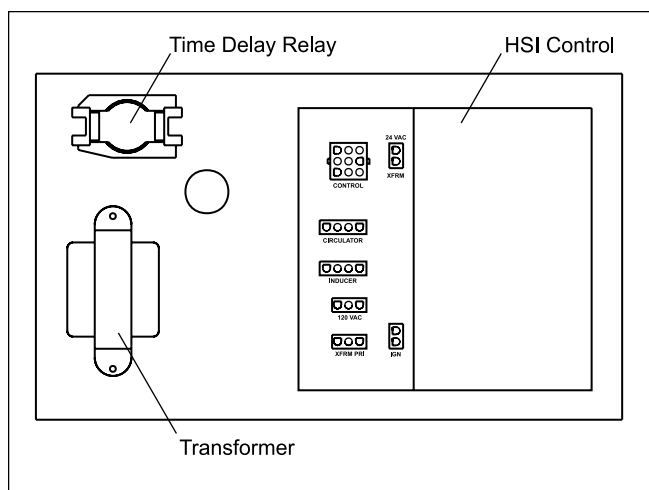


Figure 22. Control box.

SECTION 3. Replacement Parts List

Ref #	Part Number	Description
	2400-322	Gasket Kit
5	2400-079	Blower Assembly
5	2400-310	Blower Assembly (CB-250)
9	2400-284	Combustion Coil Assembly
7	2400-082	Flame Holder
7	2400-308	Flame Holder (CB-250)
	2400-286	Igniter
	2400-088	Capacitor, Motor Starter
	2400-224	Control Board
6	2400-014	Gas Valve, Neg. Pres.
6	2400-015	Gas Valve, Neg. Pres. (CB-250)
	2400-106	Pressure Diff. Switch (CB-250)
	2400-058	Intake / Exhaust TCO
	2400-056	Operating Limit
	2400-055	Safety Limit
	2400-062	Time Delay Relay
1	2400-130	Thermostat Kit (140°F)
	2400-006	Transformer
	2400-316	Pressure Relief Valve (50 psi)
	2400-096	Pressure Relief (125 psi)
	2400-097	Pressure Relief (125 psi, CB-250)
2	2400-386	Circulator (CB-150 to 200)
	2400-387	" w/diff. pres. switch (CB-250)
	2400-104	Exhaust Terminal
	2400-102	Intake Terminal
	2400-100	Wall Flange

Note: Reference page 14 for electrical components



FOR YOUR SAFETY READ BEFORE OPERATING

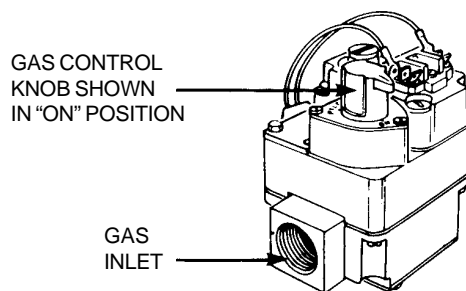
⚠ WARNING

If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.


- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS
 - Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which may have been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Make sure system has been properly filled with water and thoroughly bled of air; set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove control access panel
6. Push in gas control knob slightly and turn clockwise  to "OFF."
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas control knob counterclockwise  to "ON".
9. Replace control access panel.
10. Turn on all electric power to appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Turn in gas control knob slightly and turn clockwise  to "OFF". Do not force.
5. Replace control access panel.

1-490

Figure 23. Lighting and shutdown instructions.

PAR MESURE DE PRUDENCE, LISEZ CE QUI SUIT AVANT DE FAIRE FONCTIONNER L'APPAREIL

⚠ MISE EN GARDE

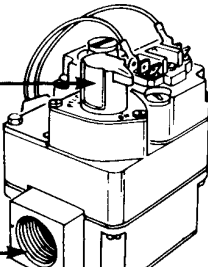
Si vous ne suivez pas ces instructions à la lettre, un incendie ou une explosion pourrait se produire et causer des dommages matériels, des blessures personnelles ou même la mort.

- A. Cet appareil n'est pas doté d'une veilleuse. Il est équipé d'un dispositif d'allumage qui allume automatiquement le brûleur. Ne tentez pas d'allumer le brûleur manuellement.
- B. AVANT D'UTILISER, vérifiez s'il n'y a pas d'odeur de gaz près de l'appareil. Vérifiez s'il n'y a pas d'odeur de gaz près du plancher, car le gaz est plus lourd que l'air et peut se déposer sur le plancher.
QUE FAIRE EN CAS D'ODEUR DE GAZ
 - N'essayez pas d'allumer n'importe quel appareil que ce soit.
 - Ne touchez pas à un commutateur électrique. N'utilisez pas le téléphone de votre résidence.
 - Appelez immédiatement votre fournisseur de gaz en utilisant le téléphone de votre voisin. Suivez les instructions de votre fournisseur de gaz.
- C. Si vous ne pouvez joindre votre fournisseur de gaz, appelez le service des incendies.
- C. Utilisez uniquement votre main pour pousser vers l'intérieur ou pour faire tourner la poignée de commande du gaz. N'utilisez jamais d'outils. Si vous n'arrivez pas à faire tourner la poignée à la main, n'essayez pas de la réparer. Communiquez avec un technicien compétent. Si vous utilisez de la force ou que vous tentez de réparer la poignée un incendie ou une explosion pourrait se produire.
- D. N'utilisez pas cet appareil si l'une des pièces a été plongée sous l'eau. Communiquez immédiatement avec un technicien de service qualifié afin qu'il inspecte l'appareil et remplace toute pièce du système de commande et toute commande de gaz qui aurait été plongée sous l'eau.

NOTICE D'UTILISATION

1. ARRÊTEZ ! Lisez l'information de sécurité ci-dessus, sur cette étiquette.
 2. Assurez-vous que le système a été convenablement rempli d'eau et que l'air a été purgé. Réglez le thermostat au réglage le plus bas.
 3. Coupez l'alimentation électrique à l'appareil.
 4. Cet appareil est doté d'un dispositif d'allumage qui allumera automatiquement le brûleur. Ne tentez pas d'allumer le brûleur manuellement.
 5. Retirez le tableau d'accès aux commandes.
- BOUTON DE
COMMANDE DE
GAZ ILLUSTRÉ EN
POSITION «ON»

ADMISSION
DU GAZ


6. Poussez la poignée de commande de gaz légèrement et tournez dans le sens des aiguilles d'une montre et mettez-la à «OFF».
 7. Attendez cinq (5) minutes afin que le gaz se dissipe. Vérifiez s'il n'y a pas d'odeur de gaz, y compris sur le plancher. Si vous croyez sentir une odeur de gaz, ARRÊTEZ ! Reportez-vous aux instructions B ci-dessus, sur cette étiquette. S'il n'y a pas d'odeur de gaz, passez à la prochaine étape.
 8. Faites tourner la poignée de commande de gaz dans le sens contraire des aiguilles d'une montre et mettez-la à «ON».
 9. Remplacez le tableau d'accès aux commandes.
 10. Rétablissez l'alimentation électrique à l'appareil.
 11. Réglez le thermostat à la température désirée.
 12. Si l'appareil ne fonctionne pas, suivez les directives relatives à la fermeture de l'alimentation en gaz et communiquez avec votre technicien de service ou le fournisseur de gaz.

FERMETURE DE L'ALIMENTATION EN GAZ

1. Réglez le thermostat au réglage le plus bas.
2. Coupez toute alimentation électrique à l'appareil si celui-ci doit faire l'objet d'un entretien.
3. Retirez le tableau d'accès aux commandes.
4. Tournez la poignée de commande légèrement vers l'intérieur et faites-la tourner dans le sens des aiguilles d'une montre, jusqu'à «OFF». N'utilisez pas de force.
5. Remplacez le tableau d'accès aux commandes.

Quick Reference Trouble Shooter

A. SHORT CYCLING:

1. CB - Boiler oversized for total load or small zone
2. CB - Units shuts down before reaching limit. Continuously restarts without resetting
 - a. Limit out of calibration
 - b. Wrong air/gas orifices for input or fuel (refer to 9600 gas orifice chart ONLY)
 - c. Thermostat heat anticipator set below 0.9 amps.

B. OVERHEATS QUICKLY OR KNOCKS DURING OPERATION:

Boiler noise in combustion chamber.

1. Air in combustion coil or in pump: Purge system
2. Pump failure or control failure.
3. Restriction in supply/return piping.
4. Defective mixing valve element.

C. DELAYED IGNITION:

Unit starts or stops with a "pop".

1. Wrong gas orifice for fuel or air orifice size.
2. LP - Gas regulator lock up 3" or greater above run pressure: correct regulator and check gas pipe sizing against piping chart in installation manual. Set regulator for maximum run pressure of 9".
3. Remove blower and inspect flame holder (burner) for hole.
4. Check that the blower flanges and gas piping are sealed.

D. OCCASIONAL LOCKOUTS:

Requires interruption of power to re-start or reset of safety limit.

1. Air in system causes safety limit to open. Vent air from system and find and eliminate source.
2. Condensing in primary heat exchanger or moisture in combustion chamber
 - a. defective element in diverting valve
 - b. improper installation of intake terminal
 - c. blocked condensate and condensate overflow system
3. Poor Combustion - check CO₂ or O₂.
4. Intermittent igniter failure: defective igniter gasket allows igniter base to overheat.
5. Occasional failure of blower: red "PURGE" light will be flashing.
6. Zone control short cycling or voltage problem: Operate thermostats in various sequences to create suspect problem: **Note:** Three wire zone valve such as Taco or Watts must have isolating relay between end switch and CB boiler.



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