



Series 4 Oil-Fired Water Boilers

Boiler Manual

- Installation
- Maintenance
- Startup
- Parts



⚠ WARNING

This manual must only be used by a qualified heating installer/service technician. BEFORE installing, read all instructions in this manual and all other information shipped with the boiler. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.



▲WARNING HOMEOWNER and SERVICE TECHNICIAN – read and follow completely.

Using this manual

Homeowner –

Read and follow all information on pages 1 through 7 ONLY.

Service technician –

Read and follow ALL information in the entire manual.

▲WARNING Failure to follow all instructions in proper order can cause severe personal injury, death or substantial property damage.

When calling or writing about the boiler

Please have boiler model number and series from boiler rating label and Consumer Protection (CP) number(s) from boiler jacket, burner and controls. On page 28 of this manual is space to list CP number(s).

Packaged, Semi-packaged, and knocked-down boilers

Packaged boilers: Available only in sizes 2 through 6, are factory assembled, completed with block, collector hood, jacket, controls and trim. Burner is ordered and shipped separately.

Semi-packaged boilers Available only in sizes 2 through 6, are shipped with block assembled with collector hood and jacket installed. Control, trim, and burner are ordered and shipped separately for field assembly.

Knocked-down boilers Available in sizes 2 through 9, are shipped with block assembled only. All other components are ordered and shipped separately for field assembly.

Hazard definitions

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

▲DANGER Indicates presence of hazards that will cause severe personal injury, death or substantial property damage.

▲WARNING Indicates presence of hazards that can cause severe personal injury, death or substantial property damage.

▲CAUTION Indicates presence of hazards that will or can cause minor personal injury or property damage.

NOTICE Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.



▲WARNING HOMEOWNER and SERVICE TECHNICIAN – read and follow completely.

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**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

Please read before proceeding

Homeowner —

- For homeowner or person responsible for simple start-up and routine maintenance of the system
- Instructions on pages 1 through page 7 must be followed to assure proper operation of your boiler. See page 7 for a list of common problems and possible corrections. In addition, it is your responsibility to:
 - Have boiler and burner installed by a qualified installer.
 - Have boiler and burner serviced annually by a qualified service technician.
 - Review and understand start-up and routine maintenance procedures with qualified service technician.
 - Perform routine maintenance as described on page 5.

Service technician —

- For a qualified service technician who has the necessary equipment to check the boiler and system performance, and is responsible for start-up and service of boiler and system.
- All instructions in this manual must be followed to assure proper operation of this boiler.
- Annually service boiler and burner to assure proper operation. See page 29 for service record.
- Review and explain start-up and routine maintenance procedures with homeowner.

▲DANGER Follow instructions below to prevent severe personal injury, death or substantial property damage:

- Do not use crankcase drainings or any oil containing gasoline. See burner manual for proper fuel oil.
- Do not attempt to start burner when excess oil has accumulated in combustion chamber, when unit is full of vapor, or when combustion chamber is very hot.
- Do not start burner unless collector hood, flue cap, jacket cap, breeching and burner mounting door are secured in place.
- Never burn garbage or paper in the boiler. Never leave combustible material around boiler.
- **DO NOT TAMPER WITH UNIT OR CONTROLS.** Always follow specific instructions when starting up boiler or performing routine maintenance or service.

▲WARNING Follow instructions below to prevent severe personal injury, death or substantial property damage:

- To avoid electric shock, disconnect electrical supply to burner service switch and additional external switches before performing service.
- To avoid severe burns, allow boiler to cool before performing service.
- Do not block flow of combustion or ventilation air to boiler.
- Boiler must be connected to a flue with sufficient draft at all times to assure proper operation.
- Do not use this boiler if any part has been under water. Electrical and mechanical failures may cause electric shock and fire risks. Immediately call a qualified service technician to inspect chimney or vent, boiler and burner. Have the boiler flue ways cleaned and have the following replaced:
 - all electrical and mechanical controls
 - electrical wiring
 - oil burner and controls
 - insulation and chamber lining

Tips for water systems —

- Check boiler and system piping for leaks. Continual makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer and causing cast iron to overheat, resulting in section failure.

▲CAUTION Failure to maintain recommended pH and repair leaks can cause section iron corrosion, leading to section failure and leaks. Do not use petroleum-based sealing or stop-leak compounds in boiler systems. Damage to system components can result, causing property damage.

- Boiler water pH 7.0 to 8.5 is recommended. For pH conditions outside 7.0 to 8.5 range or unusually hard water areas (above 7 grains hardness), consult local water treatment company.
- When using antifreeze:
 - Use antifreeze especially made for hydronic systems. Inhibited propylene glycol is recommended.

▲WARNING Do not use automotive, ethylene glycol, undiluted or petroleum-based antifreeze. Severe personal injury, death or substantial property damage can result.

- 50% solution provides protection to about -30°F .
- Local codes may require back-flow preventer or actual disconnect from city water supply.
- Determine quantity according to system water content. Boiler water content is listed on back cover of the manual.
- Percent of solution will affect sizing of heat distribution units, circulator and expansion tank.
- Follow antifreeze manufacturer's instructions.
- Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

Saltwater Damage — The exposure of boiler components to saltwater can have both immediate and long-term effects. While the immediate effects of saltwater damage are similar to those of freshwater (shorting out of electrical components, washing out of critical lubricants, etc.), the salt and other contaminants left behind can lead to longer term issues after the water is gone due to the conductive and corrosive nature of the salt residue. Therefore, Weil-McLain equipment contaminated with saltwater or polluted water will no longer be covered under warranty and should be replaced.

Electrical Damage — If any **electrical component** or **wiring** came into contact with water, or was suspected to have come into contact with water, replace the boiler with a new Weil-McLain boiler.

continued - top of next page



⚠ WARNING HOMEOWNER and SERVICE TECHNICIAN – read and follow completely.

⚠ CAUTION Frozen Water Damage Hazard

Residences or buildings that are unattended in severely cold weather, boiler system components failures, power outages, or other electrical system failures could result in frozen plumbing and water damage in a matter of hours. For your protection, take preventative actions such as having a security system installed that operates during power outages, senses low temperature, and initiates an effective action. Consult with your boiler contractor or a home security agency.

Routine maintenance schedule

<p>Beginning each heating season</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Call a qualified service technician to perform annual service.
<p>Daily during heating season</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.
<p>Weekly during heating season</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Check for and remove any obstructions to flow of combustion or ventilation air to boiler. <input type="checkbox"/> Check that breeching is attached between boiler and chimney. If breeching is loose or damaged, immediately turn off switch on boiler and call service technician to repair. <input type="checkbox"/> Check for oil leaks in oil piping and around burner. If found, immediately call qualified service technician to correct situation. <input type="checkbox"/> Check for water leaks in boiler and piping; also check for leaks around tankless heater plate, if installed. If found, immediately call service technician to repair.
<p>End of heating season</p>	<ul style="list-style-type: none"> <input type="checkbox"/> If tankless heater is installed, boiler will continue to operate. Check for the following: <ul style="list-style-type: none"> • All daily and weekly instructions listed on this page must be followed. • Burner motor may have to be oiled. Some motors are permanently lubricated and do not need additional oil. Check for oiling instructions on burner or motor.
<p>Boiler shutdown</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Do not drain boiler unless exposure to freezing temperatures will occur. <input type="checkbox"/> Always keep manual fuel supply shut off if burner is shut down for an extended period of time. <ul style="list-style-type: none"> • Turn off switch at boiler and any external switch to boiler. • Close fuel valves. • Turn off water feed valve. • Cover burner to protect from dust and dampness.



WARNING HOMEOWNER and SERVICE TECHNICIAN – read and follow completely.

Operation

WGO (see Figure 1)

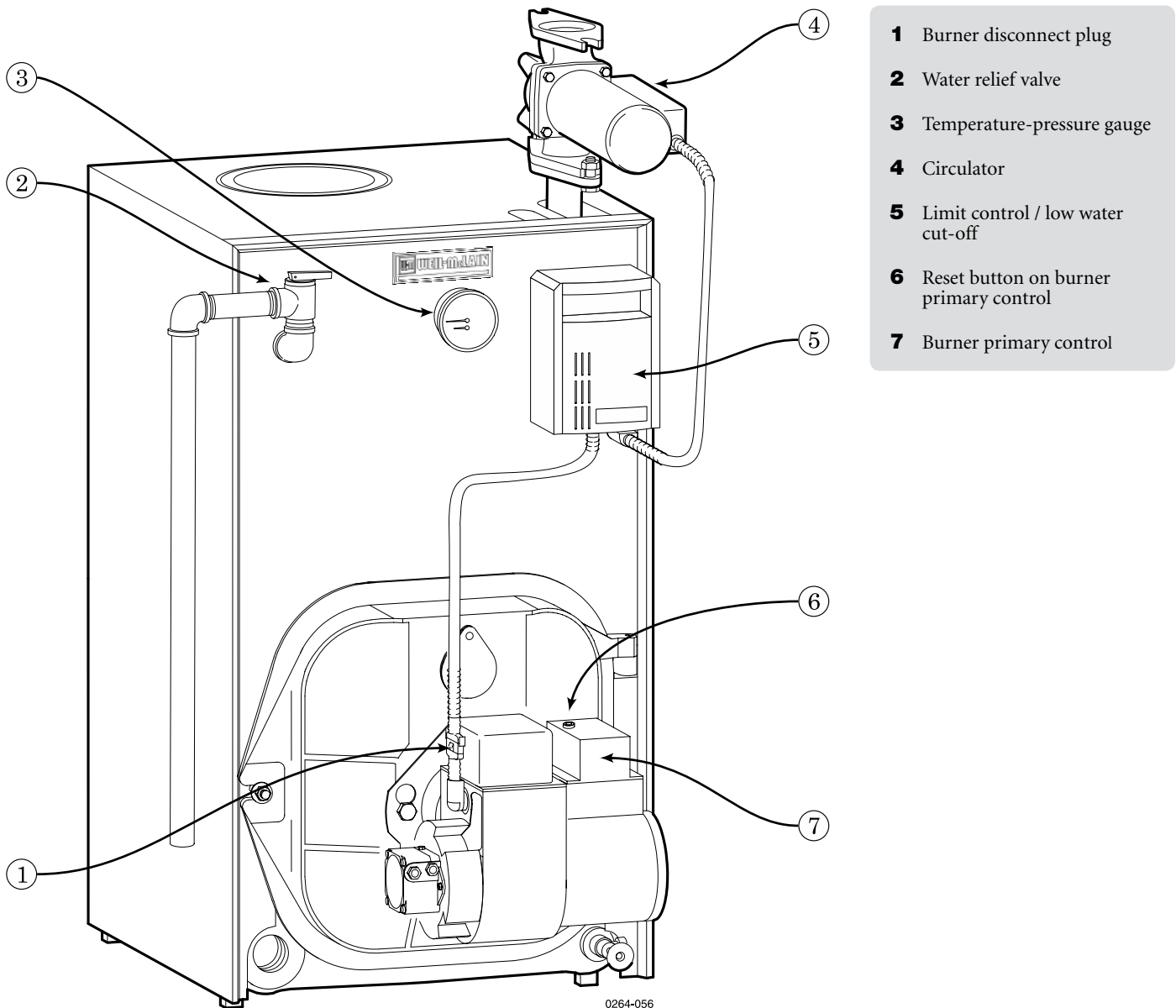
1. If burner does not fire, check for:
 - Service switch on control or additional switches turned off.
 - Fuses or breaker switch tripped.
 - Thermostat set below room temperature.
 - Fuel valves turned off.
 - Not enough oil in tank to supply burner.

2. Correct problems found in step #1. If burner does not fire, press reset button on burner primary control only once. Repeated presses will deposit oil in combustion chamber.

⚠ DANGER Burner must never be fired when oil is in combustion chamber. Immediately call qualified service technician.

3. If burner still does not fire, call qualified service technician.

Figure 1 WGO Boilers



- 1** Burner disconnect plug
- 2** Water relief valve
- 3** Temperature-pressure gauge
- 4** Circulator
- 5** Limit control / low water cut-off
- 6** Reset button on burner primary control
- 7** Burner primary control

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⚠ WARNING HOMEOWNER and SERVICE TECHNICIAN – read and follow completely.

Troubleshooting

⚠ WARNING Homeowners — The problems and corrections below represent common situations that can occur. There may be others not listed below. It is important always to contact a qualified service technician if you have any questions about the operation of your boiler or system.

Common Problems	Common Causes	Possible Corrections
Rapid cycling — burner turns on and off frequently.	Thermostat installed where drafts or heat affect reading.	Locate thermostat on inner wall away from heat sources or cool drafts.
	Heat anticipator in thermostat adjusted incorrectly.	Adjust heat anticipator to match current draw. Refer to boiler wiring diagram.
	Incorrect limit setting.	Have qualified service technician increase limit setting to decrease cycling. Maximum setting 220° F.
Need to frequently add makeup water.	Leaks in boiler or piping.	Have qualified service technician repair leaks at once to avoid constant use of makeup water.
Popping or percolating noise heard in boiler.	Mineral deposits in sections due to constant use of makeup water, or incorrect pH.	Have qualified service technician de-lime boiler, repair leaks at once to avoid constant use of makeup water and check pH (between 7.0 and 8.5).
Black water condition.	Oxygen corrosion due to leaks in piping. Improper pH.	Have qualified service technician repair leaks at once to avoid constant use of makeup water and check pH (between 7.0 and 8.5).
Frequent release of water through relief valve.	Expansion tank sized too small or water-logged.	Have qualified service technician check expansion tank operation.
Metal flakes found in flue way.	Contaminated combustion air supply in flue ways.	Remove sources of hydrocarbons in or near boiler area. (Bleaches, cleaners, chemicals, sprays, fabric softeners, paint remover, etc.)
	Condensation of combustion gases.	Have qualified service technician check burner nozzle and oil pump pressure for proper firing rate and check/adjust combustion settings with an analyzer.
Some radiators or baseboard units do not heat or are noisy.	Air in system.	Bleed air from system through air vents in radiators or baseboard units.
	Low system pressure.	Have qualified service technician check for leaks in boiler or piping at once.
	High limit set too low.	Have qualified service technician adjust limit to higher setting.
Domestic water from tankless heater is hot then suddenly turns cold. OR Domestic water from tankless heater is always lukewarm.	Mineral deposits insulate internal waterways of heater.	Have qualified service technician delime or replace coil.
	Boiler stop-leak compound has been added to boiler water and is insulating outside of coil.	Have qualified service technician remove and clean coil and drain, and flush boiler to remove stop-leak.
	Incorrect mixing valve setting for tankless heater.	Have qualified service technician adjust mixing valve setting.
	Domestic flow rate too high.	Have qualified service technician install flow check valve set to rating of tankless heater.
	Incorrect setting on tankless heater control.	Have qualified service technician raise tankless control setting. Adjust differential on tankless control to lower setting.



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Before installing boiler

⚠ DANGER Homeowner — STOP! The procedures and information on this and following pages are intended only for a qualified service technician who has the necessary equipment to inspect and adjust boiler and burner. A homeowner should never attempt these procedures. The service technician must also read pages 1 through 7 before proceeding.

Installations must comply with

United States

- State and local plumbing, heating and electrical codes.
- National codes where applicable.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, – latest edition, when required.
- National Electrical Code, ANSI/NFPA 70, – latest edition and any additional national, state or local codes.

Canada

- Canadian Standards Association, CSA B139, Installation Code for Oil-Burning Equipment - latest edition.
- CSA C22.1 Canadian Electrical Code Part One - latest edition.
- Applicable local or provincial codes.

Before selecting boiler location

Check for nearby connections to:

- System water piping.
- Chimney. See page 16. Boiler can be top or back vented.
- Combustion and ventilation air supply. See page 9.
- Oil supply. See page 26 for oil line routing.
- Electrical power.
- Check area around boiler. Remove any combustible materials, gasoline and other flammable liquids.

⚠ WARNING Failure to keep boiler area clear and free of combustible materials, gasoline and other flammable liquids and vapors can result in severe personal injury, death or substantial property damage.

Provide clearances around boiler (see Figure 2)

NOTICE Jacket cap must be in place on boiler to avoid requiring an 9" minimum clearance from back or top of boiler to combustible material.

MINIMUM clearances from vent pipe to combustible material

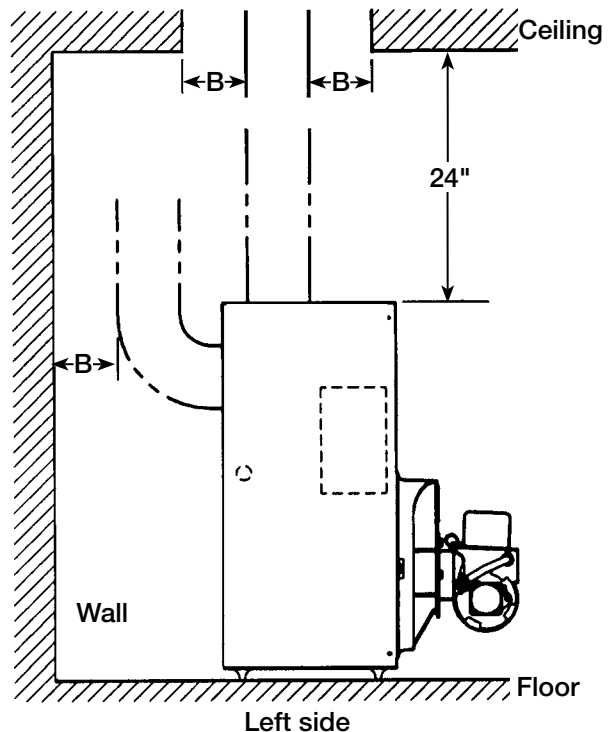
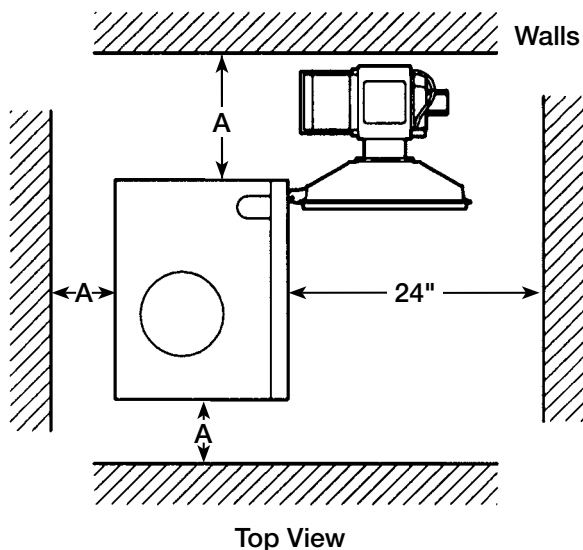
- 6 inches — Type "L" double-wall vent*
- 9 inches — Single-wall vent*

NOTICE Flue pipe clearances must take precedence over jacket clearances.

Recommended SERVICE clearances

- 24 inches — Front and top
- 6 inches — Left side, back and right side
- 12 inches — Right side for burner door swing radius
- Special close clearances (alcove, closet, under counters, etc.) — see Close Clearance Installation, page 31.

Figure 2 Recommended service clearances



A Provide 6" minimum clearance for service, provide 12" minimum clearance for burner door swing.
B Minimum clearance from vent pipe to combustible material: 6" for type "L" double-wall vent, 9" for single-wall vent.



▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Before installing boiler (continued)

Provide air for combustion and ventilation

▲WARNING Do not install exhaust fan in boiler room.

Adequate combustion and ventilation air:

- Assures proper combustion.
- Reduces risk of severe personal injury or death from possible flue gas leakage and carbon monoxide emissions.

Older buildings with single-pane windows, minimal weather-stripping and no vapor barrier often provide enough natural infiltration and ventilation without dedicated openings.

New construction or remodeled buildings are most often built tighter. Windows and doors are weather-stripped, vapor barriers are used and openings in walls are caulked. As a result, such tight construction is unlikely to allow proper natural air infiltration and ventilation.

Follow state, provincial or local codes when sizing adequate combustion and ventilation air openings. In absence of codes, use the following guidelines when boiler is in a confined room (defined by NFPA 31 as less than 7200 cubic feet per 1 GPH input of all appliances in area. A room 8 ft. high x 33.5 ft. x 33.5 ft. is 7200 cu. ft.).

Permanent Openings

Provide two permanent openings, one within 12 inches of ceiling, one within 12 inches of floor. Minimum height or length dimension of each rectangular opening should be at least 3 inches.

Inside air

When inside air is used, each opening must freely connect with areas having adequate infiltration from outside. Each opening should be at least 140 sq. in. per 1 GPH input (1 sq. in. per 1000 Btu input) of all fuel-burning appliances plus requirements for any equipment that can pull air from room (including clothes dryer and fireplace).

Outside air

When outside air is used, connect each opening directly or by ducts to the outdoors or to crawl or attic space that freely connects with outdoors. Size per below:

- Through outside wall or vertical ducts — at least 35 sq. in. per 1 GPH input (1 sq. in. per 4000 Btu input) of all fuel-burning appliances plus requirements for equipment that can pull air from room (including clothes dryer and fireplace).
- Through horizontal ducts — at least 70 sq. in. per 1 GPH boiler input (1 sq. in. per 2000 Btu input) of all fuel-burning appliances plus requirements for any equipment that can pull air from room (including clothes dryer and fireplace).

Where ducts are used, they should have same cross-sectional area as free area of openings to which they connect. Compensate for louver, grille or screen blockage when calculating free air openings. Refer to their manufacturer's instructions for details. If unknown, use:

- Wood louvers, which provide 20-25% free air.
 - Metal louvers or grilles, which provide 60-75% free air.
- Lock louvers in open position or interlock with equipment to prove open before boiler operation.

Foundation

Lay a foundation, if needed. Boiler may be installed on non-carpeted combustible flooring. Solid concrete blocks can be used to create a pad.

For residential garage installation, install boiler so burner is at least 18 inches above floor to avoid contact with gasoline fumes.

A level concrete or masonry foundation is required when:

- Floor could possibly become flooded.
- Non-level conditions exist.

Table 1 Boiler foundation sizes

Boiler Size	Length inches	Width inches	Minimum height inches
WGO-2	14	22	2
WGO-3	17	22	2
WGO-4	17	22	2
WGO-5	20	22	2
WGO-6	23	22	2
WGO-7	26	22	2
WGO-8	29	22	2
WGO-9	32	22	2

Installation instructions:
 Packaged boiler — Continued on page 10
 Semi-packaged and Knocked-down boiler — Continued on page 12

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler — Packaged boilers only

Place boiler

1. Remove circulator strapped to pallet.

NOTICE Circulator will be damaged if not removed before boiler is lifted from pallet.

2. Remove boiler from pallet.

NOTICE Do not drop boiler or bump jacket on floor or pallet. Damage to boiler can result.

▲CAUTION Smaller sized boilers may be top heavy. Use caution when handling to avoid minor personal injury or property damage.

3. Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 3, page 11):
 - a. Remove the jacket cap and the 8.00” diameter piece of insulation that covers the vent opening from the top jacket panel.
 - b. Loosen two (2) screws holding flue cap strap to collector hood. Remove strap and flue cap from opening. Re-tighten screws.
 - c. Check rope placement inside flue cap.

(Read **▲WARNING** under step #6 below).

- d. Loosen two (2) screws on back flue outlet. Set flue cap on outlet. Install strap by engaging slots in screws. Tighten screws. Make sure cap is securely installed.
- e. Place the jacket cap insulation disc in the back opening of the boiler covering the flue cap.
- f. Snap jacket cap in back outlet opening.

NOTICE Jacket cap and insulation disc must be in place on boiler to avoid requiring an 18” minimum clearance from back of boiler to combustible material.

4. Check level. Shim legs, if needed.
5. Check for secure placement of insulation on target wall, chamber floor and burner door.
6. Visually check:
 - a. Flue collector hood seal.
 - b. Burner mounting door seal.

▲WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

Perform hydrostatic pressure test

1. Remove relief valve installed in boiler.
2. Install air vent in “N” tapping on top boiler.
3. Plug supply and return tappings.
4. Drain valve is already factory-installed.
5. Fill boiler. Vent all air. Pressure test boiler at 1½ times working pressure.

▲WARNING Do not leave boiler unattended. Cold water fill can expand and damage cast iron, resulting in severe personal injury, death or substantial property damage.

6. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.
7. Drain boiler. Repair leaks if found.

▲CAUTION Do not use petroleum-based sealing compounds to repair leaks. Damage to system components can result, causing property damage.

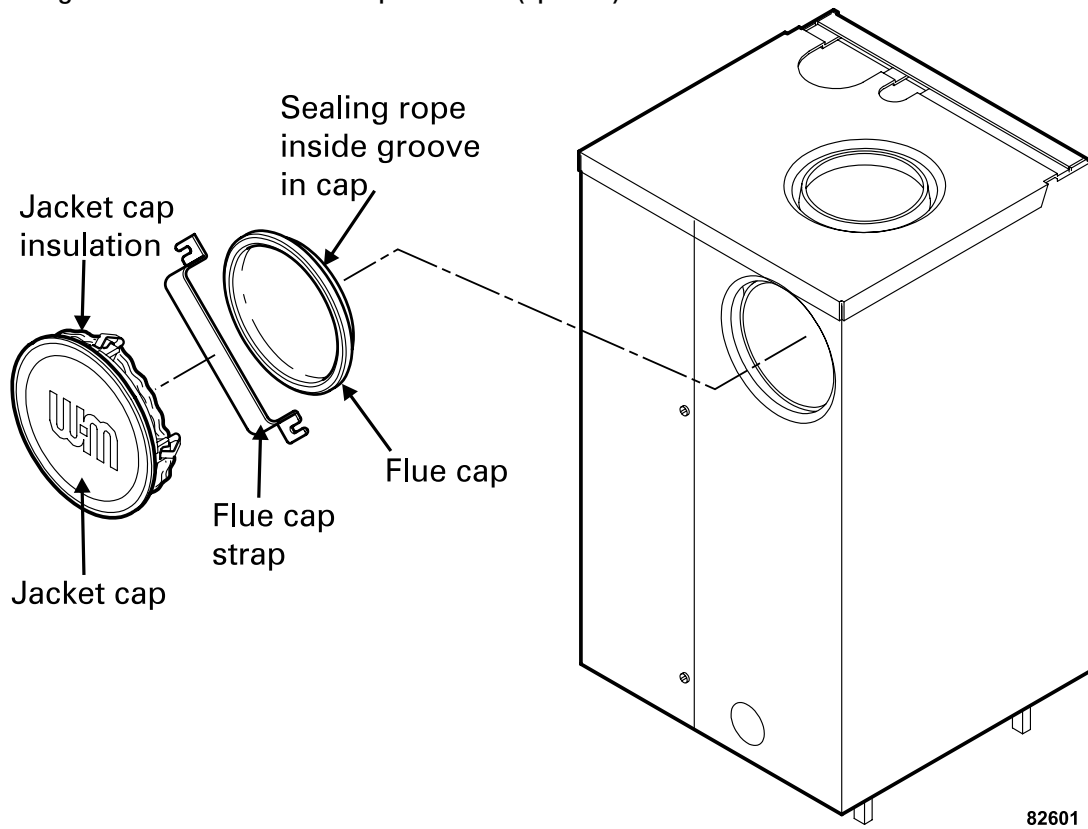
8. Retest boiler after repairing leaks.
9. Remove air vent and plugs. Reinstall relief valve.



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Install boiler – Packaged boilers only (continued)

Figure 3 Change from back flue outlet to top flue outlet (optional)



Instructions for Packaged boilers continued on page 15.

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler – Semi-packaged and Knocked-down boilers only

▲WARNING Fiberglass wool and ceramic fiber materials are possible cancer hazards. See warning on page 40.

Place boiler

Semi-packaged WGO-2 through 6 — position on site

▲CAUTION Smaller sized boilers may be top heavy. Use caution when handling to avoid minor personal injury or property damage.

Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 4, page 13):

1. Remove the jacket cap and the 8.00" diameter piece of insulation that covers the vent opening from the top jacket panel.
2. Loosen two (2) screws holding flue cap strap to collector hood. Remove strap and flue cap from opening. Re-tighten screws.
3. Check rope placement inside flue cap.
(Read **▲WARNING** above Step #1 on page 13.)
4. Loosen two (2) screws on back flue outlet. Set flue cap on outlet. Install strap by engaging slots in screws. Tighten screws. Make sure cap is securely installed.
5. Place the jacket cap insulation disc in the back opening of the boiler covering the flue cap.
6. Snap jacket cap in back outlet opening.

NOTICE Jacket cap and insulation disc must be in place on boiler to avoid requiring an 18" minimum clearance from back of boiler to combustible material.

Knocked-down WGO-7, 8 & 9 — split the assembled block for easier handling (see Figure 4, page 13)

1. Open burner mounting door and, using utility knife, slit floor insulation at joint to be separated.
2. Remove 5½" draw rod and the longest draw rod from each side. Pull block apart. Save draw rods, nuts, washers and sealing rings for reassembly.
3. Move divided block to location.
4. Clean port openings with clean rag.

▲CAUTION Do not use petroleum-based compounds to clean openings. Damage to system components can result, causing property damage.

5. Place rings in port openings. If ring slips out of groove, stretch ring gently for several seconds, then place in groove.
6. Position sections so aligning lugs fit into sockets of next section. Make sure sealing rope is in good condition and in position.
7. Oil threads on draw rods. Install washer and nut on end to be tightened. Use nut only on other end.
8. With wrench at washer/nut end, uniformly tighten nuts starting with 5½" rod at large port, 5½" rod at small port, bottom long rod and finally top long rod.
9. Torque on both 5½" rods and bottom long rod should be 50-60 ft. lbs.; long top rod should be 20-25 ft. lbs. Do not back-off nuts.
10. Metal-to-metal contact should be made around port openings. If gap does exist, it should be less than .020". Check with feeler gauge.
11. If gap around port openings exceeds .020", check for dirt on port openings, sockets or misaligned lugs. If corrections are made and gap still exists, contact our Technical Services group for assistance before continuing installation.



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Install boiler – Semi-packaged and Knocked-down boilers only (continued)

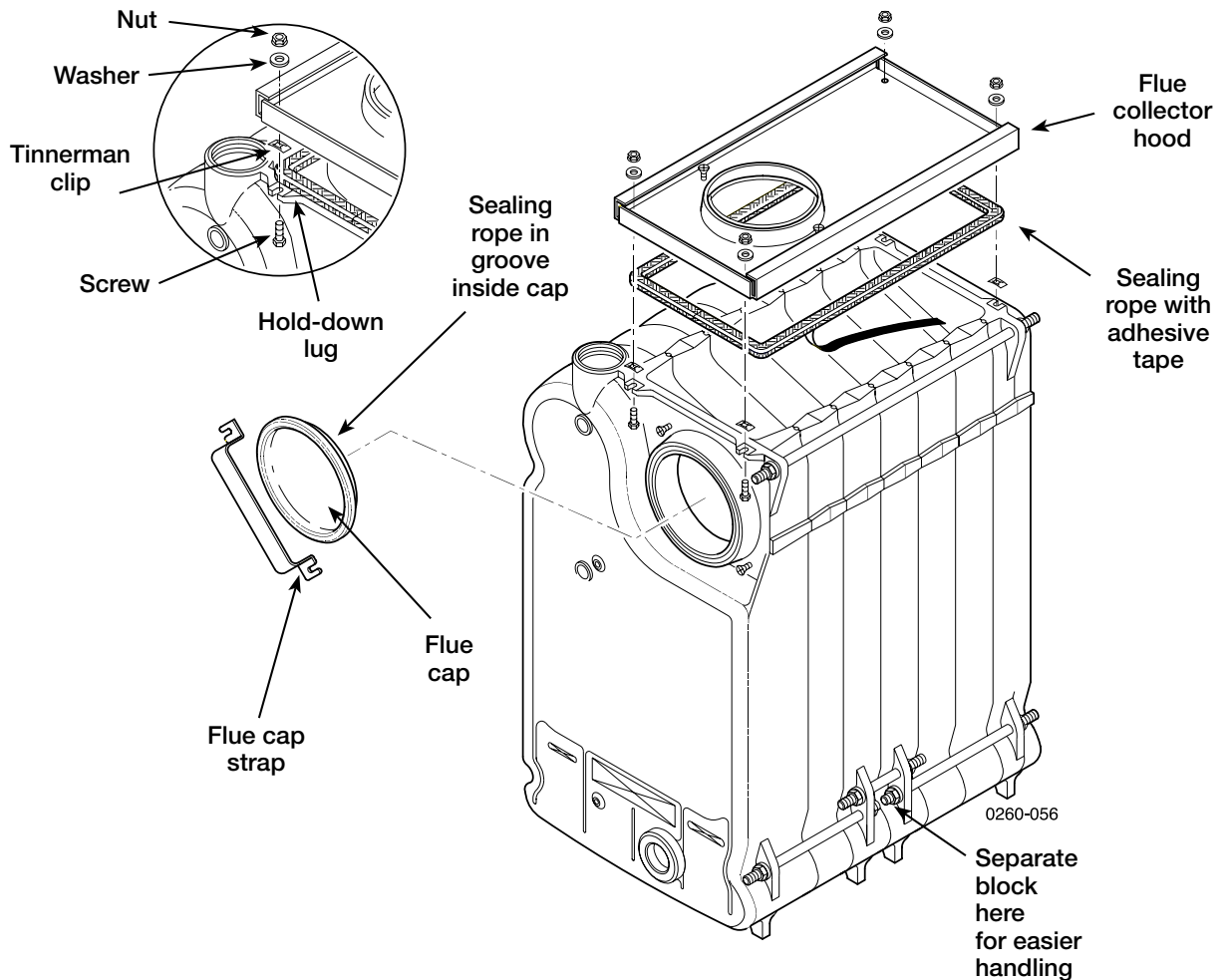
Knocked-down WGO-2 through 9 – install flue collector hood (see Figure 4)

WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

1. Thread Tinnerman clip on screw so that clip fits snugly in notch of hold-down lug. Screw must not turn.
2. Remove paper on sealing rope. Starting at back section near flue collar, position sealing rope around top of block with adhesive side to sections. Do not stretch rope. Make sure rope ends meet. Trim excess rope.
3. Position flue collector hood on top of boiler sections and over screws and clips as shown in Figure 4.

4. Install washers and nuts. Tighten nuts until collector hood makes contact with Tinnerman clip.
5. Flue Cap
 - Back flue outlet boiler — Position flue cap and strap over opening in flue collector hood. Make sure rope in cap is in place and in good condition. Tighten strap to hood with screws provided.
 - Top flue outlet boiler — Position flue cap and strap over opening in back section. Make sure rope in cap is in place and in good condition. Tighten strap to boiler with screws provided in section. Install remaining screws in holes in flue collector hood.
6. Check level. Shim legs, if needed.

Figure 4 Change from back flue outlet to top flue outlet (optional)





▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler – Semi-packaged and Knocked-down boilers only (continued)

Perform hydrostatic pressure test

1. See Figure 5 and Control Tapping table to install:
 - a. Boiler drain.
 - b. Water pressure gauge (test only). Be sure gauge can handle test pressure.
 - c. Air vent in upper “N” tapping.
 - d. Plugs in remaining tappings.
2. Fill boiler. Vent all air. Pressure test boiler at 1½ times working pressure. For boilers split and reassembled, test between 75 and 85 psig.

▲WARNING Do not leave boiler unattended. Cold water fill could expand and damage cast iron, resulting in severe personal injury, death or substantial property damage.

3. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.
4. Drain boiler. Repair leaks if found.

▲CAUTION Do not use petroleum-based compounds to repair leaks. Damage to system components can result, causing property damage.

5. Re-test boiler after repairing leaks.

6. Remove pressure gauge, air vent and plugs from tappings used for controls.
7. Visually check:
 - a. Sealing rope placement.
 - b. Metal-to-metal contact around port openings.
 - c. Flue collector hood seal.
 - d. Burner mounting door seal.

▲WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

Install jacket (knocked-down boilers only sizes 7 through 9 only)

Before installing jacket, remove burner mounting door. See jacket instructions for details.

Install boiler controls

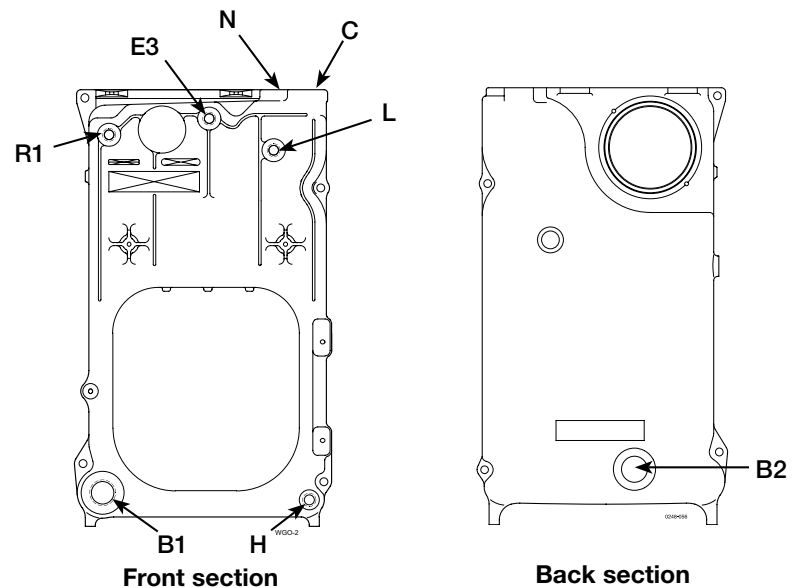
See Control Tapping Table 2 and Figures 5 and Figure 6, page 15 to install controls.

1. Install limit control. If not furnished, use high limit with maximum 220°F setting.
2. Affix Consumer Protection (CP) number label(s) on jacket front panel.

Table 2 Control tappings

Location	Size	Function
B1	1½"	Return piping
B2	1½"	Alternate return piping for A/B WGO
C	1½"	Supply piping
E3	¼"	Pressure-temperature gauge
H	¾"	Drain valve
L	¾"	High limit control
N	½"	Air vent or expansion tank piping
R1	¾"	Relief valve

Figure 5 Control tapping locations





WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Install burner – all boilers

Install burner

(also refer to instructions packed with burner)

NOTICE Use only burners specified for use on Weil-McLain oil boilers. Contact individual burner manufacturers for proper burner selections.

For burners with OEM welded flanges:

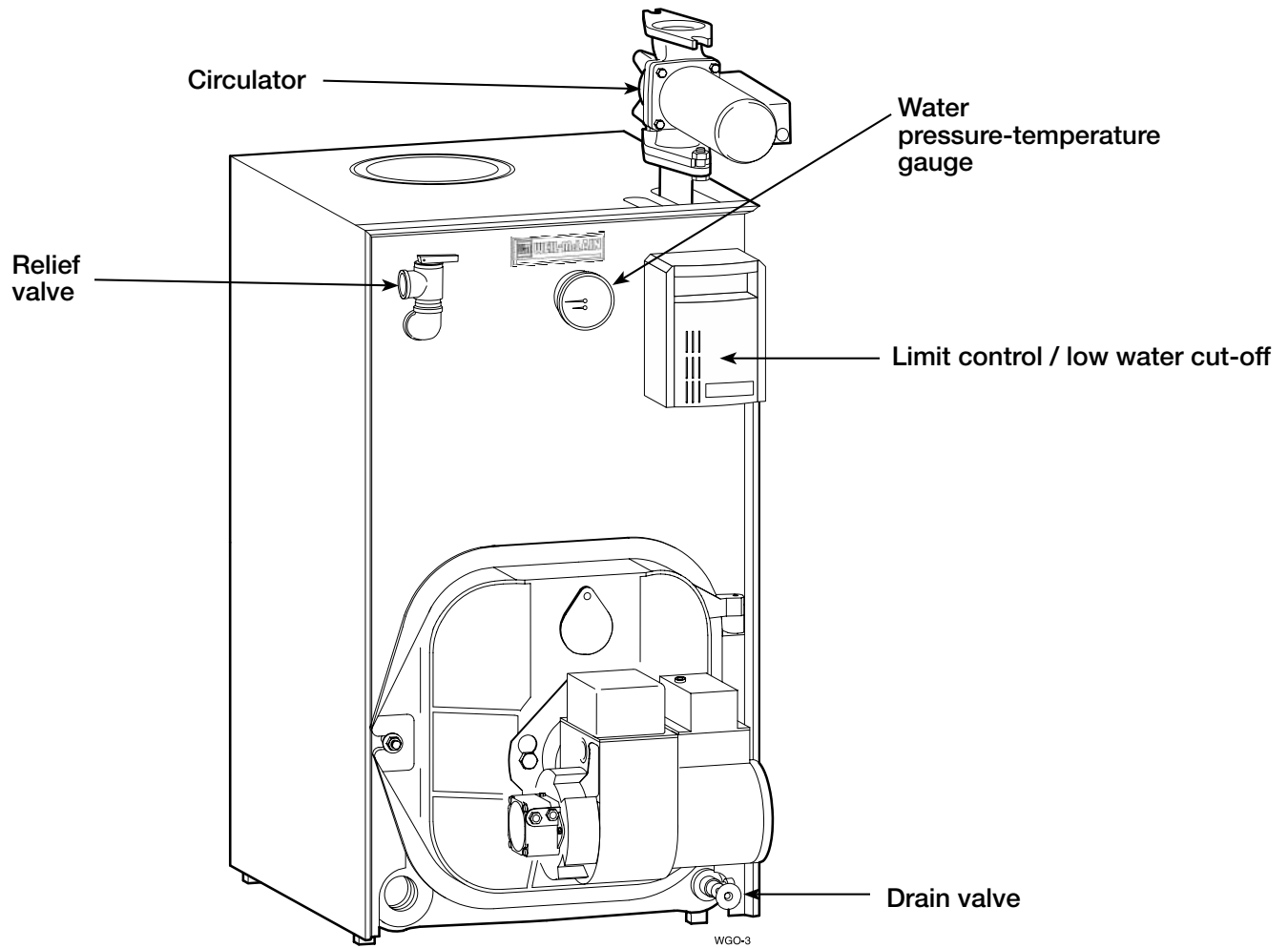
1. Secure mounting flange and gasket to burner mounting door. Use three (3) bolts provided.
2. Open door to verify secure placement of insulation on target wall, chamber floor and burner mounting door.

3. Securely close door and tighten nut.

For burners without OEM welded flanges:

1. Secure universal mounting flange and gasket to burner mounting door. Use three (3) bolts provided.
2. Secure burner on flange with three (3) bolts.
3. Position burner so end of air tube is level to 1½-degree tilt down toward chamber. Open door to verify burner position. End of air tube should be flush to ¼” recessed from inside wall of burner door refractory. Check for secure placement of insulation on target wall, chamber floor and burner mounting door.
4. Securely close door and tighten nut.

Figure 6 Water boiler controls





▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect breeching

General chimney requirements

- Designed for natural draft firing. Connect boiler to vertical chimney.
- Insufficient draft can cause flue gas leakage and carbon monoxide emissions, which will lead to severe personal injury or death.
- Use vent material approved by local codes for oil-fired burners. In their absence, refer to:
 - NFPA 31 – latest edition, Installation of Oil-Burning Equipment.
 - NFPA 211 – latest edition, Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
 - In Canada, refer to CSA B139, Installation Code for Oil-Burning Equipment.
- NFPA 211 requires chimney to be lined before connected to boiler.
- Inspect existing chimney before installing new boiler. Failure to do any of the following will result in severe personal injury or death:
- Clean chimney, including removal of blockage.
- Repair or replace damaged pipe or liner.
- Repair mortar and joints.
- To prevent downdrafts, extend chimney at least 3 feet above highest point where it passes through roof and 2 feet higher than any portion of building within 10 feet. Increase chimney cross-sectional area and height at least 4% per 1,000 feet above sea level.
- Minimum clearances from vent pipe to combustible material:
 - 6 inches — Type “L” double-wall vent
 - 9 inches — Single-wall vent
- Minimum chimney sizes should be used.

NOTICE Oversized chimneys, outside masonry chimneys and/or derated inputs can result in condensation in chimney.

Connect breeching:

▲WARNING Long horizontal breechings, excessive number of tees and elbows or other obstructions restricting combustion gas flow can result in possibility of condensation, flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

1. Install two (2) flue pipe brackets.
2. Connect full-sized breeching when possible. See Minimum Chimney Size, see Table 3.
 - Back outlet — see Figures 7 and 9, page 17.
 - Top outlet — see Figures 8 and 10, page 17.
3. Connection must be made above bottom of chimney to avoid blockage. Breeching must not enter chimney far enough to cause obstruction. Use thimble or slip joint where breeching enters chimney to allow removal for cleaning.
4. When burner and boiler are properly installed, draft overfire will be approximately -0.01” to -0.02” W.C. Install barometric control in breeching, per control manufacturer’s instructions, when excess draft needs to be relieved or to comply with applicable codes and regulations. Use draft gauge to adjust proper opening.

Table 3 Minimum chimney sizes

Boiler Size	Minimum breeching diameter (Note 3)	Minimum AHRI chimney size		Minimum chimney height
		Rect.	Round	
WGO-2	5"	8" x 8" (Note 1)	6"	15'
WGO-3				
WGO-4	6"	8" x 8" (Note 1)	7"	15'
WGO-5	6"			
WGO-6	7"			
WGO-7				
WGO-8	7"	8" x 12" (Note 2)	7"	20'
WGO-9				

NOTE:

1. 6¼" x 6¼" inside liner.
2. 6½" x 10½" inside liner.
3. Flue collar on boiler is 7" diameter

5. An induced draft fan for the chimney may be necessary if:
 - Excessive resistance to flow of combustion gases can be expected.
 - Cross-sectional area of chimney is smaller than minimum recommended.
 - Chimney height is less than recommended.

▲WARNING Seal all vent joints. Interlock burner with fan operation.

6. Boiler models ending in “D”, such as WGO-3D, require the installation of the Field Controls OVD-7 automatic damper kit, Weil-McLain part number 381-800-515. Refer to Figures 7 and 8, page 17.



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect breaching (continued)

Figure 7 Back Outlet Breaching for models which require a vent damper.

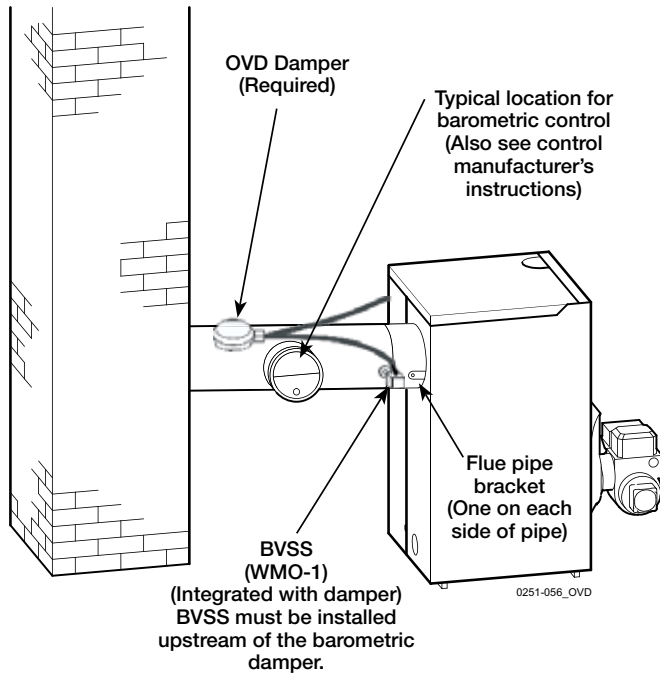


Figure 9 Back outlet breaching connection for models which do not require a vent damper.

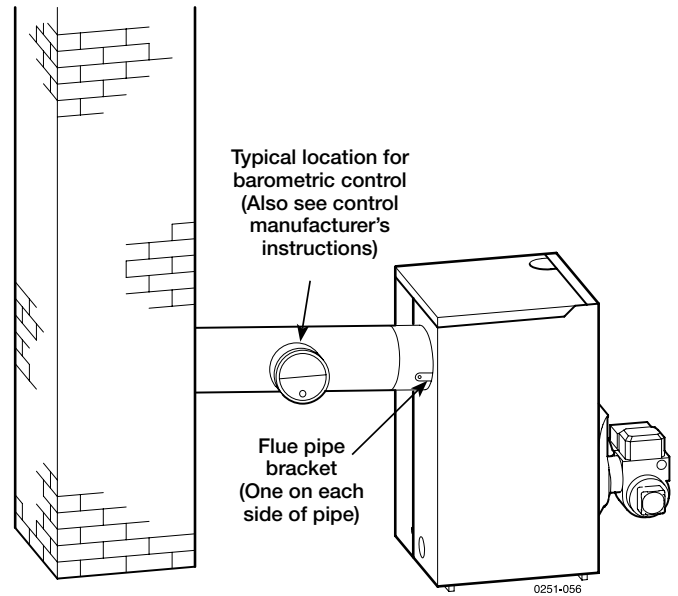


Figure 8 Top Outlet Breaching for models which require a vent damper.

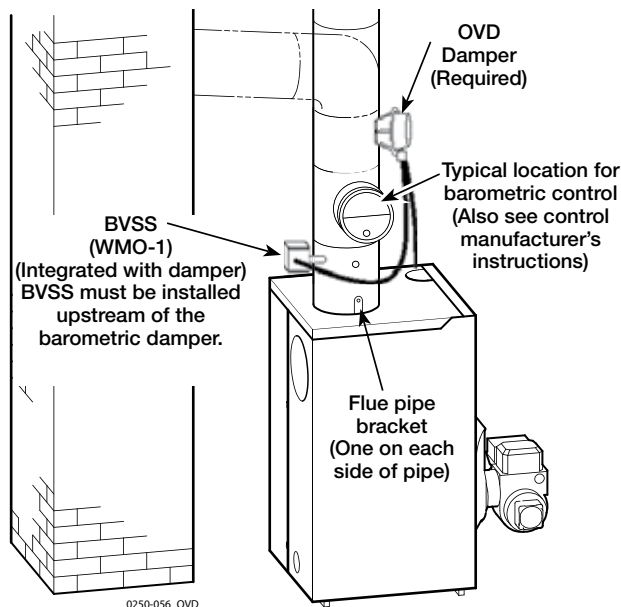
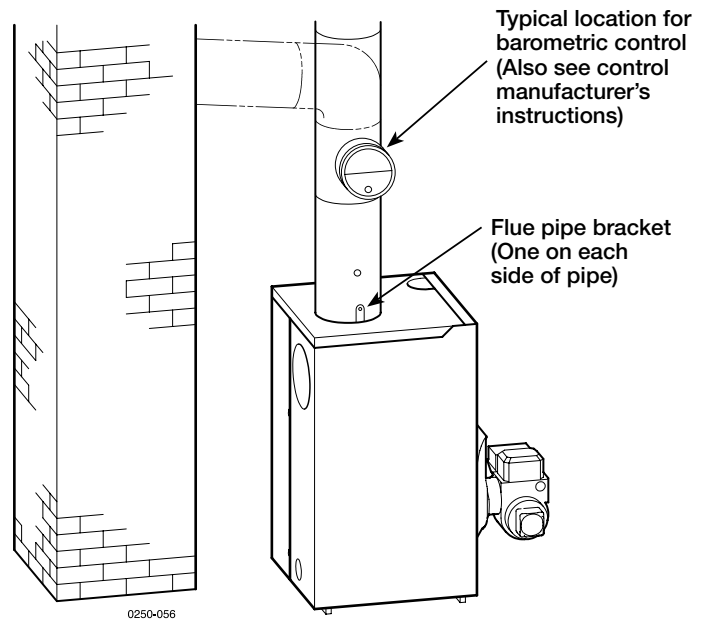


Figure 10 Top outlet breaching connection for models which do not require a vent damper.





▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect water piping

General piping information

- All Packaged WGO boilers are shipped with an installed combination temperature limit control/low water cut-off.
- If installation is to comply with ASME, an additional high temperature limit is needed. If installation is to comply with Canadian requirements, an additional high temperature limit may be needed. Consult local inspector. Install control in supply piping between boiler and isolation valve. Set control to a minimum of 20°F above set point of combination control. Maximum allowable set point is 220°F. Wire control as shown on wiring diagram.
- Use back flow check valve in cold water supply as required by local codes.

Install piping

- See Figures 11 or Figure 12, page 19, and Table 4 for near-boiler piping and single-zone piping. See page 20 to complete multiple-zone piping or page 21 to complete piping for systems operating below 140°F.
- For multiple-boiler piping, contact Weil-McLain Technical Services for assistance, if required.
- Install relief valve vertically in “R1” tapping on front of boiler. See Figure 11 or Figure 12 and also refer to tag attached to relief valve for manufacturer’s instructions.

▲WARNING Pipe relief valve discharge line near floor close to floor drain to eliminate potential of severe burns. Do not pipe to any area where freezing could occur. Do not plug, valve or place any obstruction in discharge line.

DIAPHRAGM expansion tank (Figure 11, page 19)

- Make sure expansion tank size will handle boiler and system water volume and temperature. Tank must be located near boiler before inlet to circulator. See tank manufacturer’s instructions for details.
- Undersized expansion tanks cause system water to be lost from relief valve and makeup water added through fill valve. Eventual section failure can result.
- Install automatic air vent in “N” tapping as shown in Figure 11.

CLOSED expansion tank (Figure 12, page 19)

- Ensure expansion tank size will handle boiler and system water volume and temperature.

▲WARNING Undersized expansion tanks cause system water to be lost from relief valve and makeup water added through fill valve. Eventual section failure can result.

- Connect tank from “N” tapping shown in Figure 12, page 19 to expansion tank. Use ½" NPT piping. Pitch any horizontal piping up towards tank 1 inch per 5 feet of piping.

To connect WGO boilers to indirect-fired water heaters

Install and wire per water heater manual provided with water heater.

Table 4 Water piping sizes

Boiler Size	To system	From system
WGO-2	1"	1"
WGO-3	1¼"	1¼"
WGO-4	1¼"	1¼"
WGO-5	1½"	1½"
WGO-6	1½"	1½"
WGO-7	1½"	1½"
WGO-8	2"	2"
WGO-9	2"	2"

* All piping sizes based on 20°F temperature rise through boiler.



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect water piping (continued)

Figure 11 Piping with DIAPHRAGM expansion tank

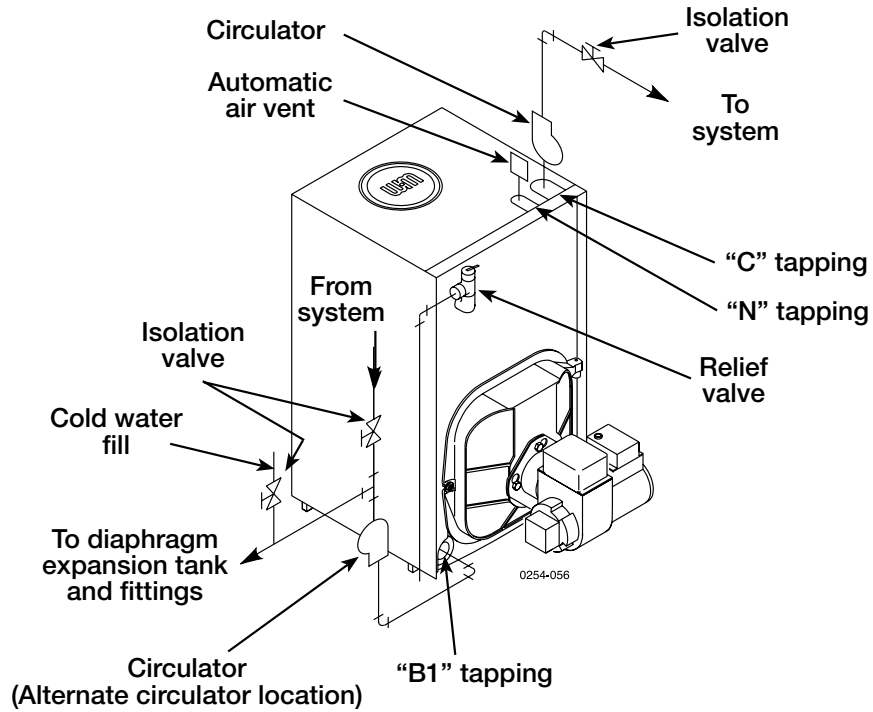
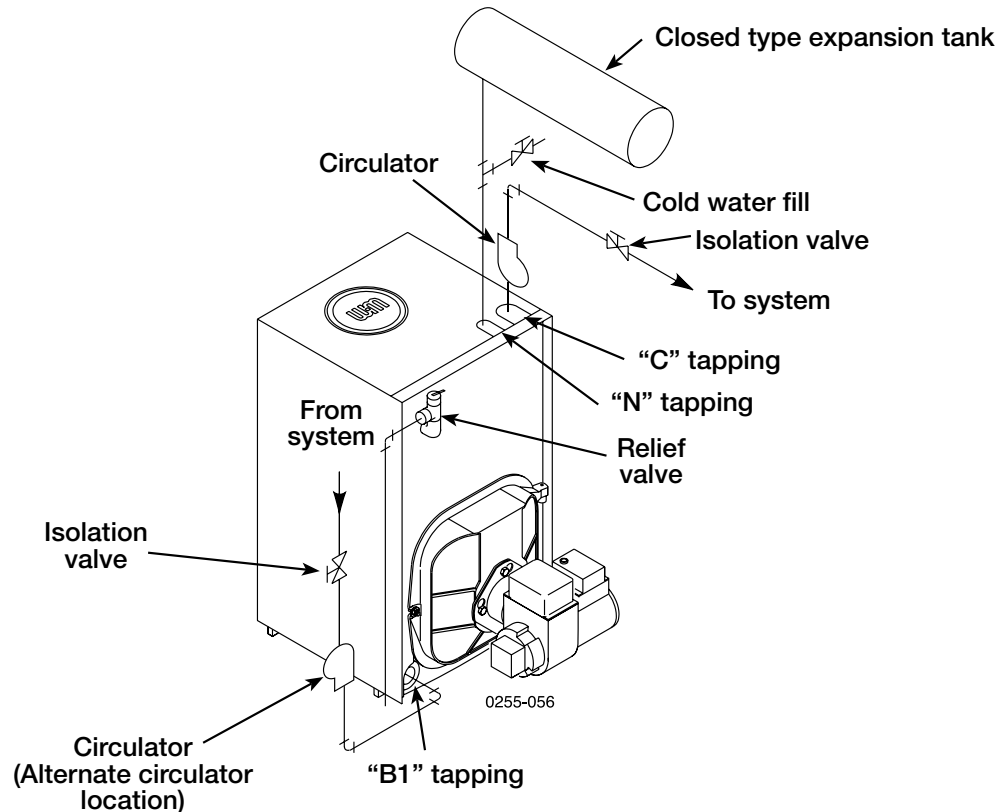


Figure 12 Piping with CLOSED expansion tank





WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect water piping (continued)

Piping MULTIPLE ZONES

Follow instructions on page 18 and page 19 to install piping near boiler.

See Figure 13 or Figure 14 to complete installation.

Zoning with circulators:

1. Size each circulator to individual circuit requirements.
2. Install balancing valves to adjust flow to distribute heat to all zones.
3. Separate relay is required for each circulator.

Zoning with zone valves:

1. Install balancing valves to adjust flow to distribute heat to all zones.
2. Separate transformer is required to power zone valves. Refer to manufacturers installation instructions for wiring or contact our Technical Services group for assistance.
3. Pressure bypass valve recommended on zone valve systems to prevent excessive flow in a single zone or water hammer when valves close.

Figure 13 Multiple zoning with CIRCULATORS

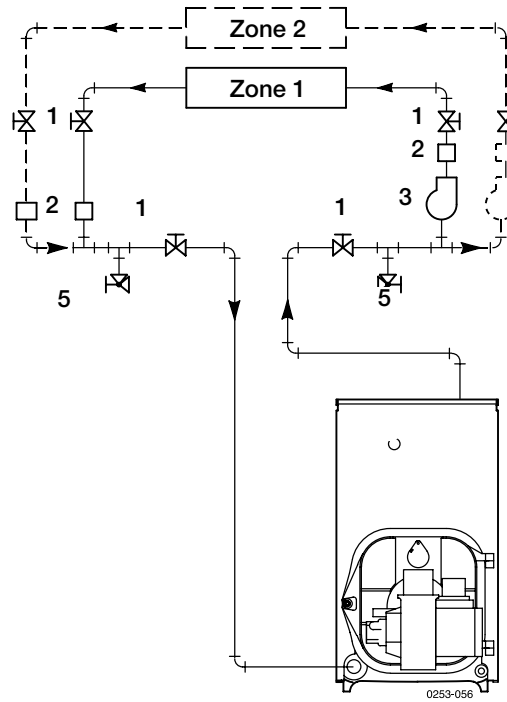
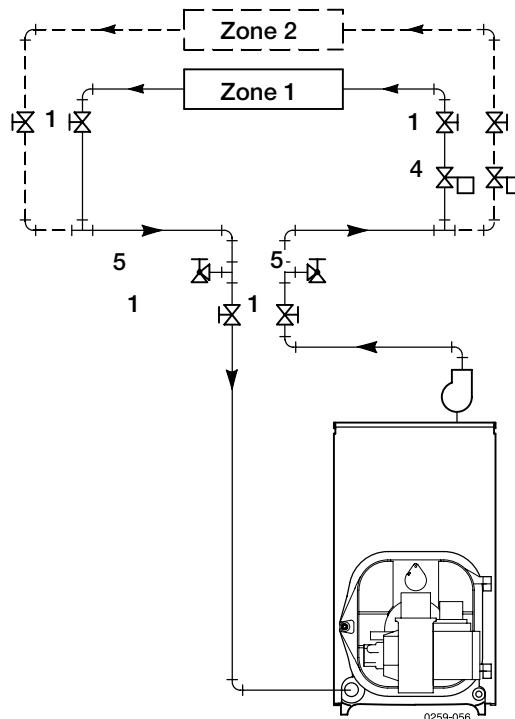


Figure 14 Multiple zoning with ZONE VALVES



Legend	
1	Isolation valve
2	Flow control valve
3	Circulator
4	Zone valve
5	Drain valve



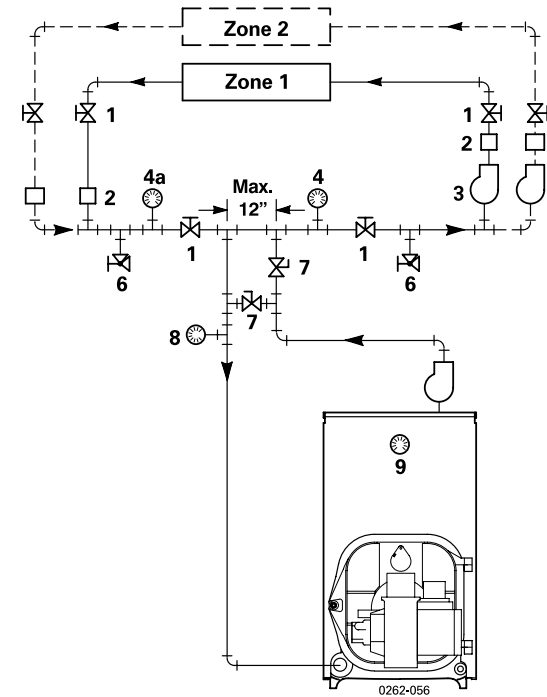
WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect water piping (continued)

Piping for systems requiring temperatures below 140°F

In most systems, this type of piping is not required. If system water temperature requirements are less than 140°F, such as radiant panels or converted gravity systems, use piping as shown in Figure 15 or Figure 16. If system piping is plastic without an oxygen barrier, a heat exchanger must be used.

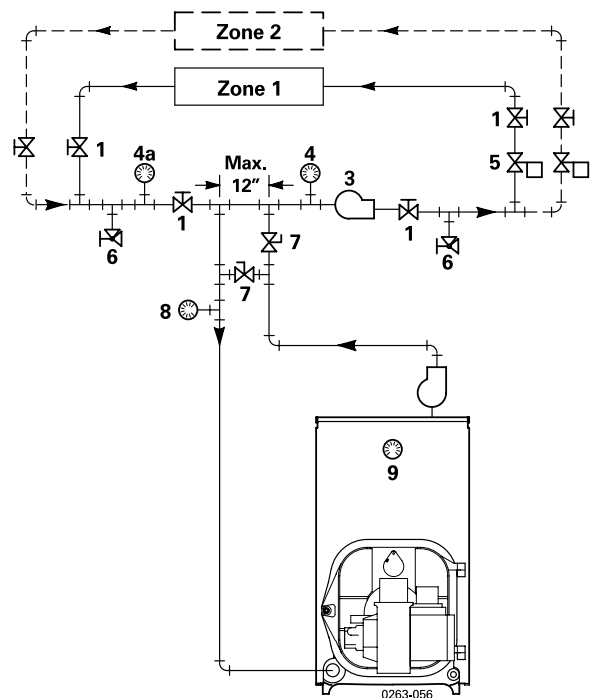
Figure 15 Piping with CIRCULATORS



Legend

- | | |
|-----------------------------------|--|
| 1 Isolation valve | 7 System temperature valves
Adjust valves so that:
- the temperature at gauge 8 is at least 140°F
- the temperature at gauge 9 is at least 160°F |
| 2 Flow control valve | 8 Blend temperature gauge |
| 3 Circulator | 9 Boiler temperature gauge |
| 4 System temperature gauge | |
| 5 Zone valve | |
| 6 Drain valve | |

Figure 16 Piping with ZONE VALVES



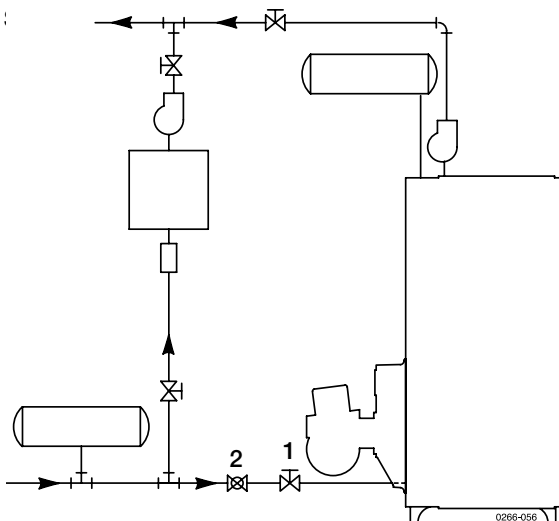
**▲WARNING** SERVICE TECHNICIAN ONLY – read and follow completely.

Connect water piping

(continued)

Use with refrigeration systems

- Install boiler so that chilled medium is piped in parallel with heating boiler. Use appropriate valves to prevent chilled medium from entering boiler. Consult AHRI Installation and Piping Guides.
- If boiler is connected to heating coils located in air handling units where they can be exposed to refrigerated air, use flow control valves or other automatic means to prevent gravity circulation during cooling cycle.

Figure 17 Use with refrigeration system**1** Isolation valve**2** Balancing valve

Connect wiring

General wiring requirements

▲WARNING **Electric shock hazard** – Can cause severe personal injury or death if power source, including service switch on boiler, is not disconnected before installing or servicing.

- Installations must follow these codes:
 - National Electrical Code, ANSI/NFPA 70, – latest edition and any additional national, state or local codes.
 - In Canada, CSA C22.1 Canadian Electrical Code Part 1 and any local codes.
- Wiring must be NEC Class 1. If original wire as supplied with boiler must be replaced, type 105°C wire or equivalent must be used. Supply wiring to boiler and additional control wiring must be 14 gauge or heavier.
- Provide electrical ground at boiler as required by codes.

Thermostat wiring

- Install thermostat on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sun rays or fireplaces.
- Follow instructions with thermostat. If it has a heat anticipator, set heat anticipator in thermostat to match power requirements of equipment connected to it. Boiler wiring diagrams give setting for standard equipment.

Zone Valve Wiring

▲CAUTION **DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler.** When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in possible severe property damage.

4- wire zone valves may be connected directly to the boiler control.



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect wiring (continued)

General wiring

- Packaged boilers have harnesses furnished.
- For Semi-packaged and Knocked-down boilers, trim kits are furnished with burner and limit harnesses integrated with Hydrolevel control.
- All field-provided high voltage wiring must be sheathed in flexible metal conduit.
- Connect incoming line voltage “HOT” wire to service switch, and neutral wire to white wire. Field-install equipment ground wire to green wire with wire nut inside Hydrolevel control.
- Service switch is integrated into the Hydrolevel control.
- Some local codes may require an emergency shut-off switch installed at a location away from boiler. Follow local codes.

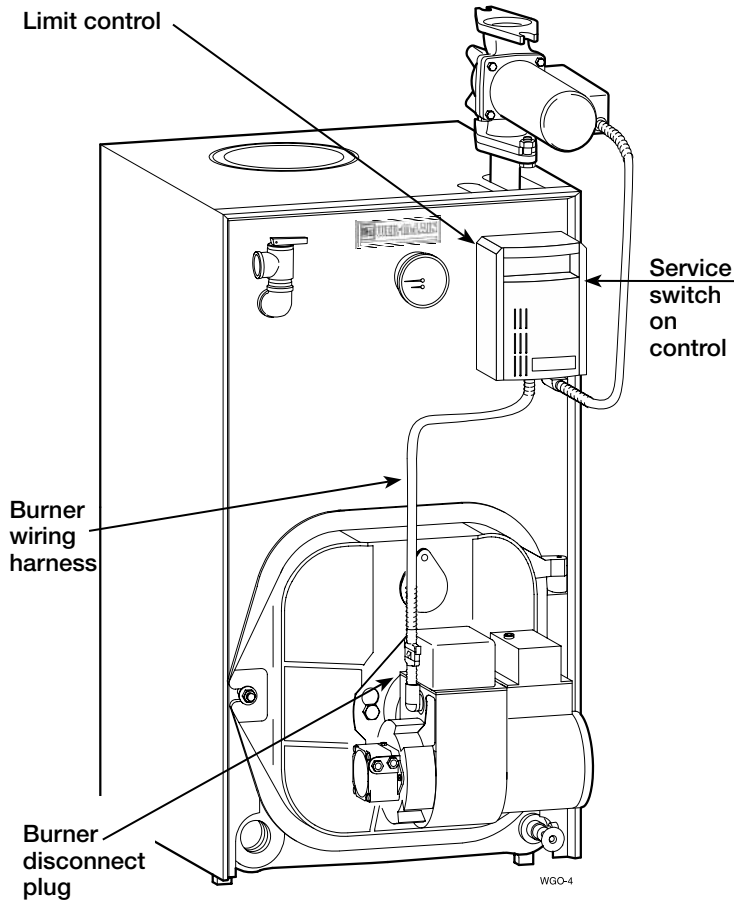
Burner wiring

- Burner harness incorporates a disconnect plug, providing a convenient way to disconnect wiring when burner mounting door is opened.
- All Packaged boilers have a power disconnect plug installed on combination limit control.
- The burner is provided with a burner disconnect plug as shown in Figure 18. For burners in which the disconnect plug is not factory-wired, connect the threaded conduit coupling of the disconnect plug wire harness (P/N 591-391-850, included in water trim carton) to the burner housing and route the wires to make all connections in burner junction box as shown in boiler wiring diagram.

High temperature limit

- To comply with ASME, UL 726 or Canadian requirements, an additional high temperature limit is needed.
- Install the secondary control in the supply piping between boiler and isolation valve.
- Set the control to a minimum of 20°F above the set point of the combination control.
- The maximum allowable set point is 220°F.
- Wire the control as shown on page 24.

Figure 18 Boiler wiring for forced hot water



THE LIMIT CONTROL SUPPLIED WITH THE BOILER MUST BE SET-UP WITH THERMAL PREPURGE OR THERMAL TARGETING ACTIVE UNLESS EXEMPTED BELOW:

IMPORTANT

In accordance with **Section 303 of the 2007 Energy 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 (not applicable to WGO boilers).



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect wiring (continued)

Figure 19 Wiring diagram

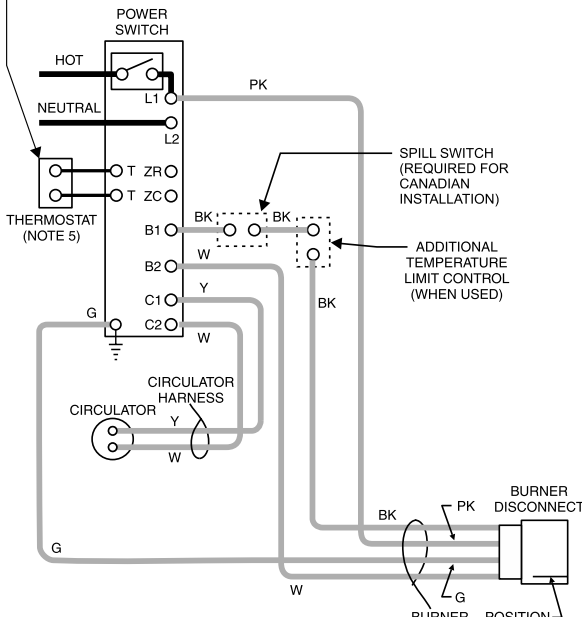
Boiler Wiring

WARNING Electrical shock hazard — can cause severe injury or death. Disconnect power before installing or servicing.

CAUTION **DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler.** When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in possible severe property damage.

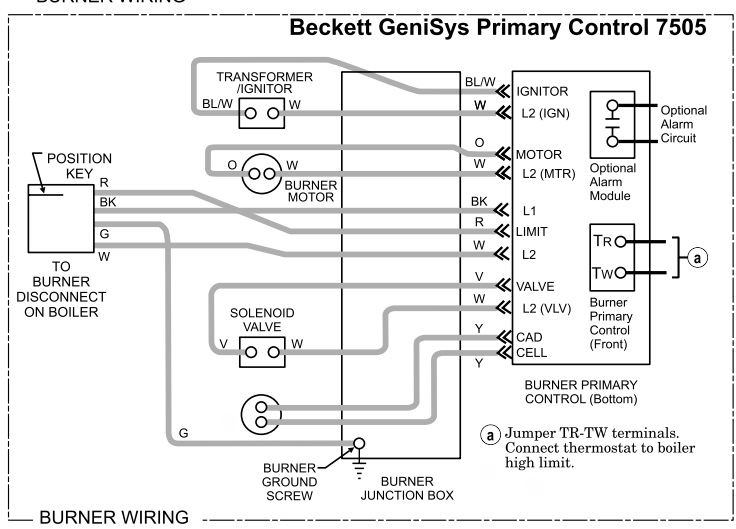
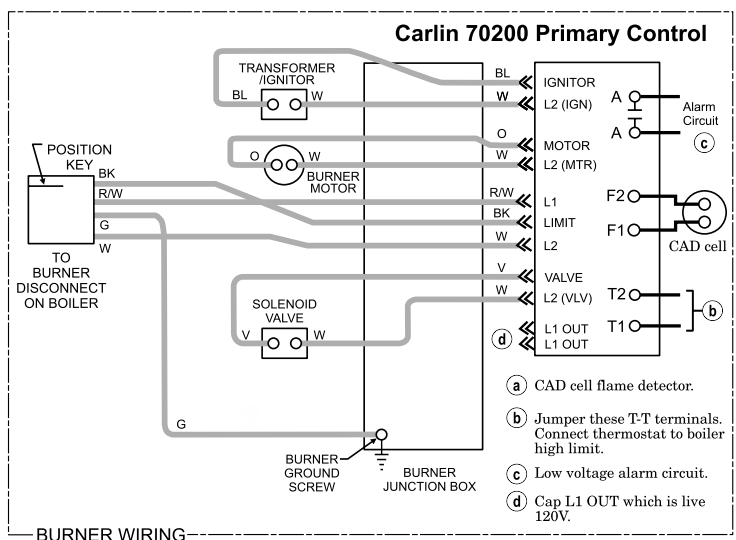
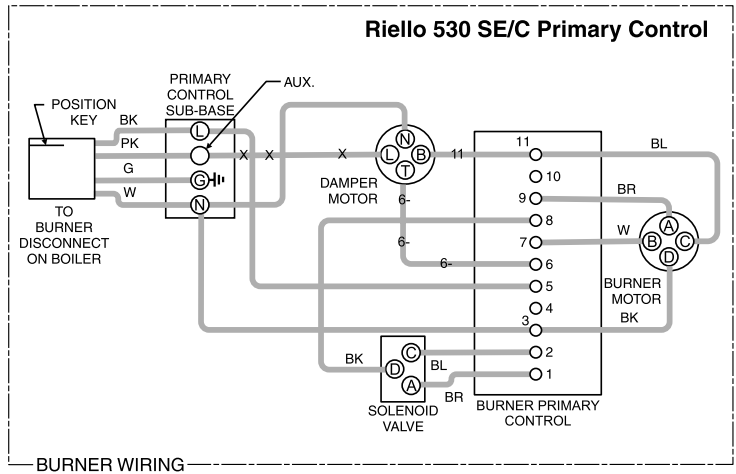
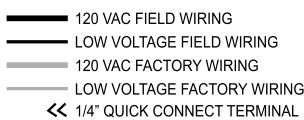
Low Limit Setting:

WGO - Set to "OFF"
WTGO - Set Low Limit Temperature



NOTICE Burners with Beckett Clean Cut Pump must be used with a primary control that has a valve-on delay (pre-purge). Controls shown have valve on delay (see control manufacturer's instructions for timings).

- NOTES:
- All wiring must be installed in accordance with N.E.C. and any other national, state, or local code requirements. For Canadian installations, all wiring must comply with the Canadian Electrical Code.
 - All wiring must be N.E.C. Class 1.
 - Refer to control component instructions packed with the boiler for application information.
 - If any of the original wire as supplied with the appliance must be replaced, use minimum 105 °C wire or equivalent.
 - Set thermostat heat anticipator as per control manufacturer's recommendations.



WGO | **WTGO**
 2 thru 9 | 3 thru 9

WGO
 • Water without tankless heater
WTGO
 • Water with tankless heater



Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388

PART NUMBER 550-200-018/0417





WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect wiring – blocked vent shutoff switch option

Blocked vent shutoff switch

NOTICE In Canada, blocked vent shutoff switch kit (see parts list page 34) must be installed. See Figure 20.

When using the OVD damper kit, the BVSS is required, and is integrated into the damper harness wiring.

When using the BVSS without the OVD damper, the BVSS is wired directly to the Combination limit control as follows.

The wiring diagram in Figure 21 shows boiler wiring only up to the burner disconnect. For additional information, refer to manufacturer’s instructions.

WARNING **Electric shock hazard** – Turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

After installing BVSS switch, proceed as follows:

1. Disconnect power.
2. Install Shutoff Switch (BVSS) Wiring Harness (P/N 591-391-942, which is included in BVSS kit P/N 591-624-650) as follows:
 - a. Remove cover from BVSS Box.
 - b. Install straight fitting end of the harness on the BVSS Box. Install elbow (90°) end fitting on the right side of the Hydrolevel control.
 - c. Install both the fork ends to the screw terminals on the BVSS Switch as per the wiring diagram, (see Figure 21).
 - d. Replace BVSS box cover.
 - e. Locate Combination Control, remove cover, and disconnect red wire from “B1” terminal.
 - f. If red wire from Step “e” has uninsulated female end, replace it with insulated female end as supplied in kit.
 - g. Connect female end of Shutoff Switch BVSS Harness (blue wire) to “B1” terminal.
 - h. Connect male end of Shutoff Switch BVSS Harness to the red wire removed in Step “e”.
 - i. Replace Combination Control Cover.
3. Turn on power and verify safe operation of the appliance.
4. Restore boiler to normal operation.

Figure 20 Blocked vent shutoff switch installation

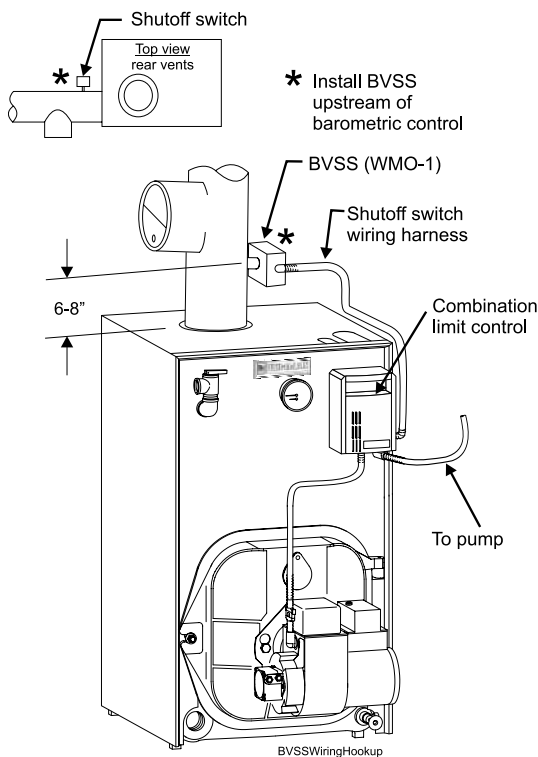
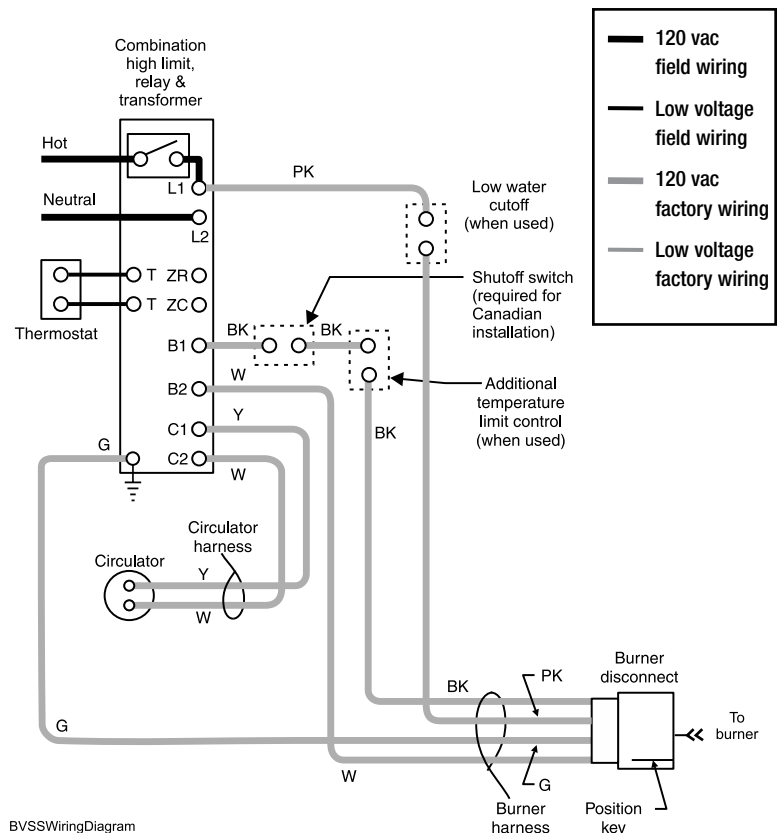


Figure 21 BVSS wiring diagram



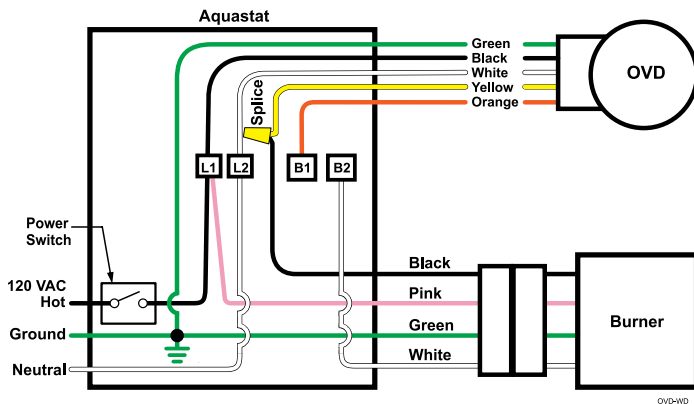


▲WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Connect wiring - vent damper

1. WGO Boiler models ending in “D”, such as WGO-3D, require the installation of the Field Controls OVD-7 damper, Weil-McLain part number 381-800-515, sold separately.
2. To configure the WGO boiler as a model ending in “RD” and to obtain the Energy Star labels, install the specific Energy Savings Damper Kit listed in Table 7 on page 36.
3. When installing the boiler, wire all controls from vent damper and thermal switch in accordance with the OVD damper manual and the following wire diagram.
4. Connect damper wires to the boiler as follows:
 - a. Remove black wire (burner disconnect harness) from the B1 terminal, and connect that wire to the yellow wire from damper, using a wire nut.
 - b. Connect the orange wire from the damper to the B1 screw terminal.
 - c. Connect the black wire from the damper to the L1 screw terminal.
 - d. Connect the white wire from the damper to the L2 screw terminal.
 - e. Connect the green wire from the damper to ground.

Figure 22 OVD Vent damper wiring diagram



Connect oil piping

General oil piping requirements

- Location and installation of oil tanks, oil piping and burners must follow:
 - NFPA 31- latest edition, Standard for the Installation of Oil-Burning Equipment.
 - In Canada, CSA B139, Installation of Oil-Burning Equipment.
 - Local codes and regulations.
 - Information provided with burner and fuel pump.
- If any part of fuel oil tank is above level of burner, installation of an anti-siphon device is highly recommended to be used to prevent flow of oil in case of oil line break.
- Support oil lines as required by codes.
- Make tank connections with swing joints or copper tubing to prevent breaking in case the tank settles. Make swing joints so they will tighten as tank settles. Non-hardening pipe joint compounds should be used on all threads.

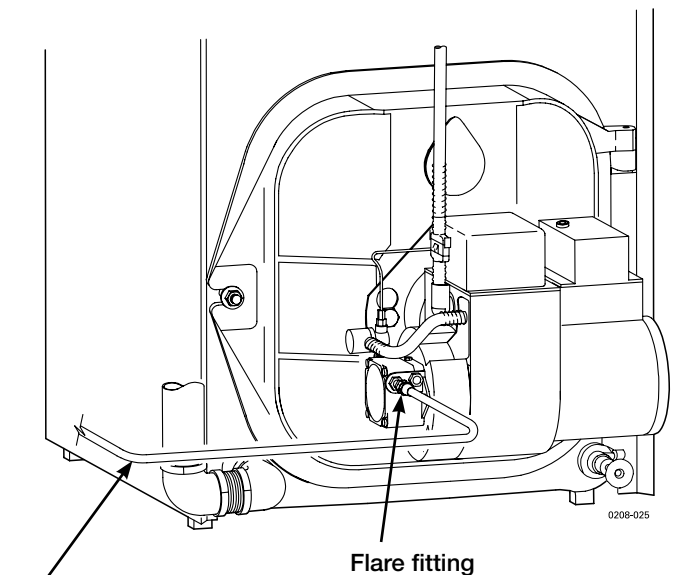
▲WARNING Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Do not use compression fittings.

- Underground pipe must be run in a casing to prevent oil leaking into ground or under floor. Check local codes for information.

Oil piping connection at burner

See Figure 23 for recommended connection at burner, allowing burner mounting door to swing open completely for servicing.

Figure 23 Recommended oil piping connection to burner



See local codes for appropriate arrangement and piping of filter control valves, etc., back to oil tank.



Start-up

Fill the system

1. Close manual and automatic air vents and boiler drain cock.
2. Fill to correct system pressure. Correct pressure will vary with each installation. Normal cold water fill pressure for residential systems is 12 psig. Boiler water pH 7.0 to 8.5 is recommended.

NOTICE Failure to maintain recommended pH level can cause section failure and leaks.

3. Open automatic air vent one turn.
4. Open other vents.
 - a. Starting on the lowest floor, open air vents one at a time until water squirts out. Close vent.
 - b. Repeat with remaining vents.
5. Refill to correct pressure.

When using antifreeze

▲WARNING Do not use automotive, ethylene glycol, undiluted or petroleum-based antifreeze. Severe personal injury, death or substantial property damage can result.

- Use antifreeze especially made for hydronic systems. Inhibited propylene glycol is recommended.
- 50% solution provides protection to about -30°F. Do not exceed 50% mixture.
- Local codes may require back-flow preventer or actual disconnect from city water supply.
- Determine quantity according to system water content. Boiler water content is listed on back cover of manual. Percent of solution will affect sizing of heat distribution units, circulator and expansion tank.
- Follow antifreeze manufacturer's instructions.
- Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

To place in operation

1. Verify boiler is filled with water.
2. Open burner mounting door and verify rear target wall, floor and burner door insulations are in proper position.
3. Verify burner mounting door is closed tightly and burner wiring harness is connected to Hydrolevel control.
4. Factory burner adjustment and settings may not be suitable for specific job conditions. See Close Clearance Installation, page 31.

NOTICE A burner nozzle change may be required - refer to the burner instructions or boiler's rating label for correct nozzle selection

▲WARNING Make final burner adjustments using combustion test equipment to assure proper operation. Do not fire boiler without water. Sections will overheat, damaging boiler and resulting in substantial property damage.

5. Vent air from system. Repeat steps 4 and 5 under "Fill the system." Air in system can interfere with water circulation and cause improper heat distribution.
6. Check boiler and system piping for leaks. See "Tips for water systems" on page 4.
7. Inspect breeching and venting for proper operation.



▲WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Check-out procedure

Check off steps as completed

- Boiler and heat distribution units filled with water?
- Automatic air vent, if used, opened one full turn?
- Air purged from system? Piping checked for leaks?
- Air purged from oil piping? Piping checked for leaks?
- Flue cap in place and tightened? Burner door closed, sealed and nut tight? Burner plugged in and service switch on?
- Proper draft and burner flame? Final adjustment made with combustion test equipment?
- Test limit control: While burner is operating, move indicator on limit control below actual boiler water temperature. Burner should go off while circulator continues to operate. Raise setting on limit control above water temperature and burner should re-ignite.
- Test additional field-installed controls: If boiler has a low water cutoff, additional high limit or other controls, test

▲WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

operation as outlined by the manufacturer. Burner should be operating and should go off when controls are tested. When controls are restored, burner should re-ignite.

- Limit control set to system temperature requirements (max. 220°F)?
- For multiple zones, flow adjusted to distribute heat in all zones?
- Thermostat heat anticipator setting (if available) set properly? Refer to “Connect wiring,” page 22 .
- Boiler cycled with thermostat? Raise to highest setting and verify boiler goes through normal start-up cycle. Lower to lowest setting and verify boiler goes off.
- Observed several operating cycles for proper operation?
- Set room thermostat(s) to desired room temperature?
- Completed Installation and Service Certificate below?
- Reviewed pages 1–7 with owner or maintenance person and instructed person to keep for future reference?
- Returned all instructions provided with boiler to its envelope and placed with boiler for future reference?

Installation and service certificate

Installation and service certificate

Date Installed: _____

Boiler Model Number: _____ Series: _____

Consumer Protection (CP) Number(s): _____

Measured Btu or GPH Input: _____

Installer: _____

(Company)

(Address)

(Phone)

(Installer’s Signature)

- Installation instructions have been followed.
- Check-out procedure has been performed.
- Above information is certified to be correct.
- Information received and left with owner/ maintenance person.



▲WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Annual service check list

Annual Service Call Checklist (follow in order listed below)		Dates										Comments	
1	Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.												
2	Check for and remove any obstruction to combustion and ventilation air flow to boiler.												
3	Check breeching and chimney or vent for obstructions, damage, etc. Repair or replace as necessary.												
4	Clean boiler flue ways. Figure 24, page 30.												
5	Perform service on relief valve and circulator. See page 30.												
6	Check boiler and piping for leaks and repair if found. Check for leaks at tankless heater plate. Tighten nuts only if leaks are found (for WGO torque to 20-25 ft.lbs.).												
7	Inspect and adjust burner. See burner manual and: <ul style="list-style-type: none"> • change nozzle. • check ignition electrode settings. • clean blower housing and wheel. • make sure blower wheel turns freely. • oil burner motor if required. • clean air inlet. • clean or change fuel filter and strainer. 												
8	Make sure boiler is filled with water.												
9	Start unit and verify combustion settings with combustion test equipment. See page 31.												
10	Verify operation of all controls on boiler. See page 28.												
Any parts of the boiler furnished by Weil-McLain must be replaced by parts listed in Weil-McLain Boiler and Repair Parts Book.													

Controls requiring annual service

Water Relief Valve

Check operation of water relief valve. Follow instructions on label fastened to relief valve.



Scald potential. Do not check operation of relief valve unless discharge piping has been installed according to Boiler Manual. If piping is not in place, a qualified service technician must properly install piping.

Circulator

Follow oil-lubricating instructions on circulator. Over-oiling will damage circulator. Water-lubricated circulators do not need oiling.

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

Detailed service procedures

Cleaning boiler flue ways

▲DANGER Make sure all electrical connections to boiler are turned off and wait until boiler is warm, not hot, before cleaning. Failure to do so will result in severe personal injury, death or substantial property damage.

1. **Top flue boilers** -remove breeching and jacket top panel.
Rear flue boilers - remove jacket top panel.
2. Remove flue collector hood, saving hardware for reassembly.
3. Shut off oil valves. Arrange drip pans under the areas of oil piping that will be disconnected. Disconnect oil line at burner so that you can swing open the door completely.
4. Line combustion chamber floor with newspaper to catch any soot that will be loosened in the cleaning process.
5. Starting at the top of the boiler, use a wire flue brush to thoroughly clean between all pins at all angles. Be careful not to damage side walls of rear refractory.
6. Move to the bottom of the flue ways and clean up between the sections to reach pins left uncleaned in step #5.
7. Once the flue ways are cleaned, carefully remove the paper from the floor of the combustion chamber.
8. Verify sealing rope around flue area is intact. Visually check condition and position of insulation in combustion chamber floor, and the refractories at the rear of boiler and in the burner mounting door. Replace any parts as necessary.
9. Close burner mounting door and tighten nut securely. Place flue collector hood on top of boiler. Secure with hardware from step #2.

▲WARNING Maintain a gas-tight seal to avoid possible flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

10. Check breeching for sooting and clean if necessary. Install jacket top panel and breeching.
11. Reconnect oil line and all electrical connections.

General description of control operation

Automatic air vent

Air is released when cap is unscrewed one turn. If air vent leaks, remove small cap on top of vent, push in stem of valve and then release to clean valve seat. Screw cap completely on, then unscrew one turn.

Temperature limit control

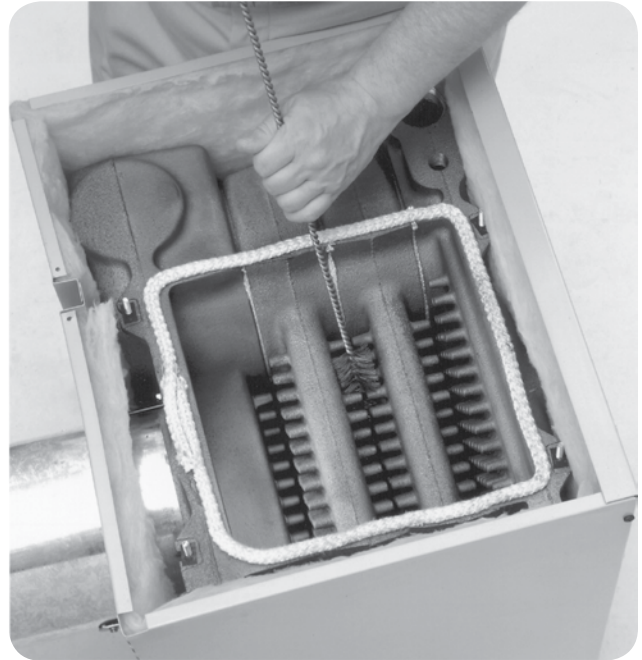
If high boiler water temperature occurs, control shuts down burner, but allows circulator to run as long as there is a call for heat. Limit should be set higher than temperature needed for the system.

Maximum limit setting is 220°F.

2007 Energy Act Compliance

In accordance with **Section 303 of the 2007 Energy 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.

Figure 24 Thoroughly clean flue ways between all pins at all angles. Start on top of boiler, finish from the bottom.



The limit control supplied with the boiler must be set-up with thermal prepurge or thermal targeting active unless exempted below:

IMPORTANT

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 (not applicable to WGO boilers).

Water relief valve

Provides discharge if boiler pressure exceeds 30 psig.

Circulator

Circulator provides forced water circulation through boiler and piping system.

Pressure-temperature gauge

Provides reading of boiler pressure and temperature. Maximum boiler pressure is 50 psig, maximum water temperature is 220°F. Temperature will vary according to system and daily heating demands. The range will be from room temperature up to limit control setting.



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Close clearance installation

WARNING To provide close clearances as described on pages 31 and 32:

Obtain the Close Clearance Kit, Weil-McLain Part No. 386-500-050. Install the kit as described below. Failure to use kit or install as described can result in a fire hazard, causing severe personal injury, death or substantial property damage.

Close clearance installation

Substitute these instructions for corresponding material in manual. All other procedures and practices must remain the same. Recommended service and minimum clearances shown on page 8 should be used where possible. Where closer clearances are required:

- Top of boiler — If less than 24" available, provide removable surface to allow for cleaning boiler flue ways.
- Right or left side — Minimum 2 inches.
- Front — Minimum 2 inches from burner.
- Double-wall flue pipe to combustible surface — as listed in Table 5, page 32 and Figures 25 through Figure 29, page 32.

NOTICE Jacket cap must be in place on boiler to avoid requiring an 9" minimum clearance from back or top of boiler to combustible material. Flue pipe clearances must take precedence over jacket clearances.

1. Install boiler using clearances described at left.
2. Install barometric control 18-20 inches from boiler in breeching.
3. Attach manual reset temperature switch near upper surface of enclosed area. See Figure 25.
4. Wire switch in series with thermostat. See Figure 26.
5. Provide two combustion/ventilation openings when installing in confined space. Size opening 140 sq. in. (1000 Btu) per 1 GPH input. Locate openings near top and bottom of enclosed space.

Burner adjustments

NOTICE A burner nozzle change may be required - refer to the burner instructions or boiler's rating label for correct nozzle selection

WARNING Final burner adjustments must be made using combustion test equipment to assure proper operation. Do not fire boiler without water or sections will overheat.

1. Refer to burner manual for start-up.
2. Allow boiler to heat to design condition.
3. Burner should be adjusted to 13% CO₂ or less with a smoke level of zero and over-fire of -0.01" to -0.02". Re-adjust burner combustion to account for environmental conditions. Actual CO₂ value will vary and should be adjusted for clean and safe combustion operation. Seasonal variations as well as sufficient combustion air supply can affect proper combustion and boiler performance. The burner should only be adjusted by a service professional with appropriate instrumentation.

Figure 25 Manual reset temperature switch location

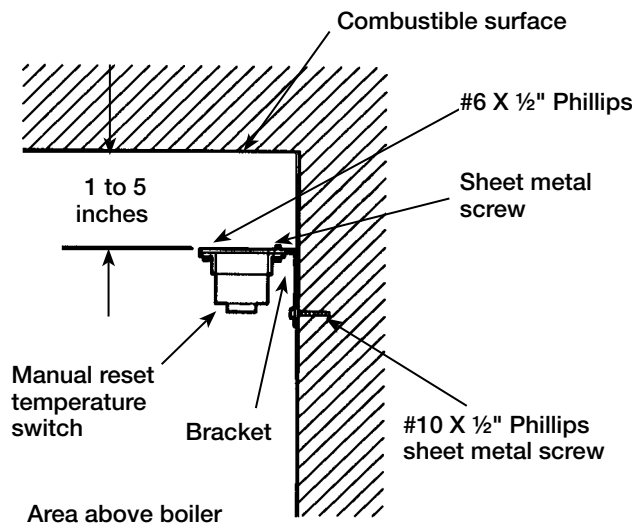
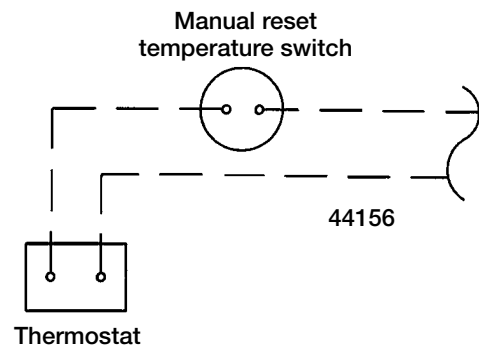


Figure 26 Manual reset temperature switch wiring





WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Close clearance installation (continued)

Figure 27 Flue pipe clearances

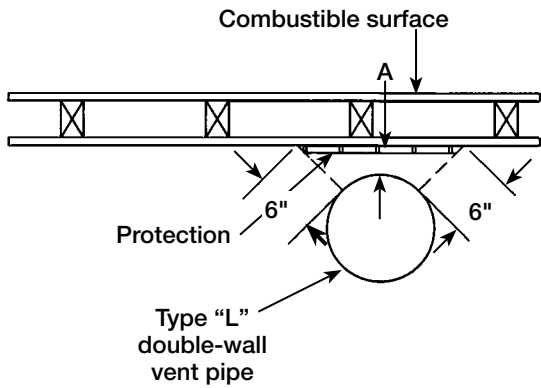


Figure 28 Back vent clearances

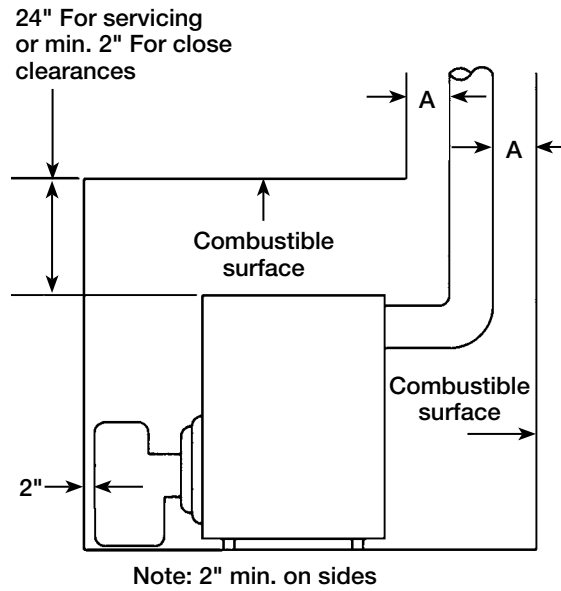
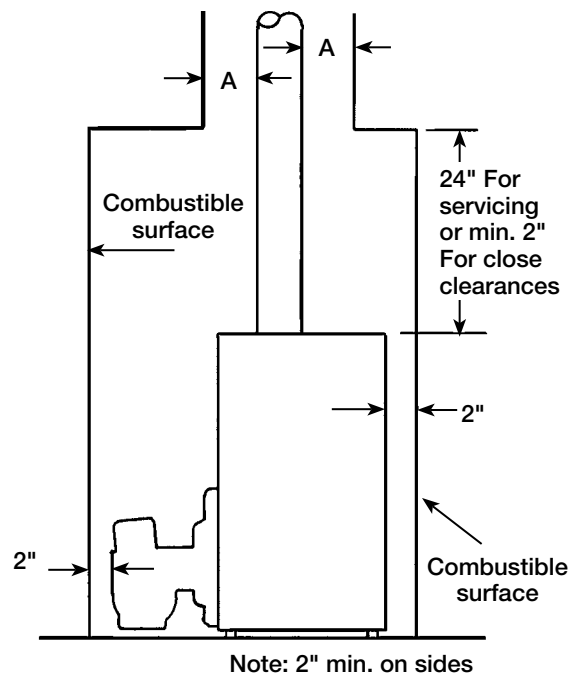


Table 5 Protection required for clearances less than 6 inches from double wall vent pipe*

Dimension A When desired minimum clearance from Type "L" double-wall vent pipe to combustable surface is:	Use the following protection**:
3"	½" thick insulation board *** over one-inch glass fiber or mineral wool batts+
2"	24 gauge sheet metal with one-inch ventilated air space
3"	½" thick insulation board *** with one-inch ventilated air space

* All clearances measured from outer surface of equipment to combustable surface, not to the protection used.
 ** Apply to combustable surface unless otherwise noted. Cover all surfaces as specified in Table and Figure 24. Thicknesses are minimum.
 *** Factory-fabricated board made of non-combustible materials, normally fibers, having thermal conductivity in range of one (Btu-inch)/(hr./sq. ft./°F) or less.
 + Mineral wool batts (blanket or board), having min. density of 8 lb./ft³ and a min. melting point of 1500°F.
 Other dimensions available. Refer to NFPA-31.

Figure 29 Top vent clearances

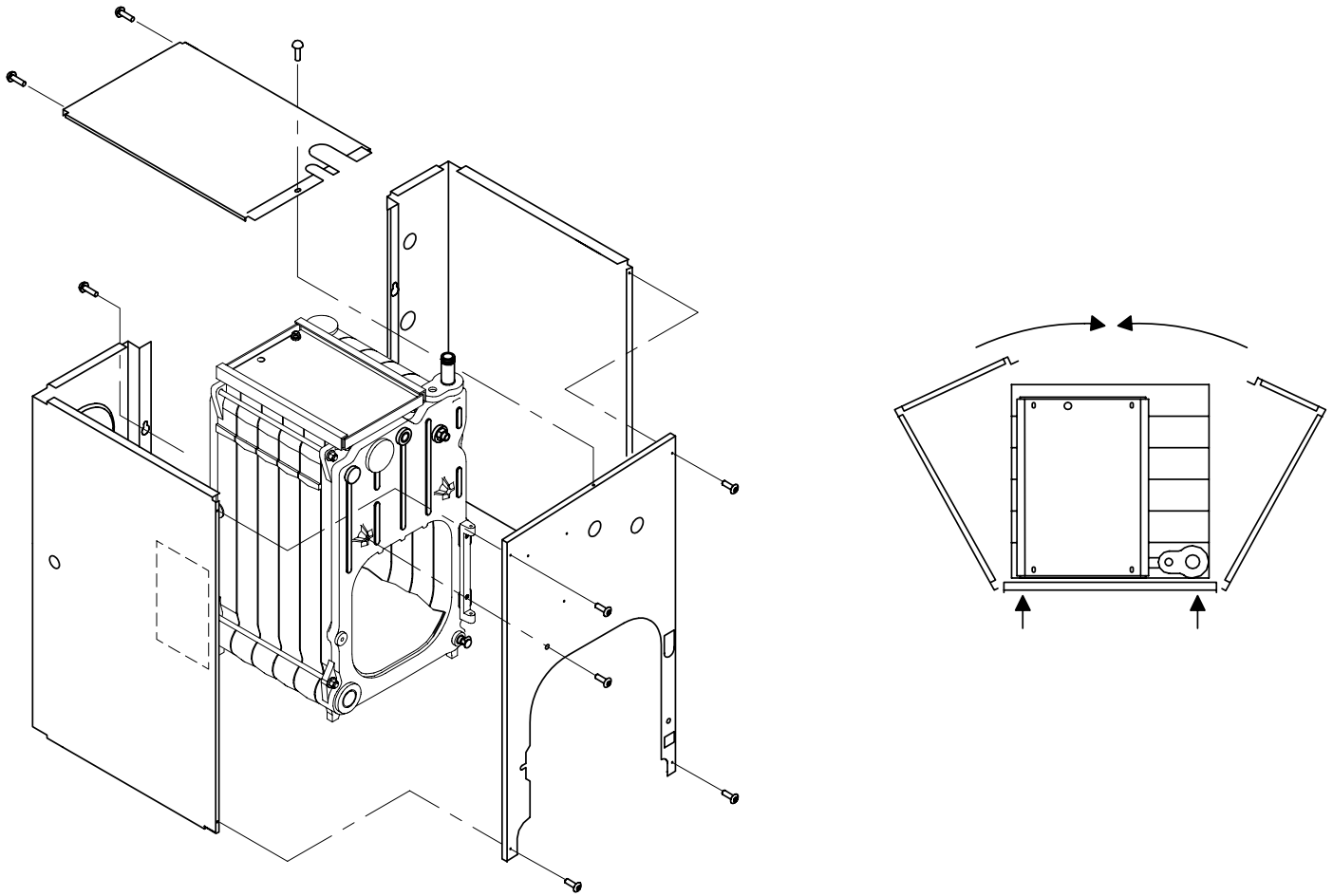




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Replacement parts

Figure 30 WGO Boiler jacket for Series 4



Boiler Size	Jacket panel with insulation — front	Left side and rear	Right side and rear	Top panel with cap
WGO-2	381-355-937	381-355-938	381-355-982	381-355-943
WGO-3	381-355-937	381-355-939	381-355-974	381-355-944
WGO-4	381-355-937	381-355-940	381-355-975	381-355-945
WGO-5	381-355-937	381-355-941	381-355-976	381-355-946
WGO-6	381-355-937	381-355-942	381-355-977	381-355-947

Complete Jacket cartons	
3 section WGO-2	416-700-460
3 section WGO-3	416-700-461
4 section	416-700-462
5 section	416-700-463
6 section	416-700-464
7 section	416-700-465
8 section	416-700-466
9 section	416-700-467

Common jacket parts for all boilers	
Plastic flue cap cover w/insulation	560-917-105
Jacket hardware kit	386-700-853
Touch up paint, Cloud spray can	381-359-278
Touch up paint, Slate spray can	384-000-141

**▲WARNING** SERVICE TECHNICIAN ONLY – read and follow completely.

Replacement parts (continued)

Table 6 WGO Section and flue collector part numbers for Series 4

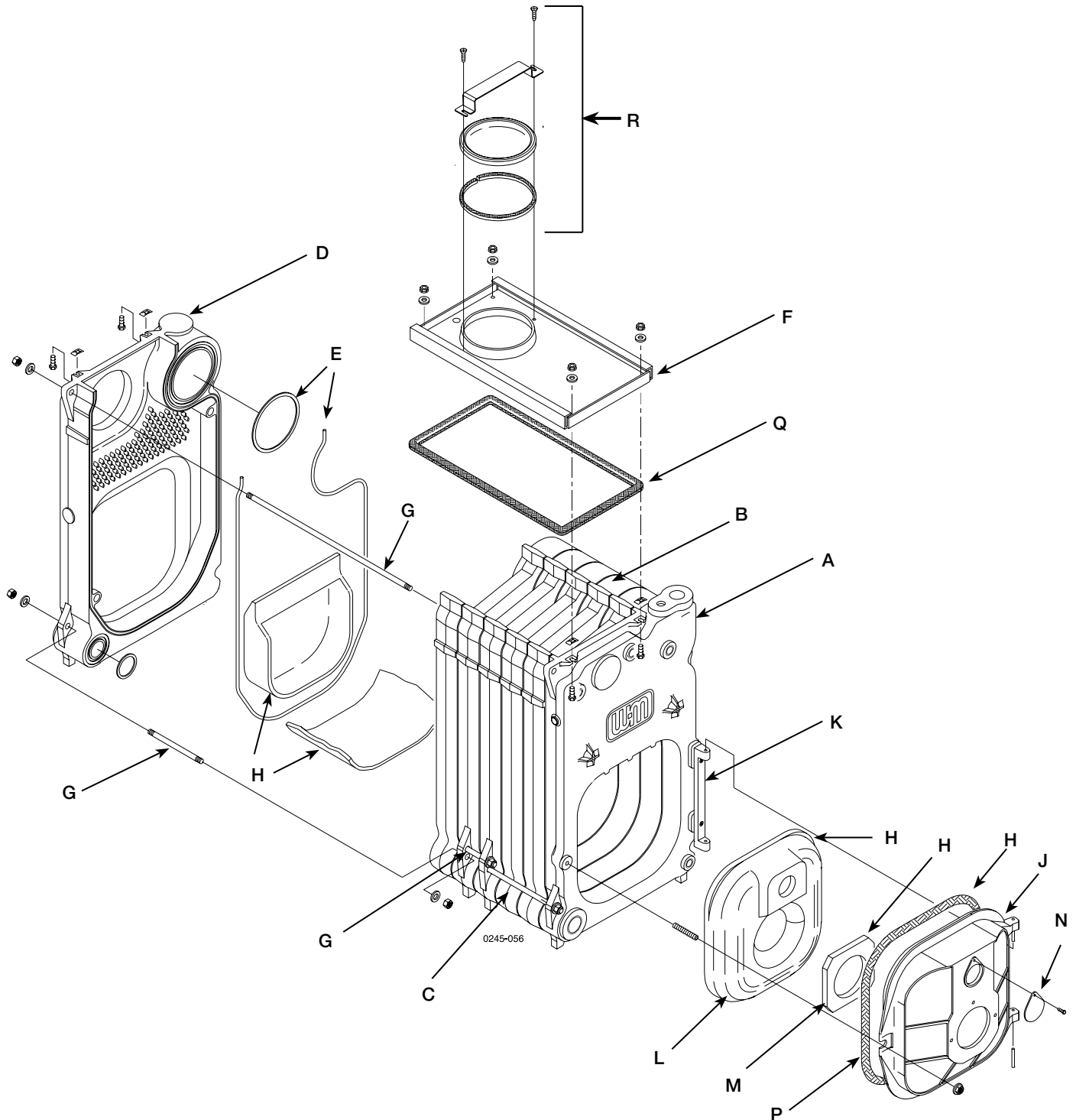
Item	Description	Part no.
A	Regular front section 7022	316-700-215
B	Wide intermediate section (WGO-3) 7010	316-700-075
B	Narrow intermediate section 7015	316-700-065
C	Intermediate section w/draw rod lugs 7016	316-700-070
D	Back section w/7" flue, supply & 2" return 7027	316-700-235
E	Section replacement kit (for 1 joint, includes seals, rope, adhesive and collector hood hardware) front or back section	386-700-852
	Section replacement kit (for 2 joints, includes seals, rope and adhesive) intermediate section	386-700-851
	Section assembly, for WGO-2 with jacket & collector hood installed	386-701-022
	Section assembly, for WGO-3 with jacket & collector hood installed	386-701-023
	Section assembly, for WGO-4 with jacket & collector hood installed	386-701-024
	Section assembly, for WGO-5 with jacket & collector hood installed	386-701-025
	Section assembly, for WGO-6 with jacket & collector hood installed	386-701-026
	Section assembly only, for WGO-2	386-700-973
	Section assembly only, for WGO-3	386-700-978
	Section assembly only, for WGO-4	386-700-980
	Section assembly only, for WGO-5	386-700-981
	Section assembly only, for WGO-6	386-700-982
	Section assembly only, for WGO-7	386-700-662
	Section assembly only, for WGO-8	386-700-663
	Section assembly only, for WGO-9	386-700-664
F	Collector hood kit for WGO-2*	386-700-336
F	Collector hood kit for WGO-3*	386-700-337
F	Collector hood kit for WGO-4*	386-700-337

Item	Description	Part no.
F	Collector hood kit for WGO-5*	386-700-338
F	Collector hood kit for WGO-6*	386-700-339
F	Collector hood kit for WGO-7*	450-020-188
F	Collector hood kit for WGO-8*	450-020-189
F	Collector hood kit for WGO-9*	450-020-190
G	Tie rod 1/2 x 51/2 (WGO-7, 8, 9)	560-234-464
G	Tie rod 1/2 x 103/4 (WGO-2 & 7)	560-234-491
G	Tie rod 1/2 x 12 (WGO-7)	560-234-492
G	Tie rod 1/2 x 14 (WGO-3, 4, 8, 9)	560-234-470
G	Tie rod 1/2 x 15 (WGO-9)	560-234-495
G	Tie rod 1/2 x 17 (WGO-5)	560-234-472
G	Tie rod 1/2 x 20 (WGO-6)	560-234-534
G	Tie rod 1/2 x 231/4 (WGO-7)	560-234-538
G	Tie rod 1/2 x 263/8 (WGO-8)	560-234-542
G	Tie rod 1/2 x 291/2 (WGO-9)	560-234-497
H	Combustion chamber kit (rear & fit. ref., door ref. blanket, rope, blanket & water glass)	386-700-355
	Burner mounting door assembly (door, obs. port, rope, ins. & pins)	386-700-358
J	Burner mounting door 7070	330-054-302
K	Door hinge 7054	330-054-300
L	Door refractory	386-700-359
M	Door refractory blanket	591-222-115
N	Observation port shutter	460-039-867
P	Door seal rope 5'	590-735-104
Q	3/8" Glass rope for collector hood (7' for largest size hood)	590-735-109
R	Flue cap assembly (cap, strap, rope & screws)	386-700-344
	Flue brush 123D	591-706-214
	Blocked vent shutoff switch (Canada only)	511-624-650
*	Includes flue cap assembly, rope and hardware for installation.	

WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Replacement parts (continued)

Figure 31 WGO Section and flue collector parts for Series 4



NOTICE

Repair parts must be purchased through Weil-McLain for the specific boiler as indicated in the list below. Results from using modified or other manufactured parts will not be covered by warranty and may damage boiler or impair operation.



▲WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Replacement parts (continued)

Table 7 WGO Trim part numbers for Series 4

Item	Description	Part no.	
1	Combination pressure-temperature gauge kit, 60° – 360° F., 0 - 75 psi, 31/8" dia., 1/4" NPT, short shank, with 1/4" x 1/2" reducing bushing	380-000-000	
2	ASME pressure relief valve, set to relieve at 30 PSIG, 3/4" male inlet, 3/4" female outlet	511-546-920	
3	Electronic aquastat, high limit or combination high/low limit, with LWCO, high limit 100°– 220°, low limit 110°- 200°, circulator amps: 5.8 FLA, anticipator: 0.2 amps	381-300-000	
4	Drain cock, 3/4" NPT, 11/2" shank	511-210-423	
	Drain cock, 3/4" NPT	511-246-392	
5	Circulator	WGO 2 - 4 – Taco 007e ECM	511-405-153
		WGO 2 - 6 – Taco 007	511-405-113
6	Circulator universal hardware kit 11/4" (Includes: (1) Flange, (1) Gasket, (2) Screws and (2) nuts) for sizes 2, 3 & 4 only	381-354-526	
	Circulator universal hardware kit 11/2" (Includes: (1) Flange, (1) Gasket, (2) Screws and (2) nuts) for sizes 5 & 6 only	381-354-531	
7	Well 3/4" NPT, 4.25" long	592-300-026	
8	Burner harness assembly	591-391-850	
9	Barometric damper	510-512-267	
10	Flue pipe brackets (set of 2) (Not shown)	426-700-268	
11	Vent damper kit - Required for ENERGY STAR® compliance, (Version 3 Boilers specification of 87% AFUE), with reduced rates only		
	WGO-2RD (Optional equipment)	381-800-501	
	WGO-3RD (Optional equipment)	381-800-502	
	WGO-4RD (Optional equipment)	381-800-503	
	WGO-5RD (Optional equipment)	381-800-504	
	WGO-6RD (Optional equipment)	381-800-505	
	WGO-7RD (Optional equipment)	381-800-506	
Vent damper kits - Required for High Input nozzle installation WGO-3D, WGO-4D, WGO-5D, WGO-6D, and WGO-7D	381-800-515		
12	Outdoor - temperature sensor (Wireless)	386-701-047	



WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Replacement parts (continued)

Figure 32 WGO Trim part for Series 4

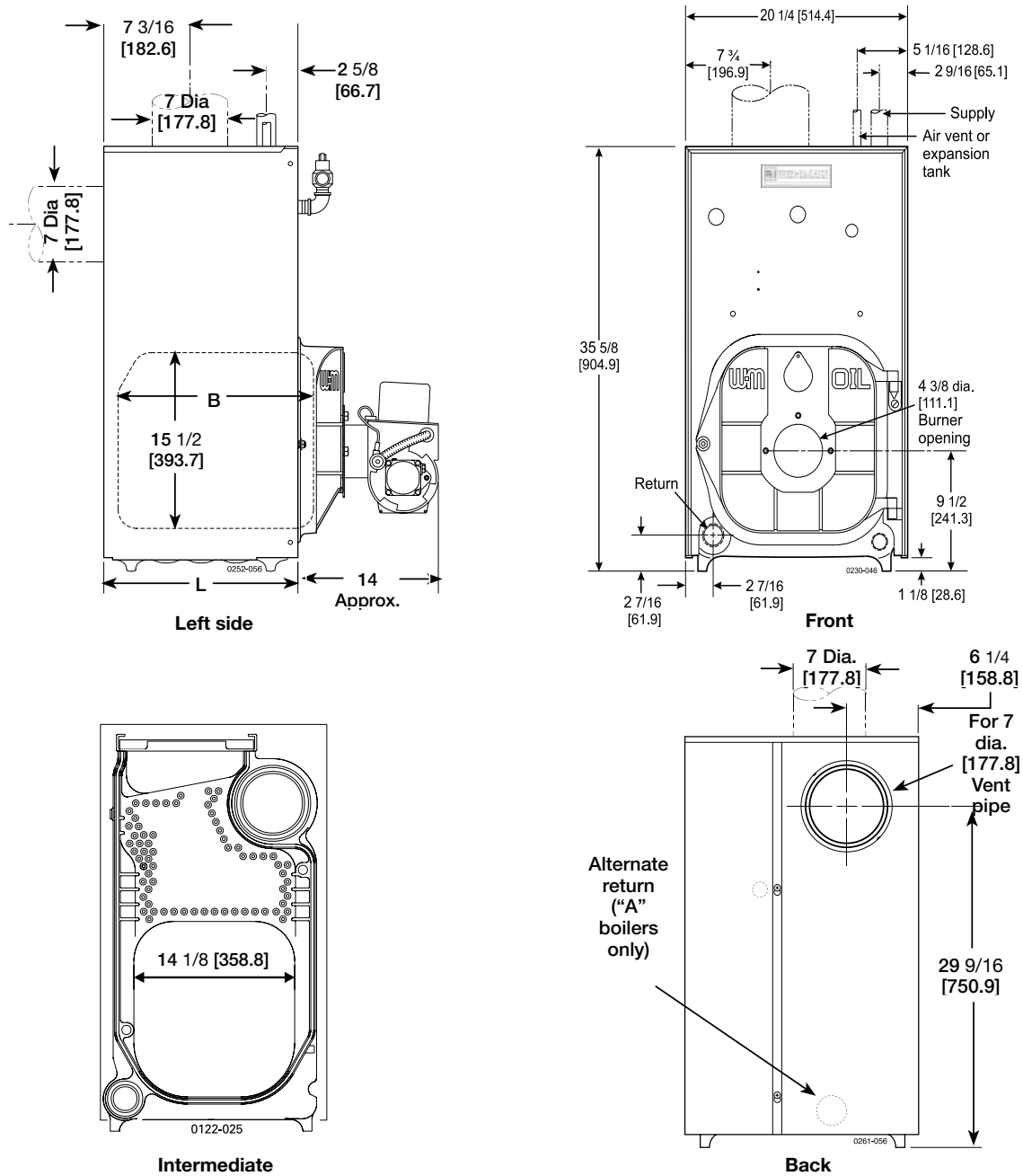




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Dimensions

Figure 33 WGO dimensions — inches (mm)



BOILER Size	B		L	
	Inches	mm	Inches	mm
WGO-2	10 1/2	266.7	13 3/4	349.2
WGO-3	13 1/2	342.9	16 7/8	428.7
WGO-4	13 5/8	345.9	16 7/8	428.7
WGO-5	16 7/8	428.7	20	508.0
WGO-6	20	508	23 1/8	587.2
WGO-7	23 1/8	587.2	26 1/4	666.7
WGO-8	26 1/4	666.7	29 3/8	746.2
WGO-9	29 3/8	746.2	32 1/2	825.5



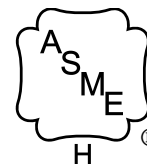
WARNING SERVICE TECHNICIAN ONLY – read and follow completely.

Ratings

Table 8 WGO Series 4 oil-fired water boiler ratings



DOE



Boiler Model (9)	Burner Input		AHRI Certified Ratings				Draft Loss Thru boiler (8)	Boiler Water Content (Gallons)	Flue Outlet Diameter (Inches (7))	Minimum Chimney			OVD Damper Required (Yes/No)
	GPH (3)	MBH (3)	Heating Capacity	Seasonal Efficiency	Net Rating (water)	Rect. Inches				Round Inches	Height Feet		
			MBH (2)	AFUE %	MBH (2) (5)								
WGO-2	0.70	98	86 (4)	86.4	75	.010	11.0	7	8 x 8	6	15	No	
WGO-2RD	0.70	98	86 (4)	87.0	75	.010						Yes	
WGO-3R	0.80	112	98 (4)	86.2	85	.020	14.9	7	8 x 8	6	15	No	
WGO-3RD	0.80	112	98 (4)	87.0	85	.010						Yes	
WGO-3D	0.95	133	115 (4)	86.0	100	.020						Yes	
WGO-4R	1.00	140	122 (4)	86.2	106	.010	13.4	7	8 x 8	6	15	No	
WGO-4RD	1.00	140	123 (4)	87.0	107	.010						Yes	
WGO-4D	1.20	168	146 (4)	86.0	127	.010						Yes	
WGO-5R	1.20	168	147 (4)	86.1	128	.015	15.9	7	8 x 8	7	15	No	
WGO-5RD	1.20	168	148 (4)	87	129	.015						Yes	
WGO-5D	1.45	203	176 (10)	86.0	153	.015						Yes	
WGO-6R	1.40	196	171 (4)	86.1	149	.015	18.4	7	8 x 8	7	15	No	
WGO-6RD	1.40	196	173 (4)	87.0	150	.015						Yes	
WGO-6D	1.75	245	213 (10)	86.0	185	.015						Yes	
WGO-7R	1.60	224	196 (4)	86.0	170	.015	20.8	7	8 x 8	8	15	No	
WGO-7RD	1.60	224	197 (4)	87.0	171	.015						Yes	
WGO-7D	2.00	280	244 (10)	86.0	212	.015						Yes	
WGO-8	2.30	322	266 (6)(4)	-	231	0.025	23.3	7	8 x 12	8	20	No	
WGO-9	2.55	357	295 (6)(4)	-	257	0.030	25.8					No	

- (1) WGO boiler designed with convertible vertical and horizontal flue outlet.
- (2) MBH refers to thousands of Btu per hour.
- (3) Based on 140,000 Btu/gal.
- (4) Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 13.5% CO₂ and -0.02" W.C. draft overfire.
- (5) Net AHRI ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pick-up. Water ratings are based on a piping and pick-up allowance of 1.15. An additional allowance should be made for unusual piping and pick-up loads.
- (6) AHRI gross output.
- (7) See page 16 for minimum breeching diameter.
- (8) Listed draft losses are for factory-shipped settings.
- (9) Boiler model suffixes: "R" designates a reduced input version. No separate/additional damper kit required. "D" designates that the separate High Input OVD Automatic Vent Damper P/N 381-800-515 is required. "RD" designates a reduced input version and the separate ES Vent damper is required (P/N 381-800-501 through 381-800-506).
- (10) Based on standard test procedures prescribed by the United States Department of Energy at combustion of 13.0% CO₂ and -0.02" W.C. draft overfire.

NOTE: A burner nozzle change may be required - refer to the burner instructions or boiler's rating label for correct selection.



Handling ceramic fiber and fiberglass materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS

▲WARNING The combustion chamber lining or base insulation panels in this product contain ceramic fiber materials that have been identified as carcinogenic, or possibly carcinogenic, to humans. Ceramic fibers can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, “Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).”:

Precautionary measures

- ❑ Avoid breathing fiberglass dust and contact with skin or eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- ❑ Apply enough water to the combustion chamber lining or base insulation to prevent airborne dust.
- ❑ Remove combustion chamber lining or base insulation from the boiler and place it in a plastic bag for disposal.
- ❑ Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid

- ❑ Eye: Irrigate immediately
- ❑ Breathing: Fresh air

REMOVAL OF FIBERGLASS WOOL

or

INSTALLATION OF FIBERGLASS WOOL OR BASE PANELS:

▲WARNING This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber lining or base panels in gas fired products. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation.

Precautionary measures

- ❑ Avoid breathing fiberglass dust and contact with skin or eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- ❑ Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
- ❑ Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid

- ❑ Eye: Irrigate immediately
- ❑ Breathing: Fresh air