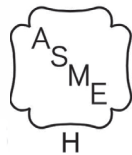
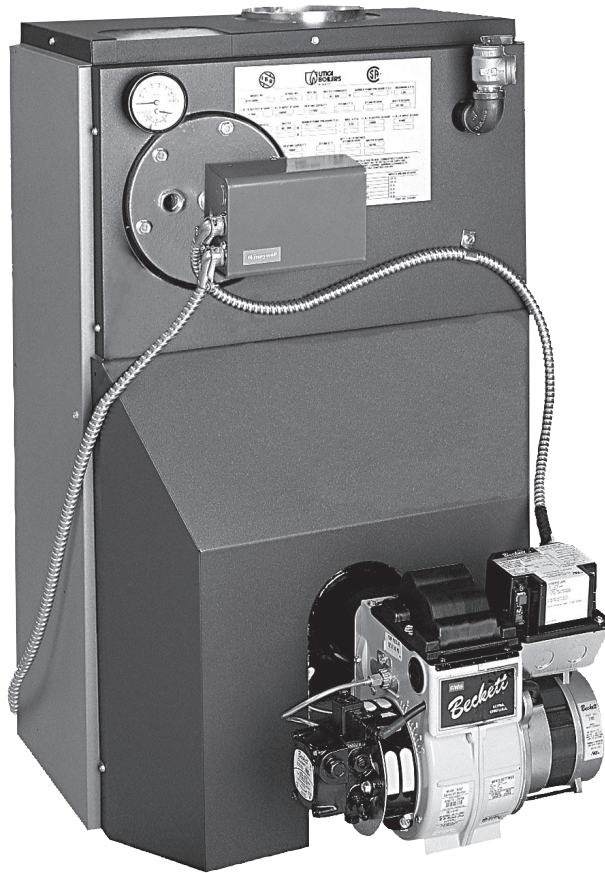




STARFIRE IV SERIES 4 WATER OIL FIRED CAST IRON BOILER

Models
SFH-3085
SFH-3100
SFH-4100
SFH-4125
SFH-4145
SFH-5160
SFH-5185
SFH-6175
SFH-6210

INSTALLATION, OPERATION & MAINTENANCE MANUAL



Tested For 75 psi
ASME
Working Pressure



An ISO 9001-2008 Certified Company

Manufactured by:
ECR International, Inc.
2201 Dwyer Avenue, Utica NY 13501
web site: www.ecrinternational.com

P/N 240009735, Rev. F [12/2014]

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**Keep this manual near boiler and
Retain for future reference**

Boiler installation shall be completed by qualified agency.

Become familiar with symbols identifying potential hazards.



This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in death or serious injury

WARNING

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

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Used to address practices not related to personal injury.

WARNING

All boiler and venting installations shall be done by qualified agency and in accordance with appropriate Manufacturer's Installation, Operation and Maintenance Manual. Installing or venting boiler or any other appliance with improper methods or materials could result in serious injury or death due to fire or to asphyxiation from poisonous gases such as carbon monoxide which is odorless and invisible.

WARNING

Modification, substitution or elimination of factory equipped, supplied or specified components could result in death or serious injury.

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

DO NOT obstruct air openings to boiler room.

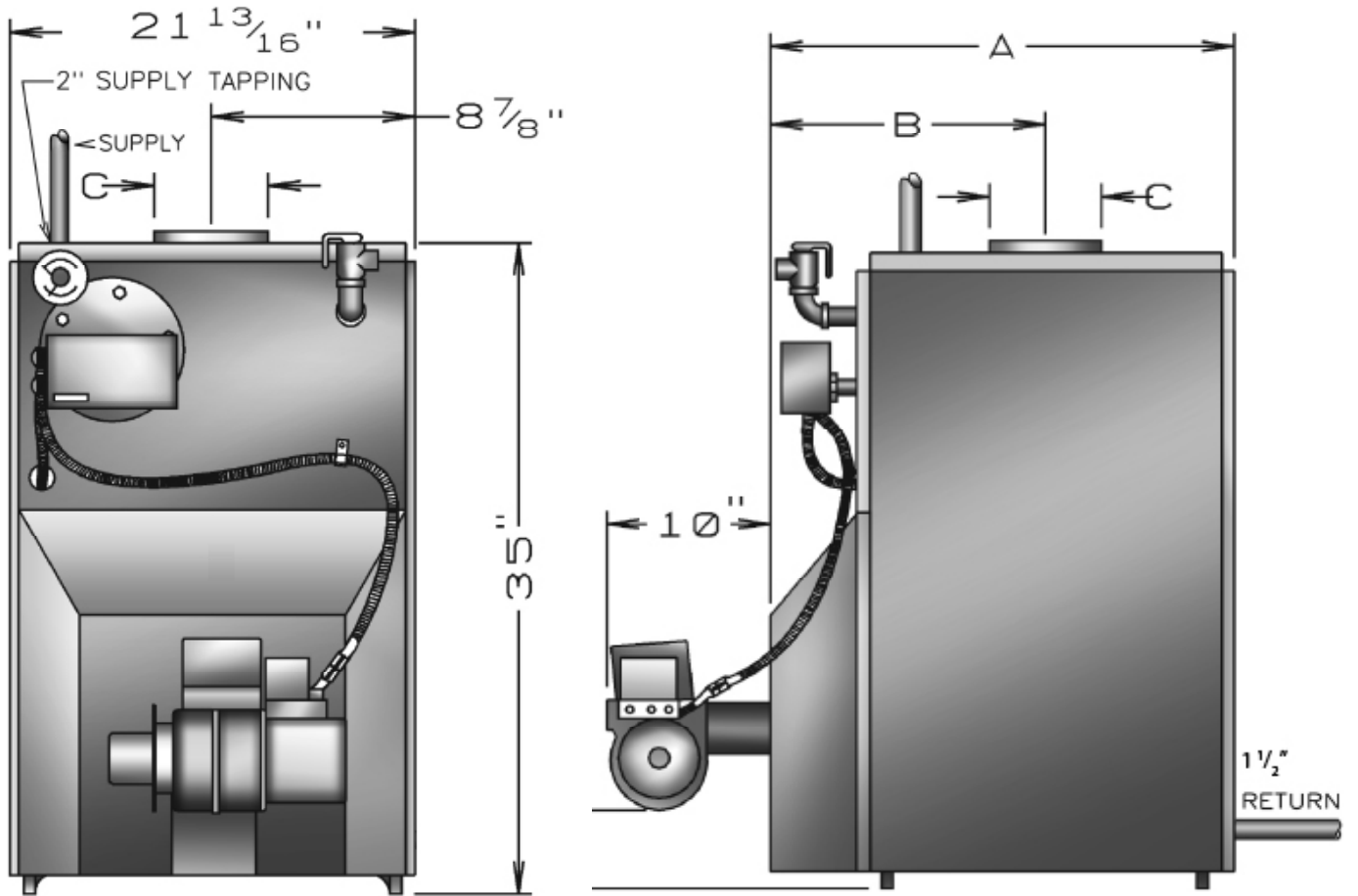
To the owner: Installation and service of this boiler must be performed by qualified installer.

To the installer: Leave all instructions with boiler for future reference.

Installation in Commonwealth of Massachusetts must be performed by Licensed Plumber or Licensed Gas Fitter.

DIMENSIONS

DIMENSIONAL DATA



BOILER SECTION	A DEPTH OF FLUSH JACKET	B FRONT OF CASING TO CENTER LINE OF FLUE OUTLET	C DIA. OF FLUE OUTLET
3	$17 \frac{7}{8}$ "	$11 \frac{1}{4}$ "	6"
4	$21 \frac{1}{2}$ "	$12 \frac{5}{8}$ "	6"
5	$25 \frac{1}{8}$ "	$14 \frac{1}{4}$ "	7"
6	$29 \frac{1}{4}$ "	$15 \frac{15}{16}$ "	8"

BOILER RATINGS & CAPACITIES



BOILER RATINGS

BOILER MODEL NUMBER		(1) OIL BURNER INPUT		(3) HEATING CAPACITY	(2) NET RATINGS WATER	(3) A.F.U.E.	CHIMNEY
		gph	*Mbh	*Mbh	*Mbh		
SFH-3085W	SFH-3085WT	0.85	119	103	90	85.0%	8X8X15
SFH-3100W	SFH-3100WT	1.00	140	119	103	84.0%	8X8X15
SFH-4100W	SFH-4100WT	1.00	140	122	106	86.0%	8X8X15
SFH-4125W	SFH-4125WT	1.25	175	151	131	85.0%	8X8X15
SFH-4145W	SFH-4145WT	1.45	203	173	150	84.0%	8X8X15
SFH-5160W	SFH-5160WT	1.60	224	193	168	85.0%	8X8X15
SFH-5185W	SFH-5185WT	1.85	259	221	192	84.0%	8X8X15
SFH-6175W	SFH-6175WT	1.75	245	212	184	85.0%	8X8X15
SFH-6210W	SFH-6210WT	2.10	294	252	219	84.0%	8X8X15

*Mbh = 1,000 Btu per hour [Btu = British Thermal Unit]

¹ Oil burner input based on 140,000 Btu per gallon.

² Net AHRI water ratings shown are based on a piping and pickup allowance of 1.15. Consult manufacturer before selecting a boiler for installation having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

³ Heating Capacity and AFUE based on 13.0% CO₂ with -0.02" W. C. draft over fire and #1 smoke or less. Tested in accordance with U.S. Department of Energy test procedures.

T= Tankless

STANDARD EQUIPMENT: Crated Boiler, Flush Jacket, Oil Burner, Target Wall/Liner, Circulator- 1¼", Safety Relief Valve, Temperature Pressure Gauge, Drain Valve, Wiring Harness, Burner Electrical Disconnect, Plastic Cover, Supply Tapping-2", Return Tapping-1 1/2", High Limit and Circulator Control, Primary Control. For Tankless Heater Units add Tankless Hot Water Coil and Triple Combination High Limit/Low Limit/Circulator Control.

TANKLESS WATER HEATER CAPACITIES

BOILER MODEL NUMBER	INPUT RATE G.P.H.	TANKLESS HEATER NUMBER	TANKLESS HEATER CAPACITY INTERMITTENT DRAW G.P.M.	BOILER WATER CONTENT GALS.
SFH-3085WT	0.85	T3	3	10.5
SFH-3100WT	1.00	T3	3¼	10.5
SFH-4100WT	1.00	T4	3¼	13.5
SFH-4125WT	1.25	T4	3¾	13.5
SFH-4145WT	1.45	T4	4	13.5
SFH-5160WT	1.60	T4	4	16.5
SFH-5185WT	1.85	T4	4¼	16.5
SFH-6175WT	1.75	T4	4¼	19.5
SFH-6210WT	2.10	T4	4½	19.5

INTRODUCTION

WARNING

Improper installation, adjustment, alteration, service or maintenance could result in death or serious injury.

- Installation must conform to requirements of the authority having jurisdiction. Such applicable requirements take precedence over the general instructions of this manual.
- Install boiler in accordance with requirements of authority having jurisdiction, or in the absence of such requirements, CSA B139: Installation Code for Oil Burning Equipment.
- Where required by the authority having jurisdiction, the installation must conform to the American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME No. CSD-1.
- LOCATE BOILERS in front of final position before removing crate. Provide level solid base as near the chimney as possible, and centrally located with respect to heat distribution system as practical.

- Allow 24 inches in the front and top for servicing and cleaning, or removing tankless water heating coil.
- When installed in utility room, door should be wide enough to allow largest boiler part to enter, or to permit replacement of another appliance such as water heater.

WARNING

Fire hazard. Do not install boiler on combustible flooring or carpeting. Failure to follow these instructions could result in death or serious injury.

Boiler must not be installed on carpeting or vinyl flooring.

Minimum clearances to combustible construction are:

TOP	24 IN.
FRONT	24 IN.
FLUE CONNECTOR	9 IN.
REAR	6 IN.
SIDES	6 IN.

NOTICE

Clearance for access should exceed fire protection clearance.

REMOVE CRATE and plastic protective wrapper, inspect for damage.

Move boiler to permanent position by sliding or walking.

⚠ WARNING

Asphyxiation, fire hazard. Do not obstruct air openings to combustion area. Follow instructions below, to maintain adequate combustion air.

COMBUSTION AIR REQUIREMENTS (MINIMUM OPENING IN SQUARE INCHES)				
INPUT (Mbh)	*UNCONFINED AREA		**CONFINED AREA	
	OUTSIDE COMBUSTION AIR	INSIDE COMBUSTION AIR	OUTSIDE COMBUSTION AIR	
	1 IN ² /5000Btu/HR (PARAGRAPH 4)	1 IN ² /1000 Btu/HR (MIN 100IN ²) (Figure 1)	1 IN ² /4000 Btu/HR (Figures 2&3)	1 IN ² /2000 Btu/HR (Figure 4)
119	24	119	30	60
140	28	140	35	70
175	35	175	44	88
203	41	203	51	102
224	45	224	56	112
245	49	245	62	123
259	52	259	65	130
294	59	297	74	147

* Unconfined area: A space whose volume is not less than 50 cubic feet per 1000 Btu per hour of all appliances installed in that space (cubic feet of space = height x width x length).

** Confined area: A space whose volume is less than 50 cubic feet per 1000 Btu per hour of all appliances installed in that space (cubic feet of space = height x width x length).

- Ventilation of boiler room must be adequate enough to provide sufficient air to properly support combustion.
- When boiler is located in an unconfined space in a building of conventional construction frame, masonry or metal, infiltration normally is adequate to provide air for combustion and ventilation. However, in any building which has been altered to conserve energy or to minimize infiltration, the boiler area should be considered as a CONFINED SPACE. Provide combustion air and ventilation air in accordance with the section "Air for Combustion and Ventilation," of NFPA 31: Standard for the Installation of Oil-Burning Equipment.
- When a boiler is installed in an unconfined space, in a building of unusually tight construction, air for combustion and room ventilation must be obtained from outdoors or from spaces freely communicating with the outdoors. A permanent opening or openings having a total free area of not less than 1 square inch per 5,000 Btu per hour of total input rating of all appliances shall be provided. Ducts may be used to convey make-up air from the outdoors and shall have the same cross-sectional area of the openings to which they are connected.

VENTILATION & COMBUSTION AIR

4. When air for combustion and room ventilation is from inside buildings, confined space shall be provided with two permanent openings, one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. Each opening shall have a minimum free area of 1 square inch per one thousand (1,000) Btu per hour of the total input rating of all appliances in the enclosed space, but must not be less than one hundred (100) square inches. These openings must freely communicate with the interior areas having adequate infiltration from the outside. See **Figure #1**.
5. When the boiler is installed in a confined space and all air is provided from the outdoors, the confined space shall be provided with two permanent openings, one commencing within 12 inches from the top and one commencing 12 inches from the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. One of the following methods must be used to provide adequate air for ventilation and combustion.
 - A. When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btu per hour of total input rating of all equipment in the enclosure. See **Figure #2**.
 - B. When communicating with the outdoors by means of vertical ducts, each opening shall have a minimum free area 1 square inch per 4,000 Btu per hour of total input rating of all appliances in the enclosed space. See **Figure #3**.
 - C. If horizontal ducts are used, each opening shall have a minimum free area 1 square inch per 2,000 Btu per hour total input rating of all appliances in the enclosed space. See **Figure #4**.
 - D. When ducts are used, they shall be of the same cross sectional area as the free area of the area of the openings to which they connect. The minimum dimension of rectangular air ducts shall not be less than 3 inches.
6. In calculating free area using louvers, grills or screens for the above, consideration shall be given to their blocking effect. Screens used shall not be smaller than $\frac{1}{4}$ inch mesh. If the free area through a design of louver or grill is known, it should be used in calculating the size opening required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grills will have 60-75% free area. Louvers and grills shall be fixed in the open position or interlocked with the boiler so that they are opened automatically during boiler operation. Refer to the *Combustion Air Requirements* chart on previous page for combustion air minimum opening requirements.

Figure #1

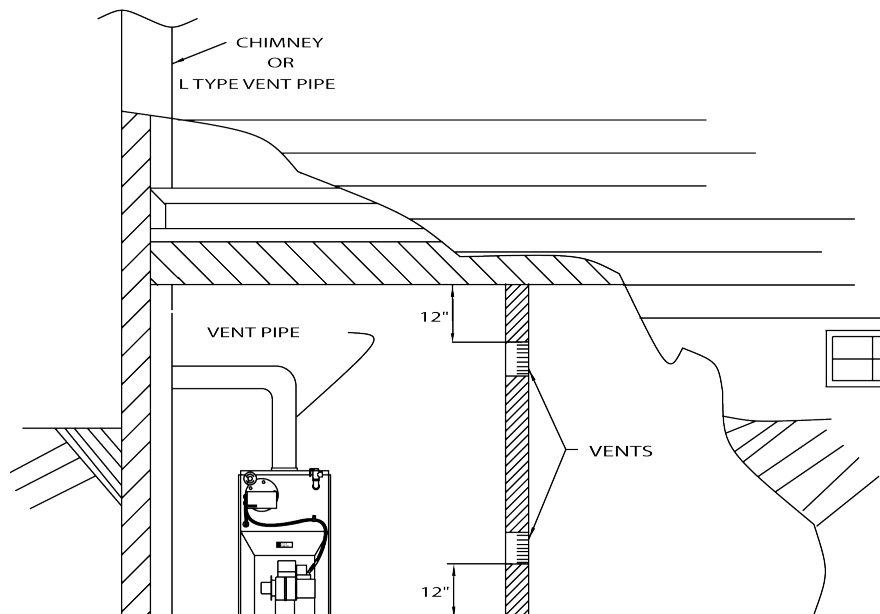


Figure #2

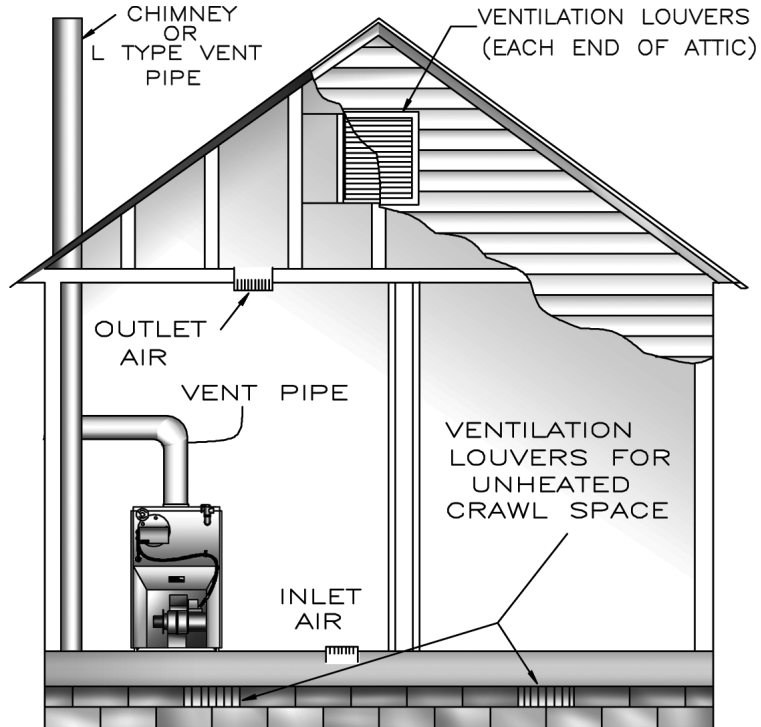


Figure #3

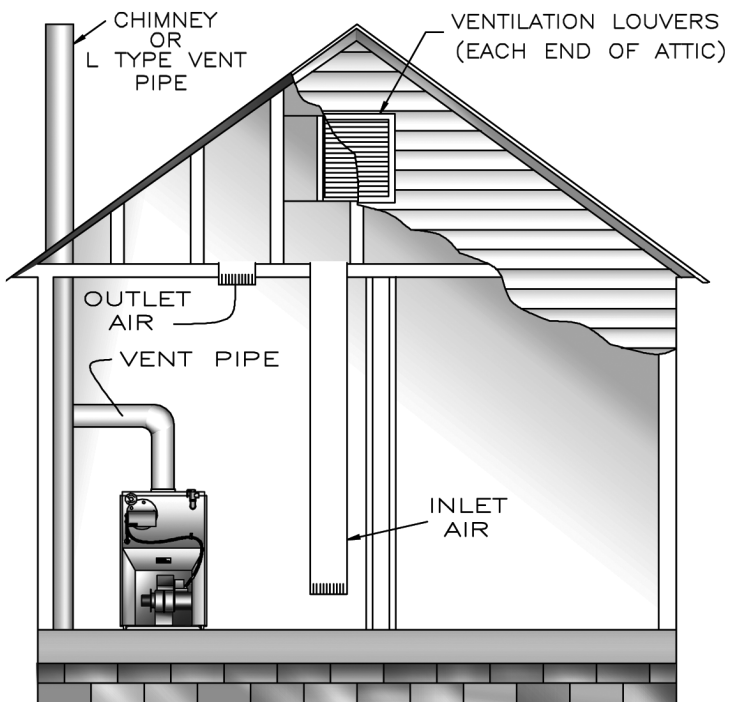
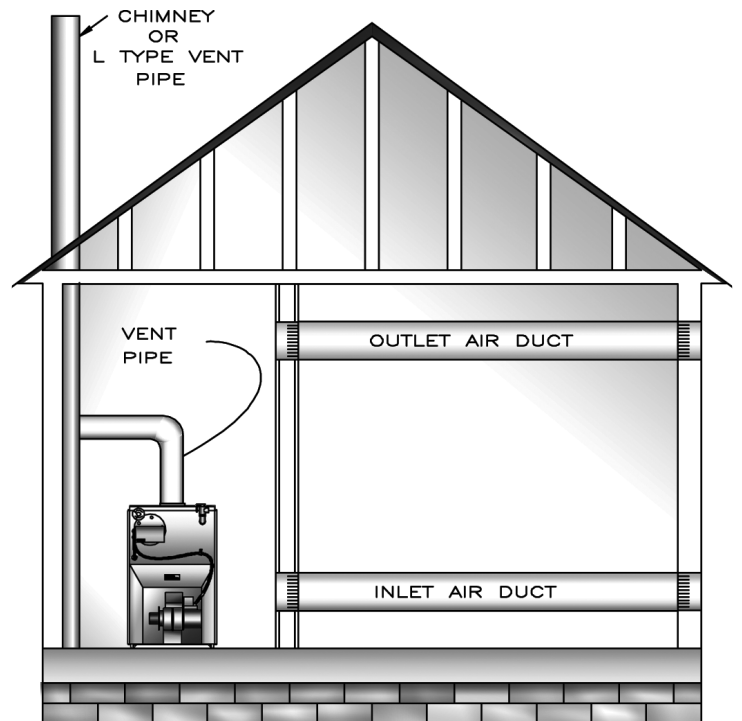


Figure #4



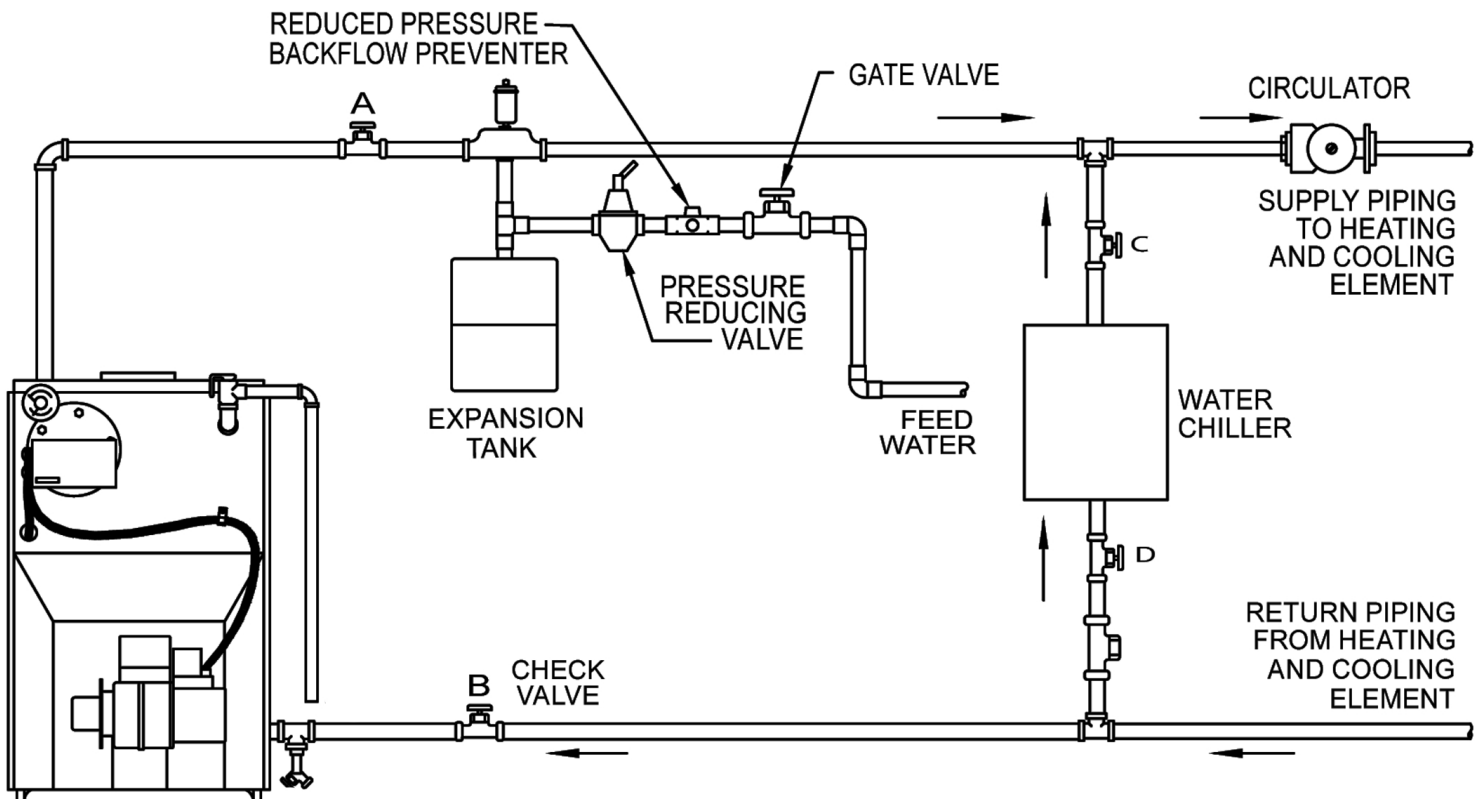
CONNECTING SUPPLY AND RETURN PIPING

1. Connect supply and return piping as suggested in **Figure #5**, below. When boiler is used in connection with refrigerated systems:
 - A. Chilled medium **MUST BE IN PARALLEL** with boiler.
 - B. Use appropriate valves to prevent chilled medium from entering heating boiler.
2. During heating cycle open valves A and B, close valves C and D.
3. During heating cooling cycle open valves C and D, close valves A and B.
 - A. Maintain minimum clearance of one inch to hot water pipes.
4. Hot water boilers installed above radiation level must be provided with low water device either as part of boiler or at time of boiler installation.
5. When boiler is connected to heating system utilizing multiple zoned circulators, each circulator must be supplied with flow control valve to prevent gravity circulation.

** Reduced pressure back flow preventer must be used under provisions required by the Environmental Protection Agency, (EPA).*
6. Bypass piping is an option which gives ability to adjust supply boiler water temperature to fit system or condition of installation. Although, this method of piping is not typically required for baseboard heating systems.

In air handling units where they may be exposed to refrigerated air circulation, boiler piping system **MUST** be supplied with flow control valves or other automatic means to prevent gravity circulation of boiler water during cooling cycle.

Figure #5 Typical Piping Configuration



CONNECTING SUPPLY AND RETURN PIPING

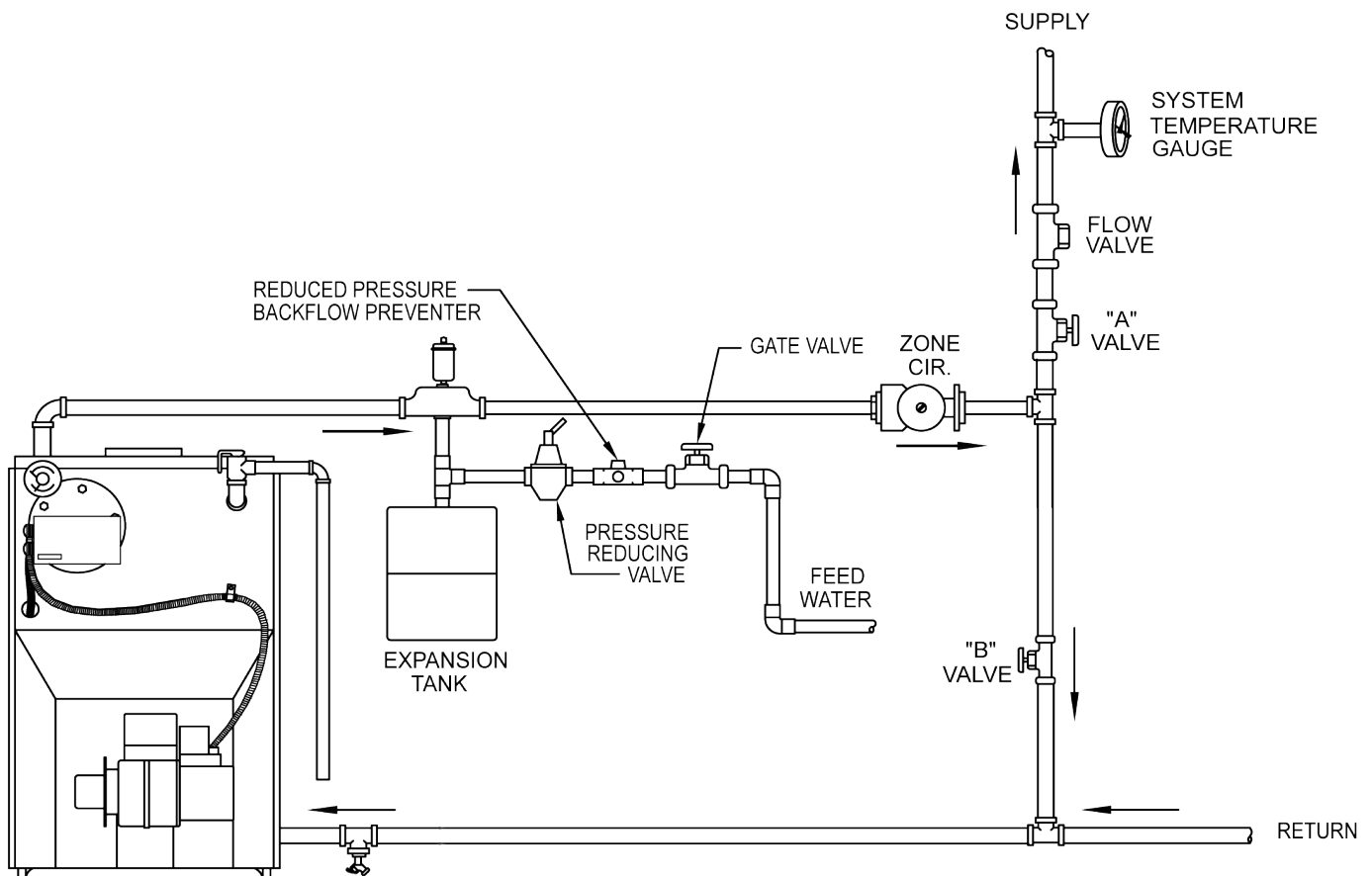
- A. This method is used to protect boilers from condensate forming due to low temperature return water. Generally noticed in large converted gravity systems or other large water volume systems. See **Figure #6**.
- B. These methods are used to protect systems using radiant panels and material they are encased in from high temperature supply water from boiler and protect boiler from condensation. See **Figures #7 and #8** following page.

- C. This method is used to protect boilers from condensate forming as well as protecting heating system from high water temperature. See **Figure #8** following page.

Note: When using bypass piping, adjust valves A and B until desired system temperature is obtained.

7. Bypass loop piping must be same size piping for supply and return.

Figure #6 Bypass Piping



CONNECTING SUPPLY AND RETURN PIPING

Figure #7 - Mixing Valve Piping

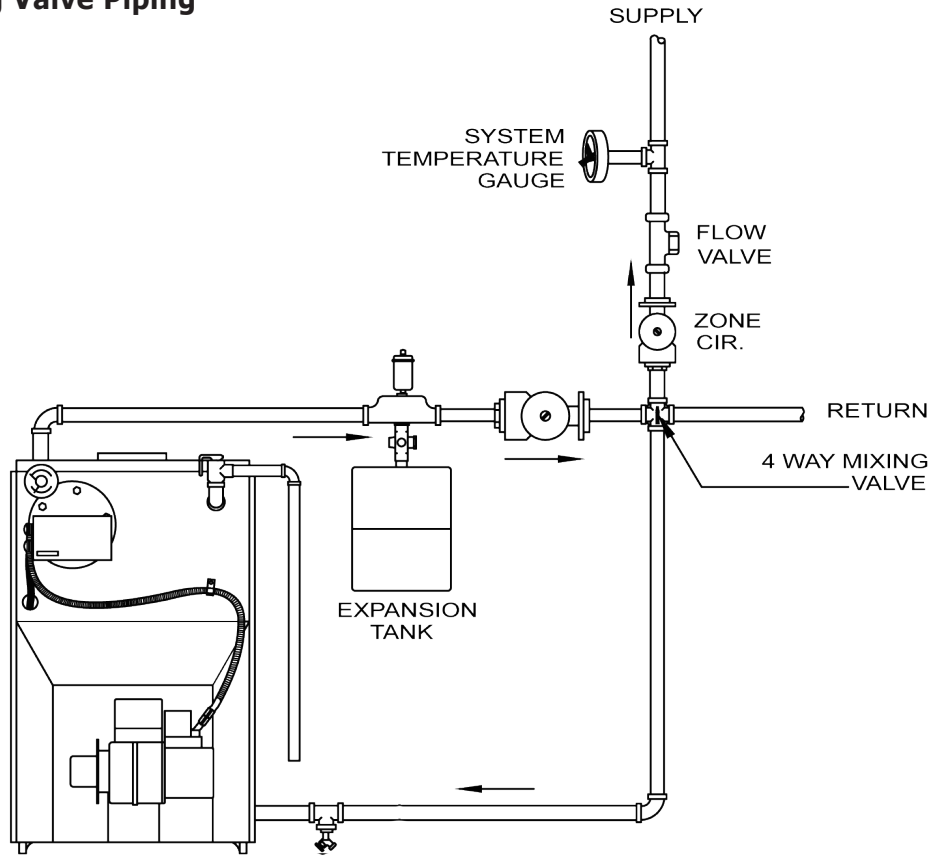
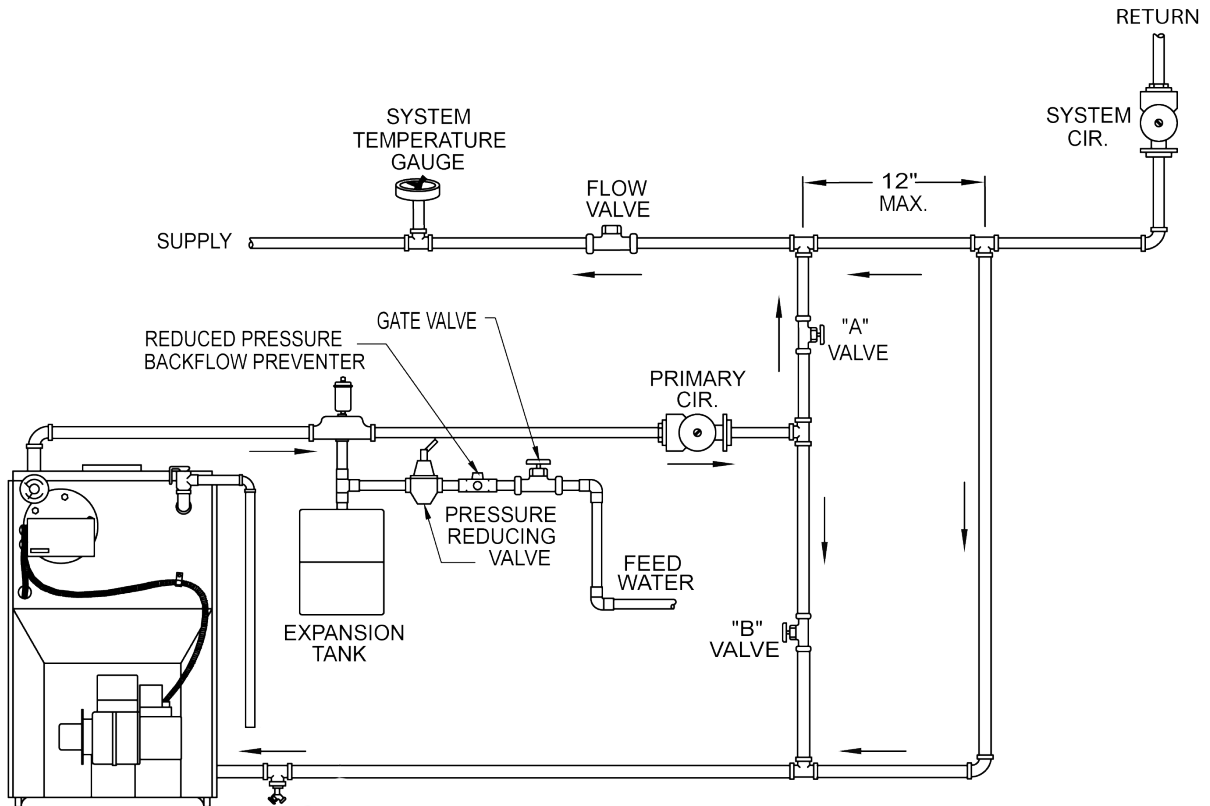


Figure #8 - Primary Secondary Piping With Bypass



CONNECTING SUPPLY AND RETURN PIPING

- Typical indirect water heater installation using circulators is shown in **Figure #9**.
- Typical indirect water heater installation using zone valves is shown in **Figure #10**.

Figure #9 - Indirect Water Heater Piping with Circulator

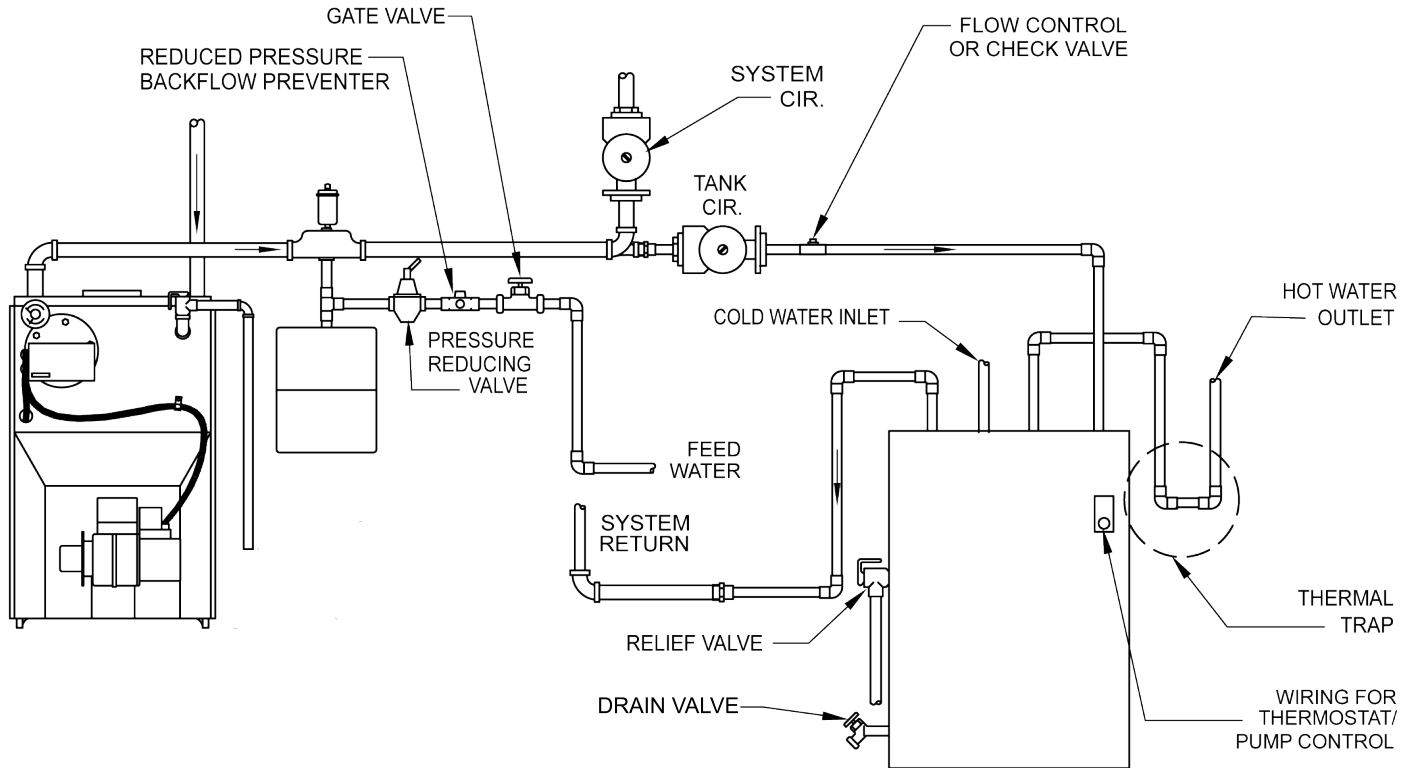
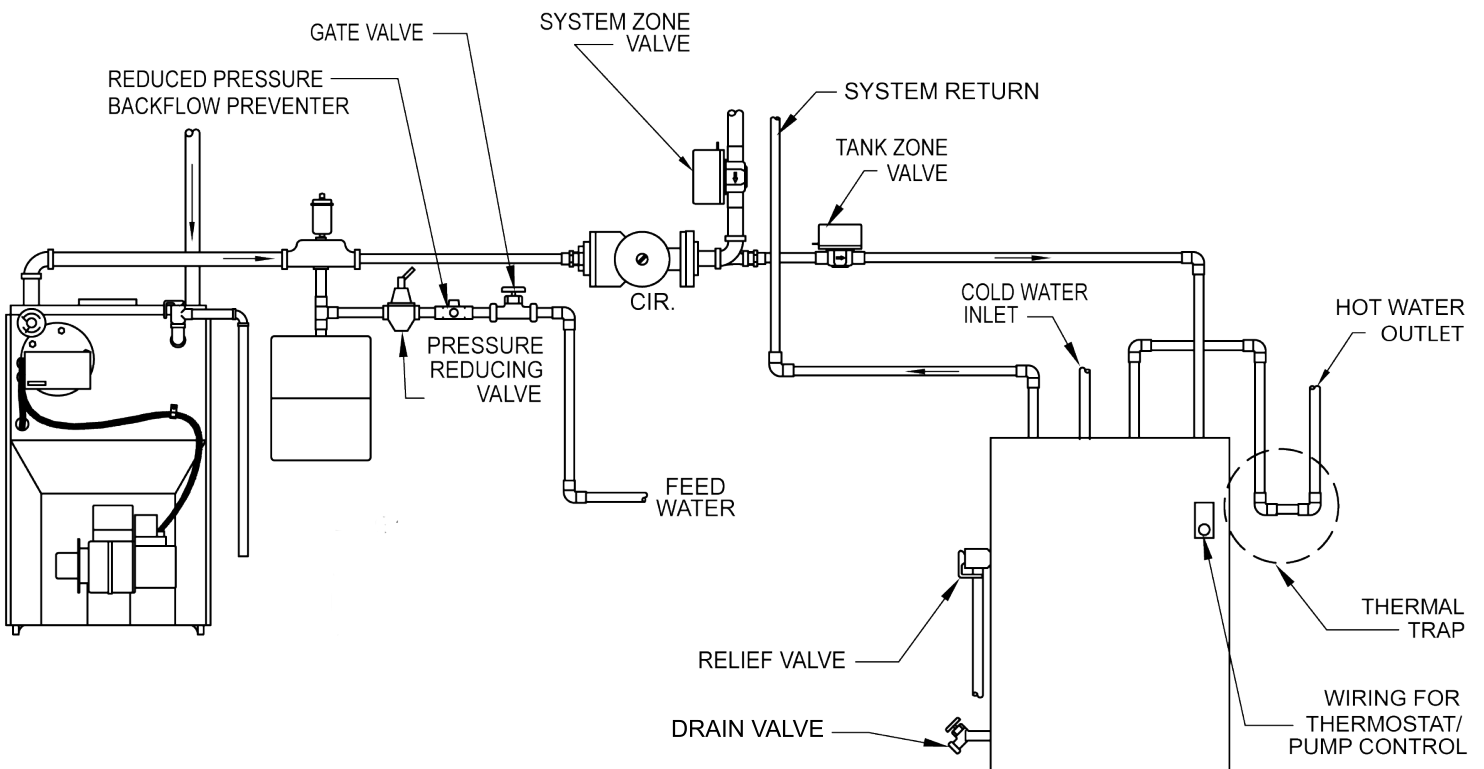


Figure #10 - Indirect Water Heater Piping with Zone Valve



⚠ WARNING

Burn or Scald Hazard. Discharge line shall be installed to relief valve outlet connection to avoid burns, scalding, or water damage due to discharge of steam and/or hot water during operation.

Discharge line shall:

- Connect to safety valve outlet. Piped down to safe point of disposal. Check local codes for maximum distance from floor or allowable safe point of discharge.
- Pipe size be of equal to or greater than of safety valve outlet over entire length of discharge line.
- Have no intervening shutoff valve between safety valve and discharge to atmosphere. Do not plug or place any obstruction in discharge line.
- Terminate freely to atmosphere where any discharge will be clearly visible and at no risk of freezing.
- Allow complete drainage of valve and discharge line.
 - Install safety valve with spindle in vertical position.
 - Do not install shutoff valve between boiler and safety valve.
 - Support safety valve discharge piping.
- Be short and straight as possible.
- Terminate with plain end, not threaded.
- Constructed of material suitable for exposure to temperatures of 375° F (191°C); or greater.

Refer to local codes and appropriate ASME Boiler and Pressure Vessel Code for additional installation requirements.

10. Install discharge piping from safety relief valve.

- Use ¾" or larger pipe. See **Figure #11**.
- Individual boiler discharge piping shall be independent of other discharge piping.
- Size and arrange discharge piping to avoid reducing safety relief valve relieving capacity below minimum relief valve capacity stated on rating plate.
- Install union, if used, close to safety relief valve outlet.
- Install elbow(s), if used, close to safety relief valve outlet and downstream of union (if used).

Figure #11 - Discharge Piping From Safety Relief Valve

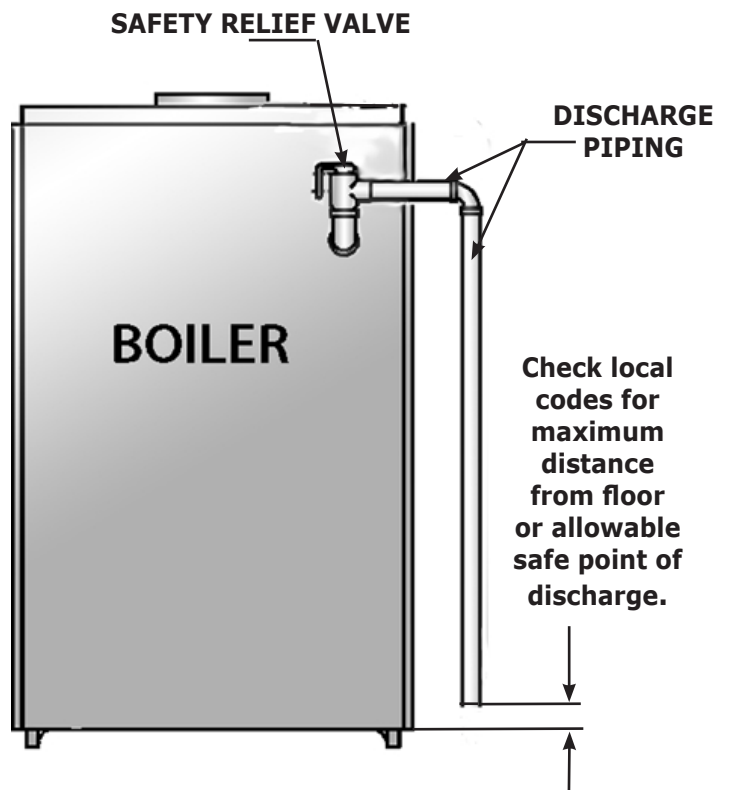
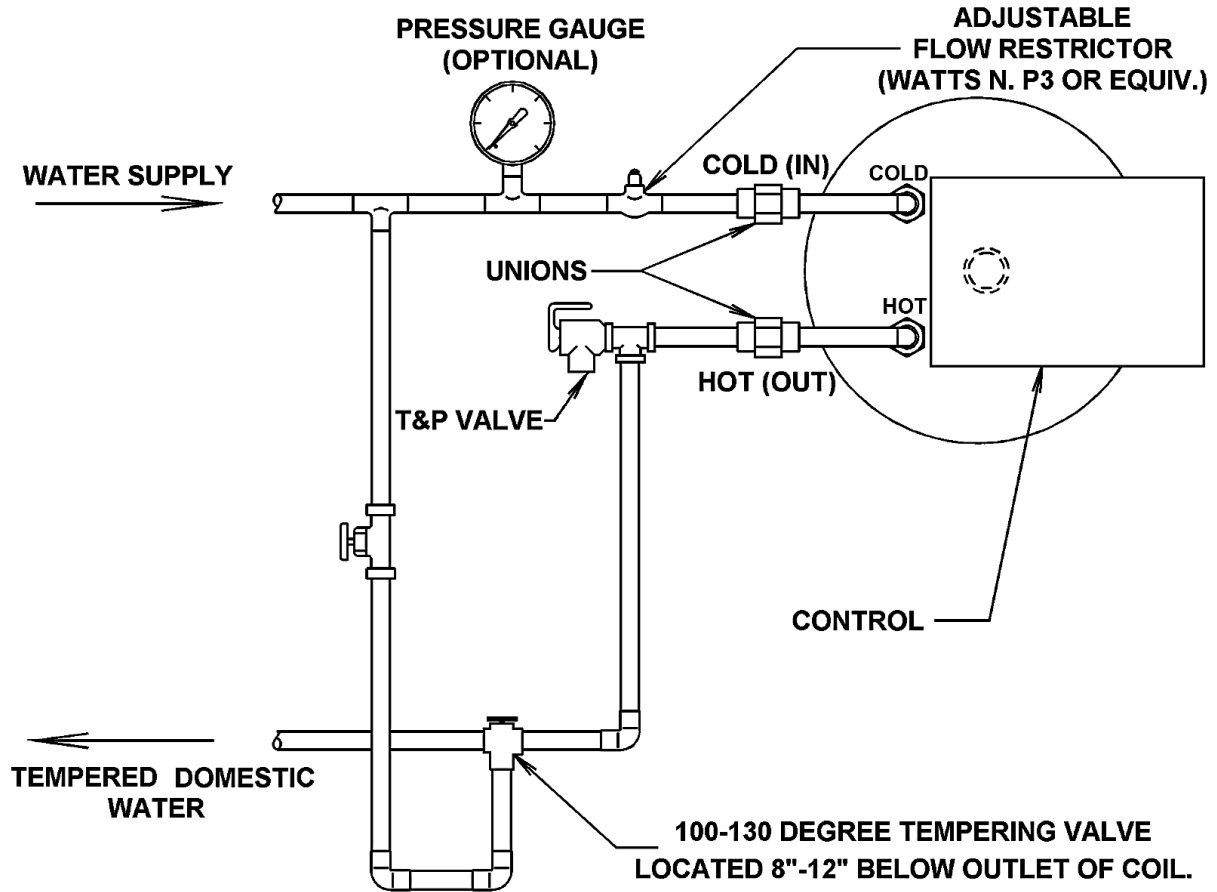


Figure #12 - Recommended Piping For Boilers Equipped With T3 Or T4 Tankless Heater



⚠ DANGER

Water temperatures exceeding 125°F will cause severe burns instantly or death by scalding.

- Automatic mixing valve must be installed on outlet of domestic coil. Installation must comply with valve manufacturer's recommendations, and instructions.
- Do not remove bolts or limit at time of installation.
- Pipe in accordance with boiler's Installation, Operation and Maintenance Manual.
- Due to varying water conditions, adjustable flow restrictor must be installed in cold water inlet of this coil.

CONNECTING SUPPLY AND RETURN PIPING

OPTIONS UTILIZING 3/4" TAPPING

Figure #13 - Optional Location For Air Vent

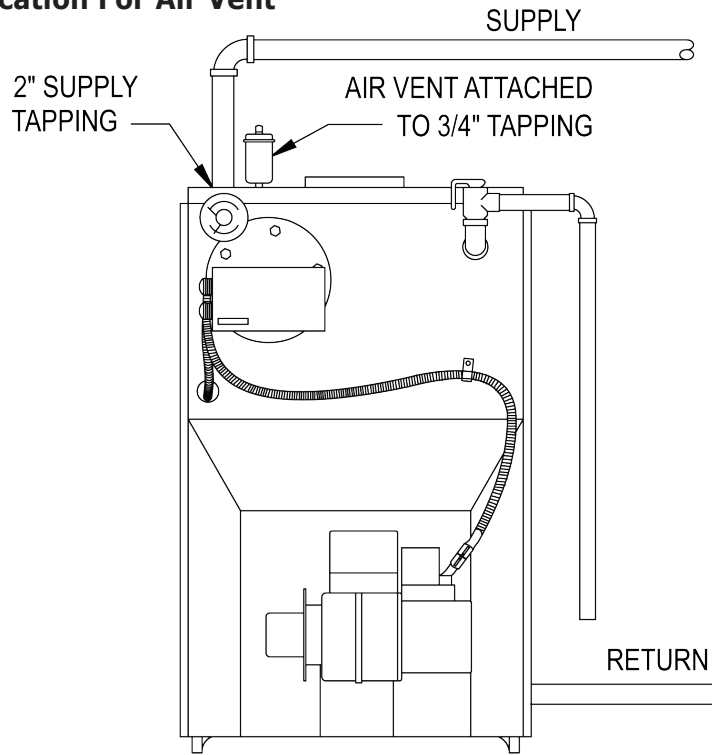
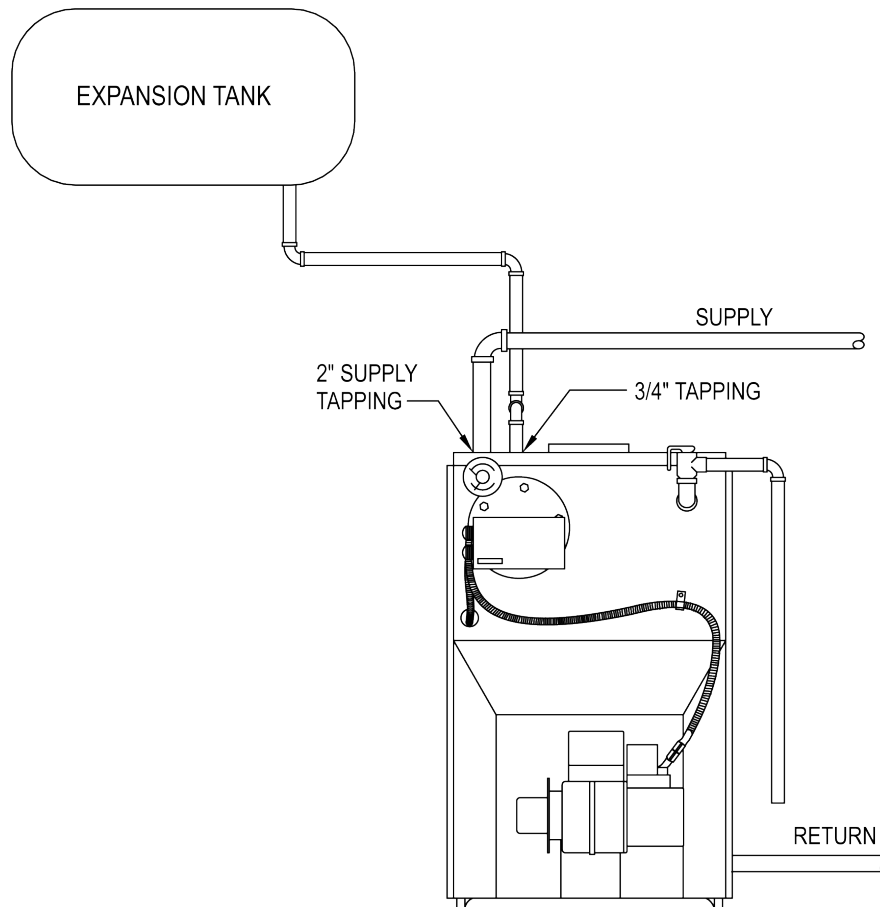


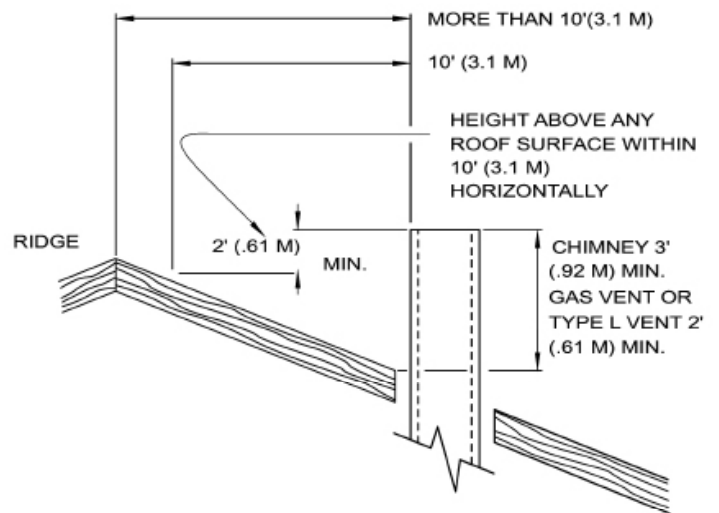
Figure #14 - Optional Location For Expansion Tank (Non-Diaphragm Type)



INSPECT CHIMNEY to verify it is constructed according to latest revision of the NFPA 211. Local codes may differ from this code and should be checked. Where there is a conflict, local code will prevail.

- Boiler must be installed into chimney which has masonry or metallic chimney liner.
- Unlined chimney will have leaks that will cause poor chimney performance (NO DRAFT), and could result in positive pressure in combustion chamber.
- Horizontal portions of venting system should not exceed 10 feet in length. Horizontal lengths over 10 feet will have negative effect on chimney performance.
- Chimney should extend at least 2 feet above any portion of building within 10 feet. See **Figure #15**. It should produce negative draft of .06 to .08 inches of water column, (W.C.), as measured with draft gauge between boiler and barometric draft control while maintaining .02 inch W.C. negative draft in combustion chamber. See chart "Chimney or Vent Sizes" for recommended chimney or vent sizes.
- Inadequate draft will cause improper combustion, resulting in dirty flue ways and high fuel bills.

Figure #15



CONNECT FLUE PIPE same size as boiler outlet to chimney, sloping upward continuously toward chimney approximately 1/4" per foot. Bolt or screw joints together to avoid sag.

If oil fired water heater is vented into same flue as boiler, provide separate hole into chimney whenever possible. When not possible, use "Y" connection in flue pipe, using separate draft regulator for each unit.

When chimney will not provide adequate draft to handle input from water heater and boiler simultaneously, wire units so that only one will operate at a time, favoring water heater.

OIL TANK AND PIPING

- Install burner per instructions provided with burner-in-a-box kit.
- Install oil tank and piping in accordance with the National Board of Fire Underwriters and local regulations.
- Oil storage tank, vent, fill pipe and caps should be as prescribed by local codes.
- In no case should vent pipe be smaller than 1¼" I.P.S. Fill pipe should not be less than 2" I.P.S.
- Suction line from tank to burner should be one continuous piece of tubing to prevent air entering line.
- Suction line, must be ¾" O.D. copper tubing for runs of 50 feet or less, and ½" O.D. for longer runs. Oil return line, same size as suction line, must be used on any installation where bottom of tank is below fuel unit of burner.
- Oil lines should be buried or otherwise protected from mechanical injury.
- Flare fittings on all oil lines are recommended. Compression fittings on suction line often allow air to be drawn into fuel pump, making it difficult to maintain oil pressure at nozzle.
- Do not run overhead fuel lines from tank to oil burner.
- Fuel pump connections and by-pass should be made according to instructions attached to fuel pump. If tank is more than 20' from boiler, a two stage fuel unit should be installed in place of single stage pump supplied as standard equipment with burner. Make certain rotation and speed are same and pump is suitable for burner horsepower rating.
- Oil line filter and shut-off valve should be installed in suction line. Shut-off valves should be installed in both suction and return lines at burner for convenience in servicing burner.
- Allow extra tubing at burner so burner may be removed from boiler for cleaning without disconnecting tubing. (See **Figures #16 & #17**, below).
- Optional flexible oil line is available.

Figure #16 - Typical Installation Single Pipe Oil System

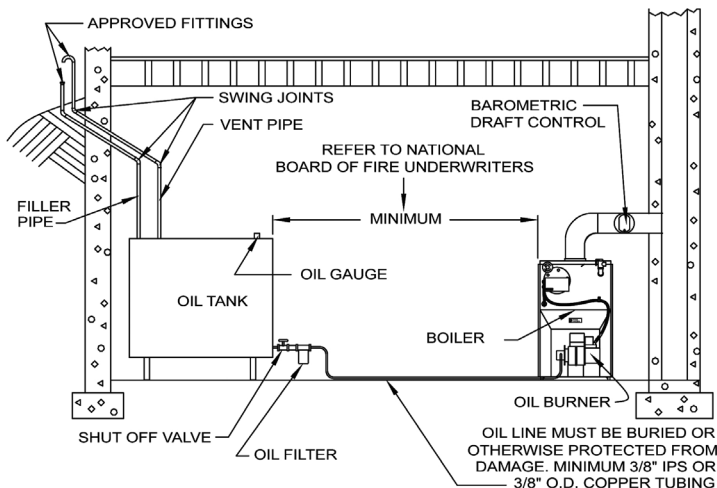
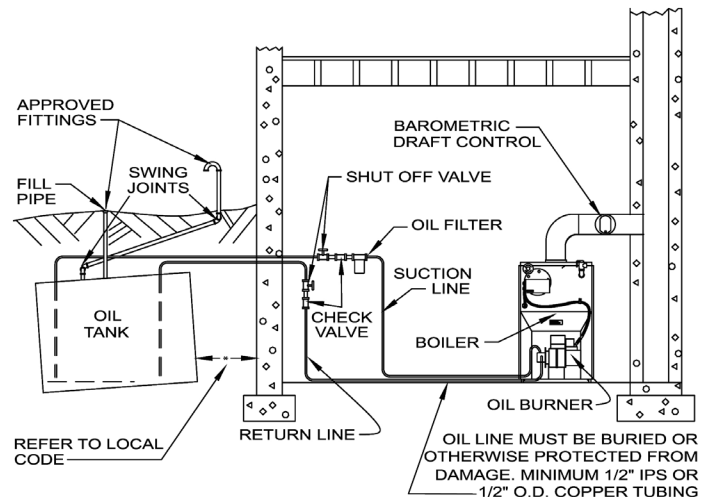


Figure #17 - Typical Installation Two Pipe Oil System



WARNING

Electrical shock hazard. Turn OFF electrical power supply at service panel before making electrical connections. Failure to do so could result in death or serious injury.

Electrically bond boiler to ground in accordance with requirements of authority having jurisdiction. Refer to:

- USA- National Electrical Code, ANSI/NFPA 70.

Install fused disconnect switch between boiler and meter at convenient location.

Sequence Of Operations

On call for heat, thermostat will actuate, completing circuit to limit. In turn, circulator and ignition systems are activated and ignition will begin.

In event boiler water temperature exceeds high limit setting on boiler mounted limit, power will be interrupted between limit and ignition system. Power will remain off until boiler water temperature drops below high limit setting. Circulator will continue to operate under this condition until thermostat is satisfied.

Thermostat Installation

1. Thermostat should be installed on inside wall about four feet above the floor.
2. **NEVER** install thermostat on outside wall.
3. Do not install thermostat where it will be affected by:
 - Drafts
 - Hot or cold pipes
 - Sun light
 - Lighting fixtures
 - Television sets
 - Fireplace or chimney
4. Check thermostat operation by raising and lowering thermostat as required to start and stop burner.
5. Instructions for final adjustment of thermostat are packaged with thermostat (adjusting heating anticipator, calibration, ect.).

Figure #18 - Wiring Diagram Beckett AFG without Tankless Heater

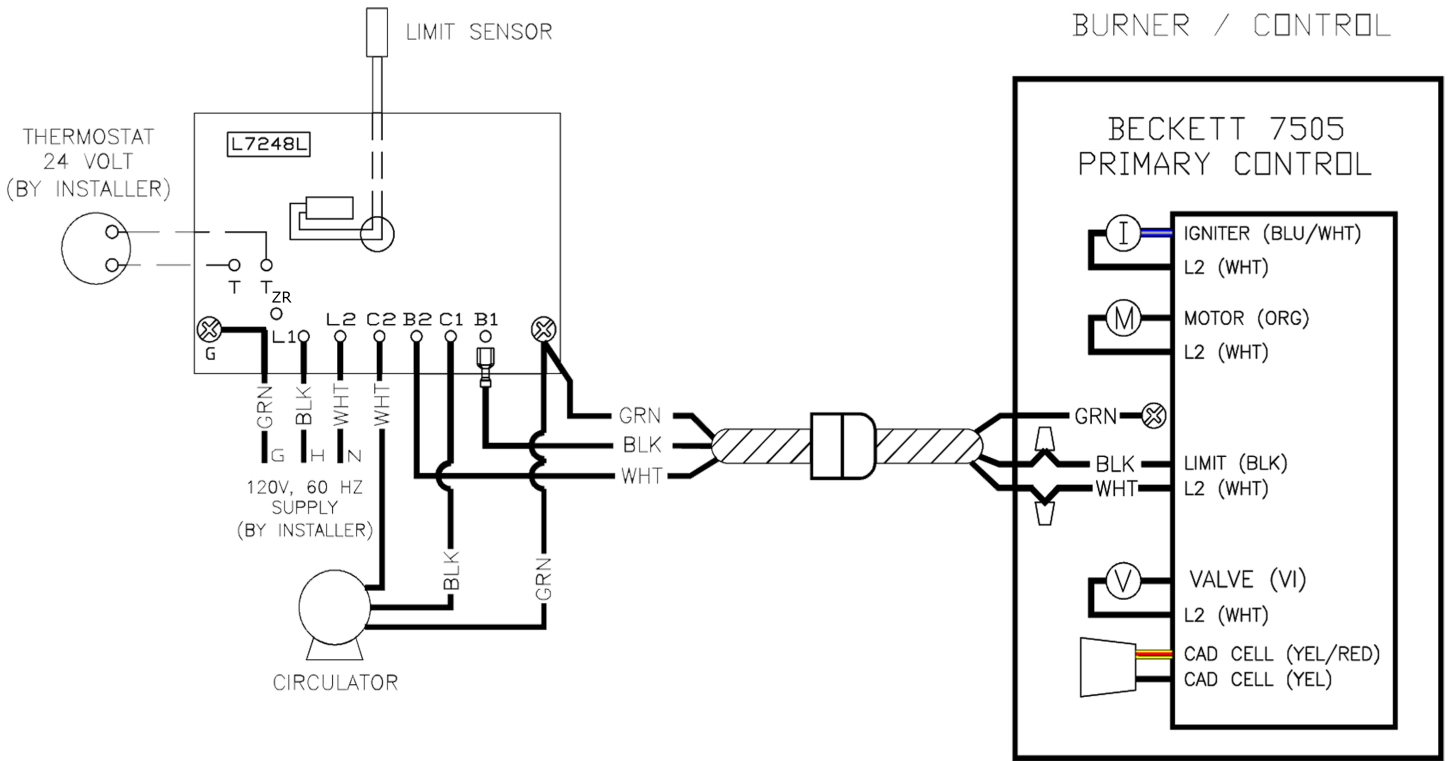


Figure #19 Wiring Diagram Beckett AFG wth Tankless Heater

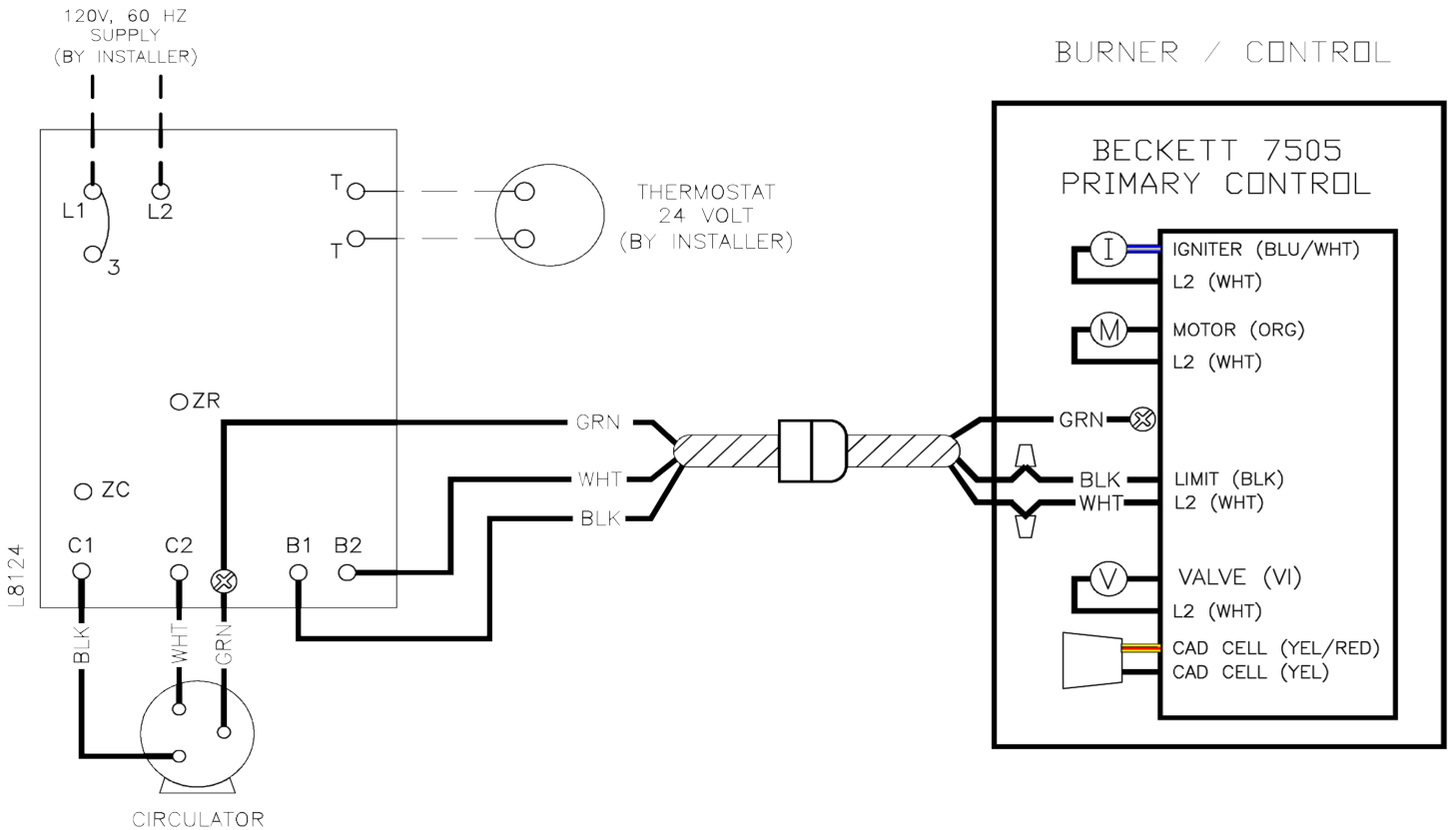


Figure #20 Wiring Diagram Riello 40F5 without Tankless Heater

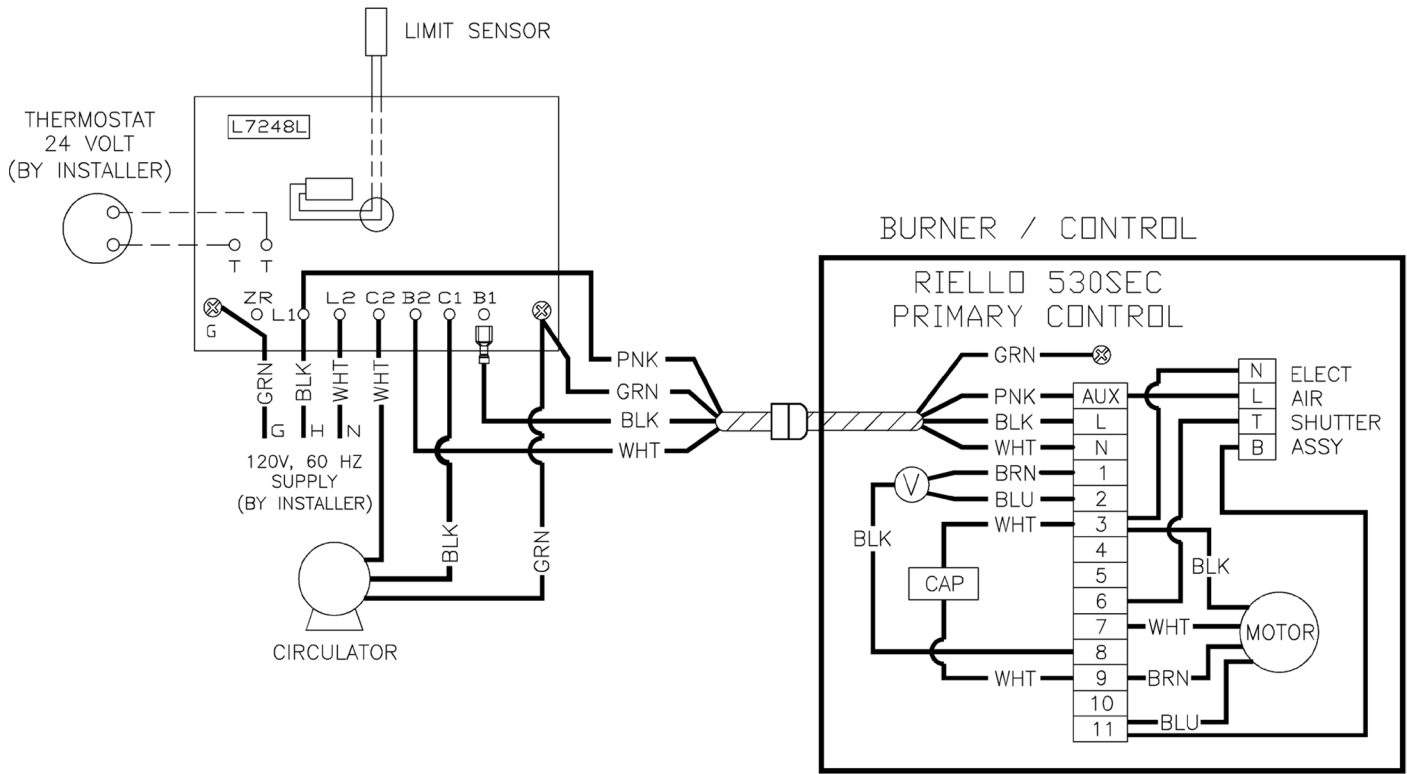


Figure #21 Wiring Diagram Riello 40F5 with Tankless Heater

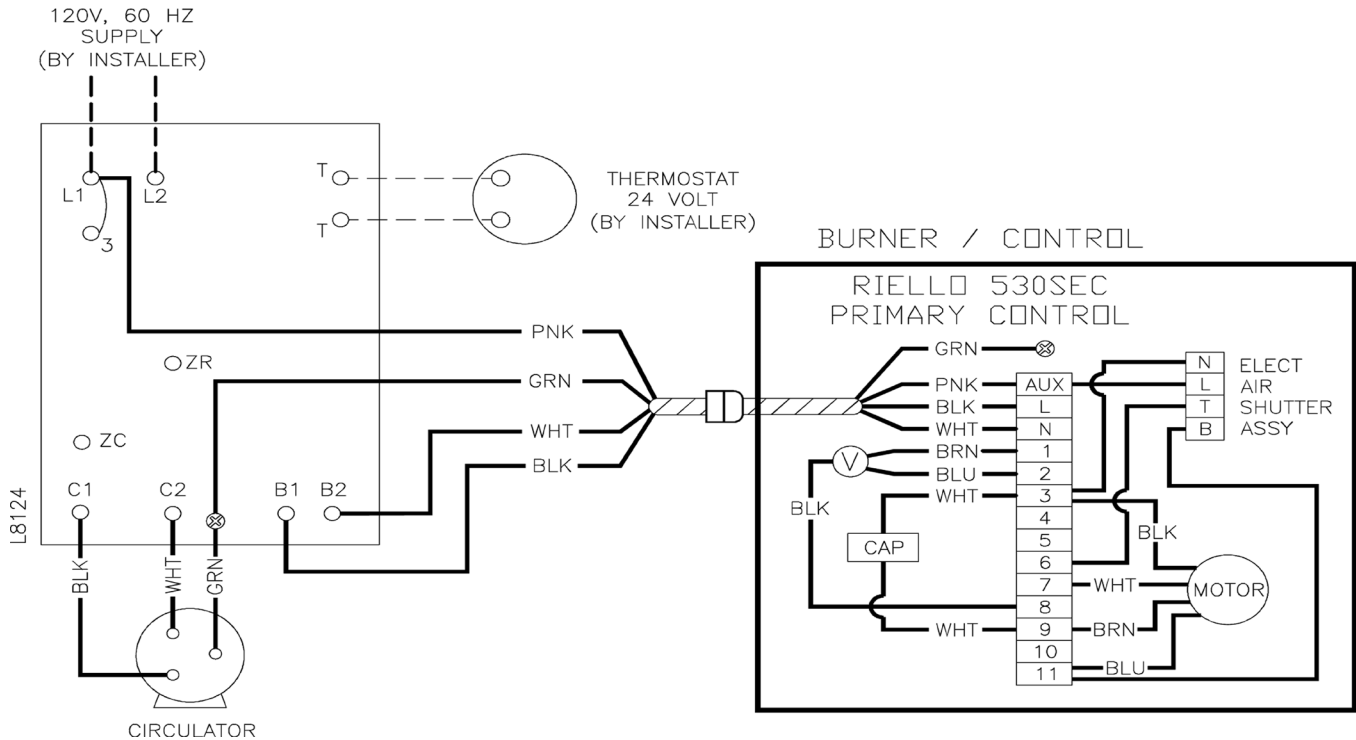


Figure #22 Wiring Diagram Riello 40F10 without Tankless Heater

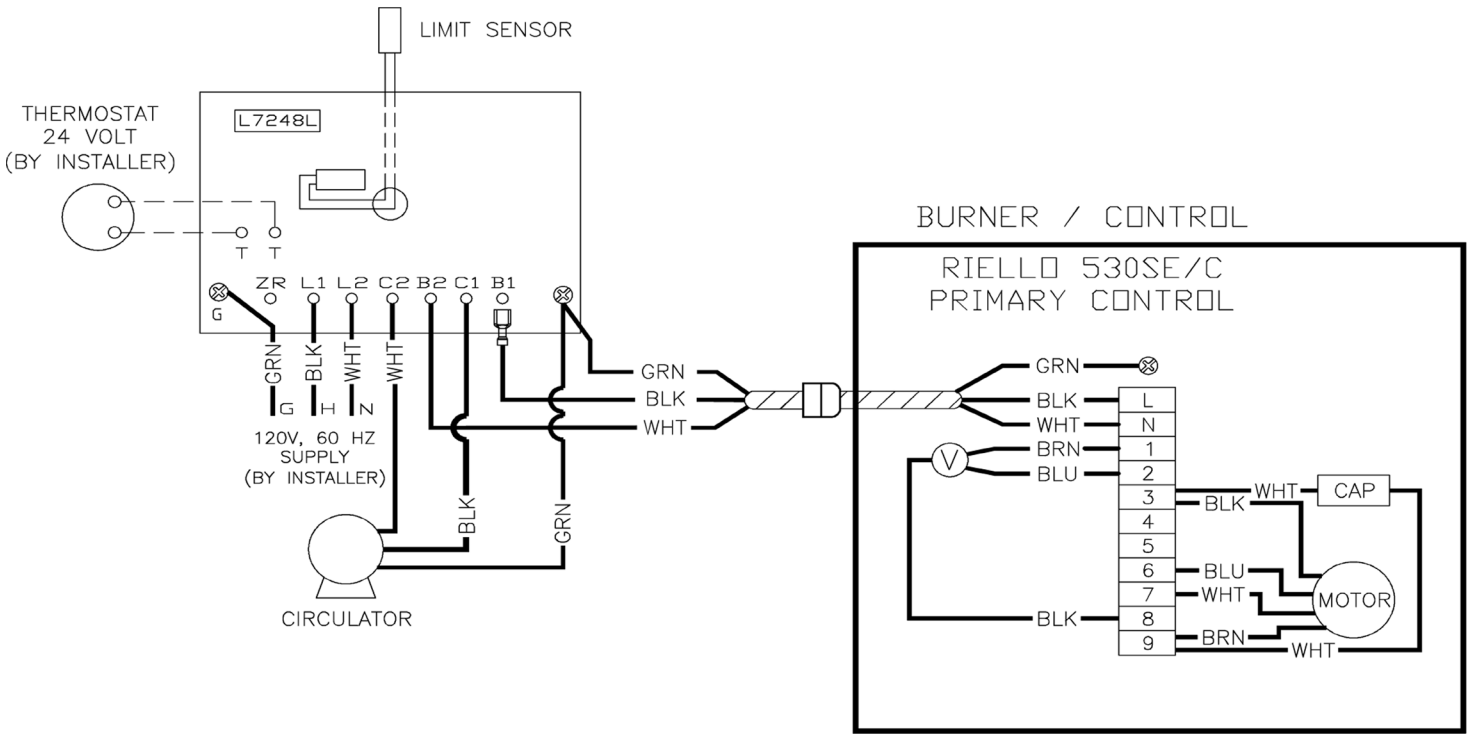


Figure #23 Wiring Diagram Riello 40F10 with Tankless Heater

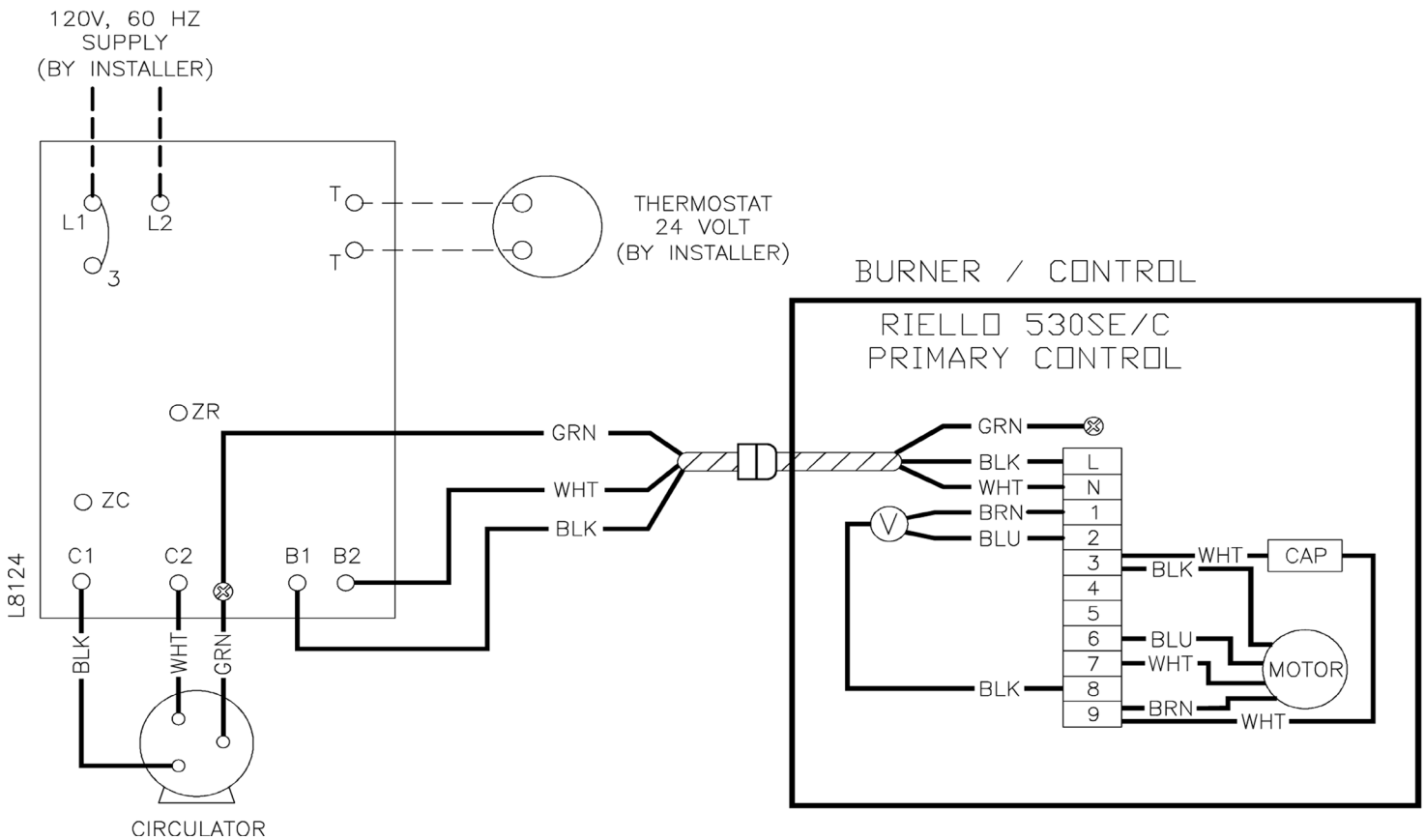


Figure #24 Wiring Diagram Carlin EZ-1/2 without Tankless Heater

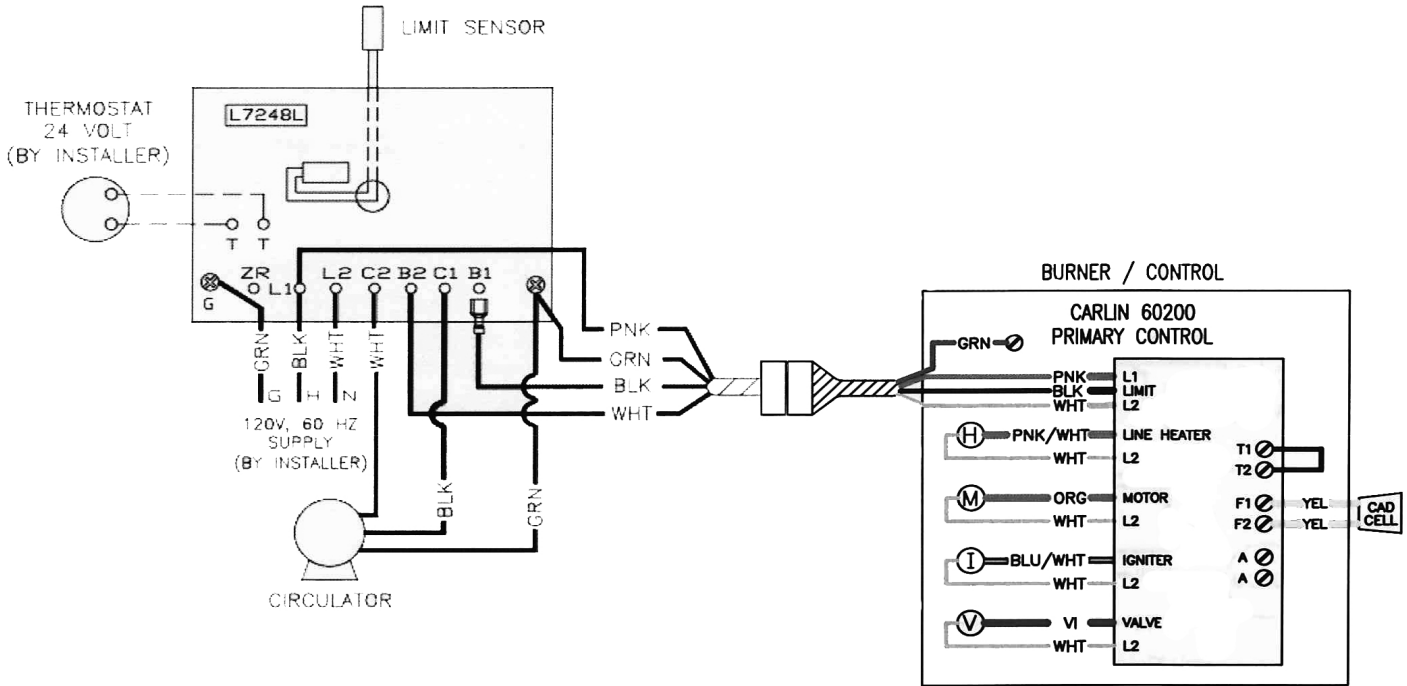
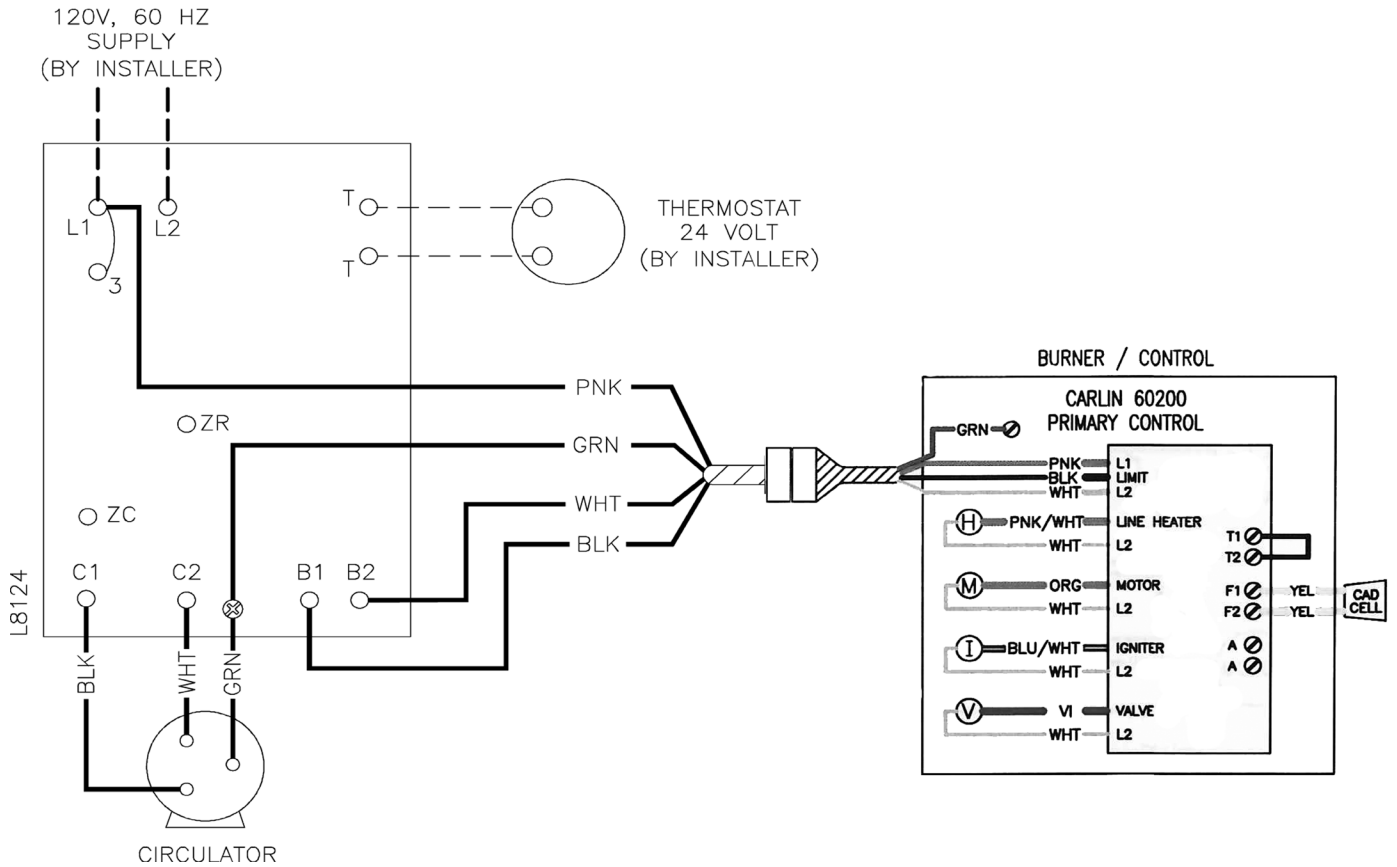


Figure #25 Wiring Diagram Carlin EZ-1/2 with Tankless Heater



Operating Instructions

1. Inspect venting system at start of each heating season.
2. Check vent pipe from boiler to chimney for signs of deterioration by rust or sagging joints. Repair if necessary.
3. Remove vent pipe at base of chimney or flue and, using mirror, check for obstruction.

Safety Relief Valve

⚠ WARNING

Burn and scald hazard. Safety relief valve could discharge steam or hot water during operation.

- Operate lever of safety relief valve, on boiler periodically to make sure it is functioning properly.
- Safety relief valve should open before water pressure exceeds 30 psi reading on gauge.
- If this pressure is exceeded and safety relief valve starts leaking water when boiler is operating at normal pressures, it should be immediately replaced.
- Corrosion can build up rapidly at valve seat and prevent its functioning as safety device. See **Figure #11**, page 13.

Start-Up And Adjustment Of Oil Burner

(See oil burner instructions for nozzle and electrode setting)

- A. Check oil burner nozzle to verify it is tight in the adapter.
- B. Check electrode setting, may have been jarred out of position during transportation.
- C. Burner mounting bolts should be tight.
- D. Set room thermostat to call for heat, or jump thermostat contacts on the boiler control.
- E. Open all oil line valves.
- F. Turn service switch on. Burner should start.
- G. On one pipe fuel systems only, vent pump as soon as burner starts. Allow oil to run until all traces of air in the suction line disappear.
- H. Turn "OFF" burner and install pressure gauge port on pump.
- I. Start burner again and check oil pressure per setup charts on page 24. Adjust if necessary.

Do not set fire visually. Instruments are only reliable method to determine proper air adjustments.

Improperly adjusted burner causes soot and high fuel bills because of incomplete combustion of fuel oil. This in turn may require excessive boiler maintenance, service costs, and in some instances, house cleaning or redecorating. A competent service mechanic should be consulted to make proper adjustments with smoke tester, CO₂ indicator and draft gauge.

Instructions For Proper Operation Of Boiler Burner Unit

A ¼" diameter slot is provided in inspection cover plate to take draft readings in combustion chamber. See **Figure #26**. A ¼" diameter hole will be required in flue pipe between boiler and barometric damper (if used) to take draft, CO₂, smoke and temperature readings. Adjust air shutter on oil burner to obtain "trace" of smoke. Measure CO₂ at this point. Increase air adjustment to lower CO₂ approximately one (1) percent. Check to insure minimum negative .02" w.c., (water column), "overfire" draft and zero (0) smoke. If - .02"w.c. "overfire" draft can not be maintained, changes and/or modifications may be required in venting or chimney.

Following tables (page 25) are provided as guideline for initial start-up. Final adjustments MUST be made using combustion instruments as previously mentioned.

Check Safety Control Circuit - for satisfactory performance after burner adjustments have been made.

1. High limit control: remove cover and note temperature setting. See **Figure #26**. With burner operating, decrease setting to minimum point. When boiler water temperature exceeds this set point, high limit switch will open, shutting off power to oil burner. Return setting to desired high limit point. Burner should restart. Refer to instructions included with limit.
2. Primary control and flame sensor check following:
 - A. Flame failure** - simulate by shutting off oil supply with hand valve while burner is on. After flame extinguishes, control goes through recycle period and attempts another ignition then locks out. To restart, open oil supply valve and reset safety switch. Refer to instructions included with burner.
 - B. Ignition failure** - with burner off, close oil supply valve and run through start-up procedure, The safety switch should lock out as in flame failure.
 - C. Power failure** - Turn off main power supply switch while burner is operating. When burner stops, restore power and burner should start.

If operation is not as described as above, check wiring and controls.

OPERATING INSTRUCTIONS

Preventive Maintenance - of oil fired boiler reduces operating costs. Boiler and vent pipe should be inspected for accumulation of soot or scale deposits periodically but at least once every year before start of each heating season. When soot is present on section walls and flueways, improper combustion will result, causing additional sooting and scaling until flueways are completely closed. To remove soot and scale from flueways, remove top jacket panel, top clean-out plate, open burner swing door. **See Figure #26.**

Periodic Inspection - and tightening of tankless heater/ cover plate bolts will reduce risk of leaks. See *Replacement Parts "Heat Exchanger"* section.

Instructions For Opening Burner Swing Door

1. Turn off power to boiler.
2. Allow boiler to cool down.
3. Disconnect power cable at factory supplied burner electrical disconnect. See **Figure #26.**
4. Loosen screws on the sides of lower front jacket panel. See **Figure #24.**
5. Pull bottom part of lower front panel forward.
6. Lift lower front panel up and off boiler. See **Figure #26.**

7. Close oil valve. See **Figures #16 & #17.**
8. Disconnect oil line from burner.
9. Do not try to swing door with oil line attached.
10. Remove nut from swing door stud on right hand side of door.
11. Swing open burner and door to the left.
 - Brush, using flue brush, soot and scale into combustion space where it can be removed through swing door opening.
 - It is recommended to replace nozzle at start of each heating season.
 - Lubricate burner motor and circulator motor - if required - with few drops of good grade light motor oil. Do not over oil.
 - Have service agent service burner, check controls and check electrodes for carbon or cracks in insulators.
 - Burners should be adjusted to produce conditions shown in Start-up and Adjustment of Oil Burner procedure covered earlier in this section.
 - Use caution when vacuuming in the chamber area. Damage to chamber could result.

WARNING

Burn, scald hazard. Do not attempt to start burner when excess oil has accumulated, when unit is full of vapor, or when combustion chamber is very hot.

NOTICE

Use only number 2 fuel oil. Do not use gasoline, crankcase drainings or any oil containing gasoline.

OPERATING INSTRUCTIONS

TABLE 1 - BECKETT AFG SETTINGS

BOILER MODEL	HEAD TYPE	HEAD SETTING	STATIC PLATE	NOZZLE	PUMP PRESSURE [PSI]	AIR BAND	AIR SHUTTER
SFH-3085W(T)	L1	--	3 ³ / ₈	0.75-60°B	140	0	8
SFH-3100W(T)	L1	--	3 ³ / ₈	0.85-60°B	140	1	8
SFH-4100W(T)	V1	0	2 ³ / ₄	0.85-60°B	140	0	6
SFH-4125W(T)	V1	0	2 ³ / ₄	1.10-60°B	140	1	8
SFH-4145W(T)	V1	2	2 ³ / ₄	1.25-60°B	140	2	10
SFH-5160W(T)	F12	--	2 ³ / ₄	1.35-70°B	140	1	10
SFH-5185W(T)	F12	--	2 ³ / ₄	1.50-70°B	150	2	10
SFH-6175W(T)	F12	--	--	1.50-70°B	140	1	8
SFH-6210W(T)	F16	--	--	1.75-70°B	145	2	10

TABLE 2 - RIELLO 40F5/40F10 SETTINGS

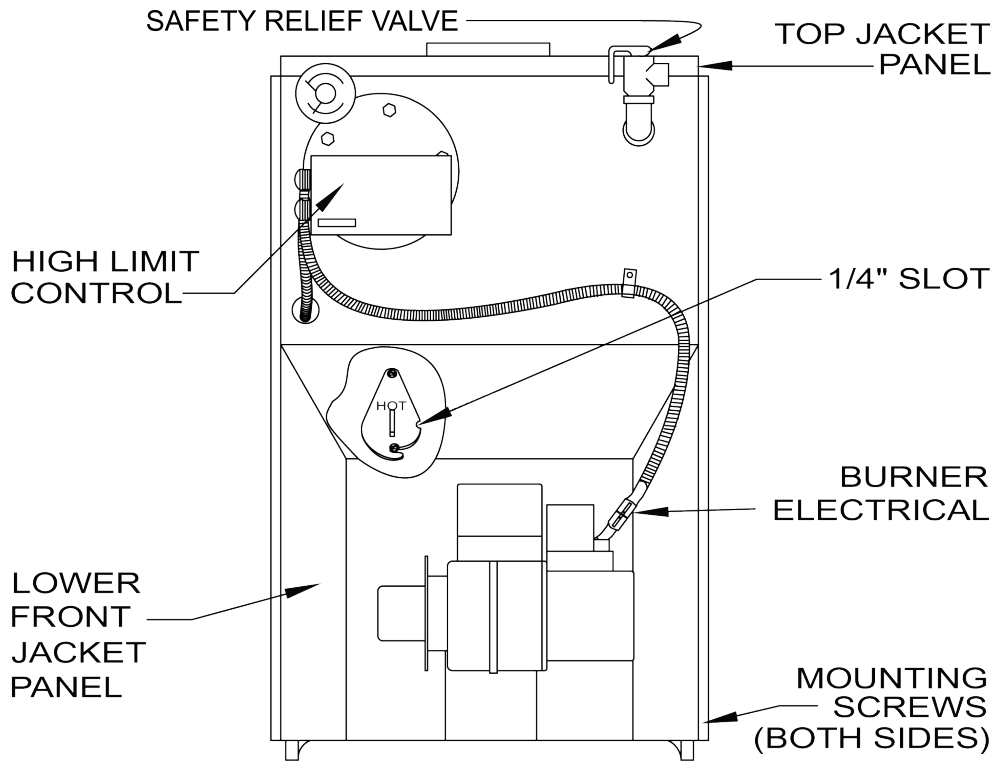
BOILER MODEL	RIELLO BURNER MODEL	BURNER INSERTION [INCHES]	NOZZLE	PUMP PRESSURE [PSI]	TURBULATOR SETTING	AIR GATE SETTING
SFH-3085W(T)	40F5	2.25	0.70x80°W	145	0.0	2.0
SFH-3100W(T)	40F5	2.25	0.85x80°W	145	1.0	2.5
SFH-4100W(T)	40F5	2.25	0.85x80°W	145	1.0	2.55
SFH-4125W(T)	40F5	2.25	1.00x80°W	155	2.0	4.0
SFH-4145W(T)	40F5	2.25	1.20x60°W	150	3.5	4.75
SFH-5160W(T)	40F5	2.25	1.35x60°W	145	4.0	5.75
SFH-5160W(T)	40F10	2.25	1.35x60°W	145	1.5	2.5
SFH-5185W(T)	40F10	2.25	1.50x60°B	150	2.0	3.0
SFH-6175W(T)	40F10	4.75	1.50x45°B	140	0.0	3.8
SFH-6210W(T)	40F10	4.75	1.75x45°B	145	2.0	4.75

TABLE 3 - CARLIN EZ-1/2 SETTINGS

BOILER MODEL	BURNER MODEL	FIRING RATE	NOZZLE MFR.	NOZZLE TYPE	PUMP PRESSURE [PSI]	HEAD BAR	AIR BAND SETTING	AIR SHUTTER
3085	EZ-1HP	0.85	DELAVAN	0.75 x 70 B	130	0.75	45%	BLANK
3100	EZ-1HP	1.00	DELAVAN	0.85 x 70 B	140	0.85/1.00	55%	BLANK
4100	EZ-1HP	1.00	DELAVAN	0.85 x 70 B	140	0.85/1.00	52%	BLANK
4125	EZ-1HP	1.25	DELAVAN	1.00 x 70 B	155	0.85/1.00	70%	BLANK
4145	EZ-1HP	1.45	DELAVAN	1.20 x 70 B	145	1.10/1.25	78%	BLANK
5160	EZ-2HP	1.60	DELAVAN	1.35 x 70 B	140	0.85/1.00	20%	3 SLOT
5185	EZ-2HP	1.85	DELAVAN	1.50 x 70 B	155	1.50	30%	3 SLOT
6175	EZ-2HP	1.75	DELAVAN	1.50 x 60 B	140	1.50	35%	3 SLOT
6210	EZ-2HP	2.10	DANFOSS	1.75 x 70 AS	145	1.65/1.75	65%	OPEN

Above settings are preliminary settings only. Final adjustments must be made using combustion test instruments as previously outlined in the Operating Instructions

Figure #26



Instructions For Closing Burner Swing Door

1. Swing burner and door to right until insulation is slightly compressed and stud is exposed.
2. Attach nut to stud and tighten until built in stop contacts the mounting door.
3. Replace oil line to burner.
4. Replace lower jacket panel, and tighten screws.
5. Connect power cable at factory supplied burner electrical disconnect.
6. Turn on power to boiler.
7. Bleed oil line.

SERVICE RECORD

Company Address & Phone #																			
Company Name & Tech Initials																			
Service Performed																			
Date																			

IMPORTANT

In accordance with Section 325 (f) (3) of the Energy Policy and Conservation Act, this boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases.

This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

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

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



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