



Oil-Fired Steam Boilers

Boiler Manual

- Installation
- Maintenance
- Startup
- Parts



Mobile Product
Library

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 8 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 CP number(s) from boiler jacket, burner and controls. On page 33 of this manual is space to list CP number(s).

Packaged and non-packaged boilers

Packaged boilers, available only in sizes 2 through 6, are factory assembled, complete with block, jacket and controls. Burner is shipped separately.

Non-packaged boilers, available in all sizes, 2 through 9, are shipped with block assembled, with jacket. Controls, trim and burner 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 1 through page 8 must be followed to assure proper operation of your boiler. See page 8 for lists 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 34 for service record.
- Review and explain start-up and routine maintenance procedures with homeowner.

▲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 flueways 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 Boiler 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.

▲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.



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

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. <input type="checkbox"/> Check float-type low water cutoff, when used: Refer to control manufacturer's instructions. <p>⚠ DANGER Scald potential. Do not blow down low water cutoff unless blow-down piping has been installed according to Boiler Manual. If piping is not in place, call qualified service technician to install.</p>
<p>Periodically during heating season</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Test probe-type low water cutoff, when used: refer to control manufacturer's instructions.
<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"/> Do not use antifreeze in steam systems. <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

SGO with float-type low water cutoff

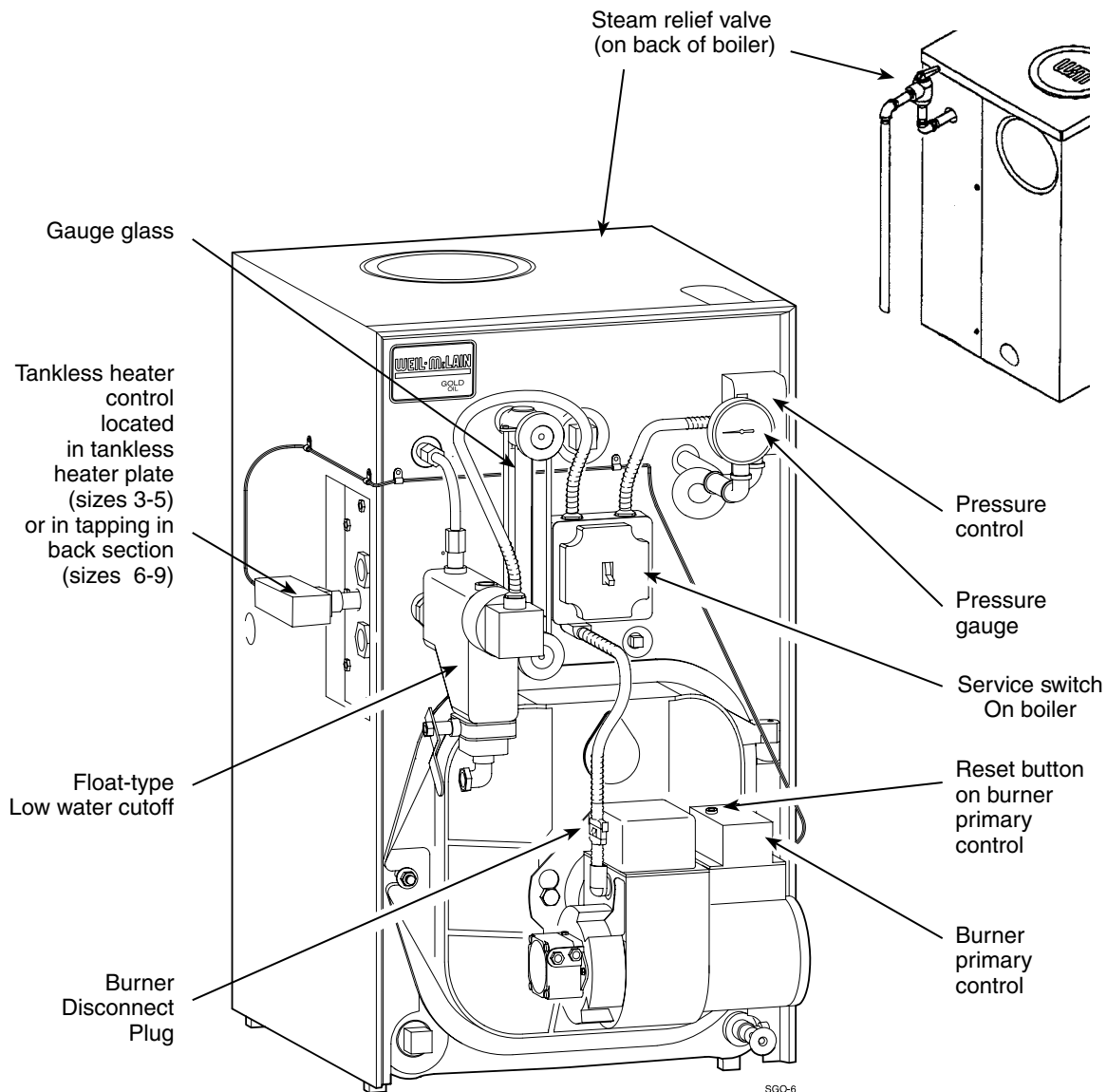
1. If burner does not fire, check for:
 - Switch on boiler or additional shut-off switches turned off.
 - Fuses or breaker switch tripped.
 - Thermostat set below room temperature.
 - Fuel valves turned off.
 - Not enough oil in tank to supply burner.
 - No water in gauge glass.

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 SGO boiler with float-type low water cutoff (see Figure 2, page 7 for probe-type low water cutoff)





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

Operation (continued)

SGO with probe-type low water cutoff

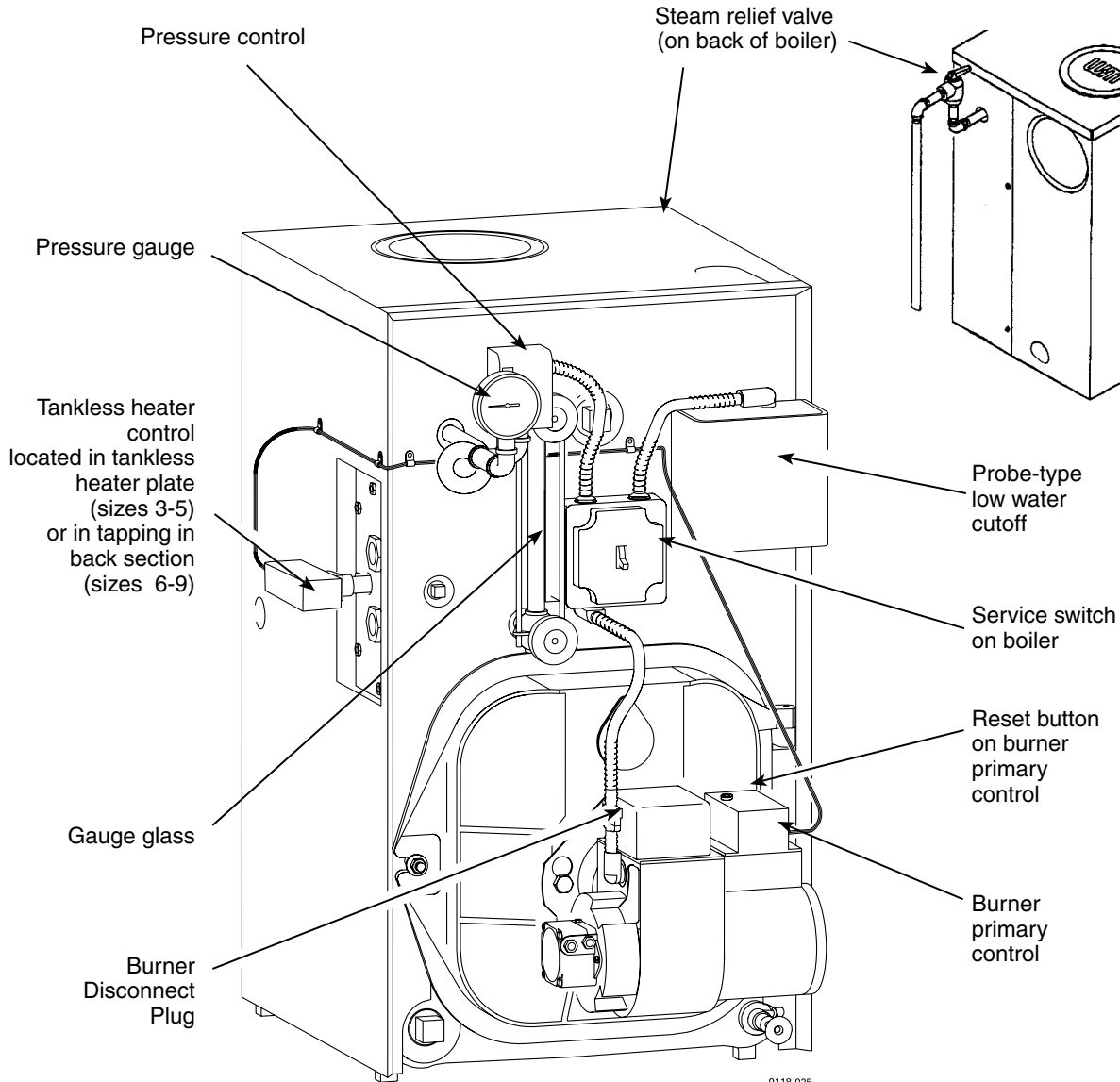
1. If burner does not fire, check for:
 - Service switch on boiler or additional switches turned off.
 - Fuses or breaker switch tripped.
 - Thermostat set below room temperature.
 - Fuel valves turned off.
 - Not enough oil in tank to supply burner.
 - No water in gauge glass.

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 2 SGO boiler with probe-type low water cutoff (see Figure 1, page 6 for float-type low water cutoff)





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. Normal operation is usually less than 5 psig.
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 and repair leaks at once to avoid constant use of makeup water and check ph (7.0-8.5).
Metal flakes found in flueway.	Contaminated combustion air supply.	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 boiler operation.
Isolated radiation does not heat.	Air vents or traps inoperative.	Have qualified service technician repair, clean or replace air vents or traps.
Water disappearing from gauge glass and back into system through return piping.	Incorrect Hartford loop piping.	Have qualified service technician pipe boiler exactly as shown in boiler manual.
	Check-valve inoperative.	Have qualified service technician clean or replace check-valve.
	Vacuum-breaker inoperative.	Have qualified service technician clean or replace vacuum breaker.
Violent waterline fluctuations - surging. OR Water passing into steam mains - priming.	Dirt, oil or other impurities in water.	Have qualified service technician skim boiler.
	Waterline too high.	Have qualified service technician adjust waterline to normal height.
	Incorrect piping.	Have qualified service technician pipe boiler exactly as shown in boiler manual.
	Sudden release of boiler steam pressure by action of zone valves.	Have qualified service technician adjust valve operating time or install slow-opening valves.
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 8 before proceeding.

Installations must comply with

- United States
 - State and local plumbing, heating and electrical codes.
 - National codes where applicable.
- Canada
 - Canadian Standards Association, CSA B139, Installation Code for Oil-Burning Equipment.
 - CSA C22.1 Canadian Electrical Code Part One.
 - 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 10.
 - Oil supply. See page 30 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 3)

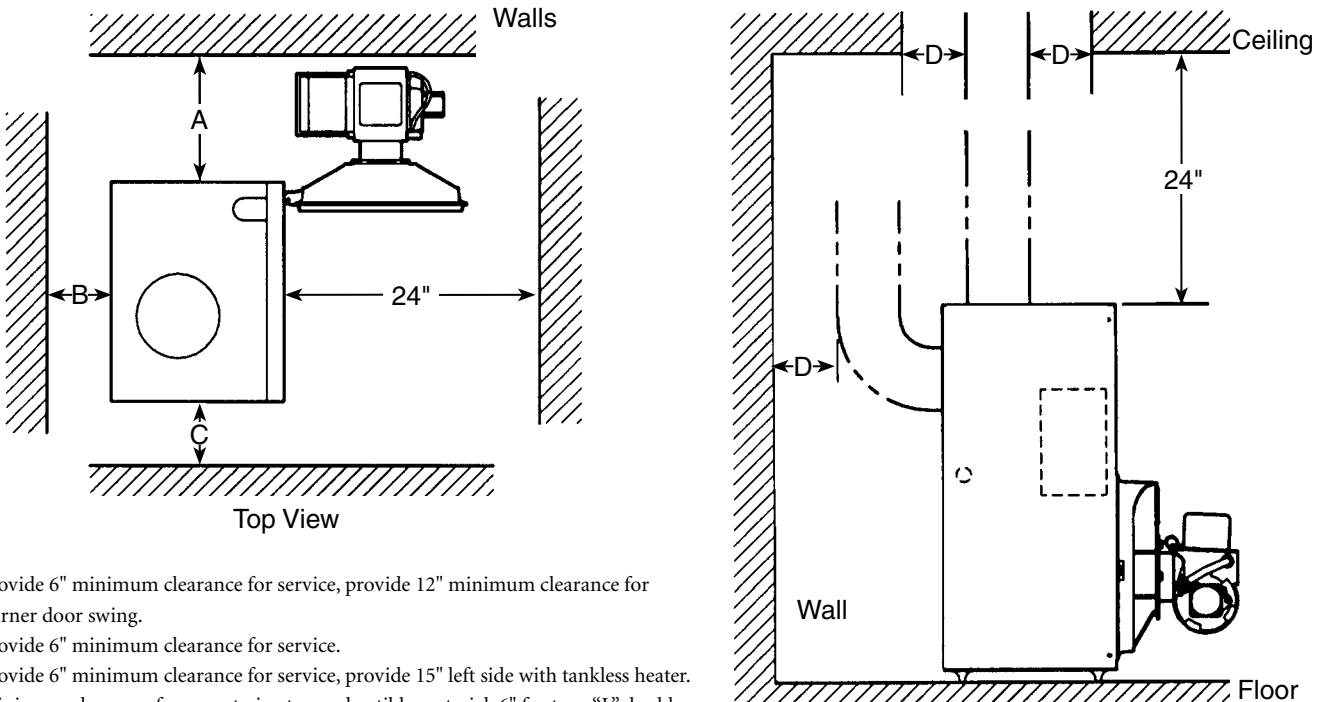
NOTICE Jacket cap must be in place on boiler to avoid requiring an 9" minimum clearance from back or top of boiler to combustible material.

- 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
 - 15 inches — Left side with tankless heater
 - 12 inches — Right side for burner door swing radius

Figure 3 Recommended service clearances



- A** Provide 6" minimum clearance for service, provide 12" minimum clearance for burner door swing.
- B** Provide 6" minimum clearance for service.
- C** Provide 6" minimum clearance for service, provide 15" left side with tankless heater.
- D** 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.):

- 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.
- 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).
- 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 any 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.

Lay a foundation, if needed

Boiler may be installed on non-carpeted combustible flooring.

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.

Solid concrete blocks can be used to create a pad.

Table 1 Boiler foundation sizes

Boiler model	Length inches	Width inches	Min. height inches
SGO-3	17	22	2
SGO-4	20	22	2
SGO-5	23	22	2
SGO-6	26	22	2
SGO-7	29	22	2
SGO-8	32	22	2
SGO-9	35	22	2



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler — packaged boilers only

Place boiler

1. Remove boiler from pallet.

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

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

2. Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 4):
 - a. Remove jacket cap on top of boiler.
 - b. Loosen two 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 #5 below).
 - d. Loosen two 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. Snap jacket cap in back outlet opening.

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

3. Check level. Shim legs, if needed.
4. Check for secure placement of insulation on target wall, chamber floor and burner door.
5. 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.

Tankless heater, if used

1. Remove tankless heater knockout in left side of jacket panel and, for SGO-6 only, tankless heater control knockout.
2. Remove tankless heater cover plate and gasket.
3. Install new gasket and tankless heater over studs around opening. Secure with 3/8" nuts.
4. Install tankless heater operating control where shown on page 23. If not furnished, use operating control with maximum 10°F differential.

Perform hydrostatic pressure test

1. Remove steam pressure gauge furnished with boiler. Install water pressure gauge for test only. Be sure gauge can handle test pressure.
2. Install air vent in tapping on top of boiler.
3. Remove pressure control and low water cutoff. Plug tappings.
4. Plug supply and return tappings.
5. Drain valve is already factory-installed.
6. Fill boiler. Vent all air. Pressure test boiler at 45-55 psig.

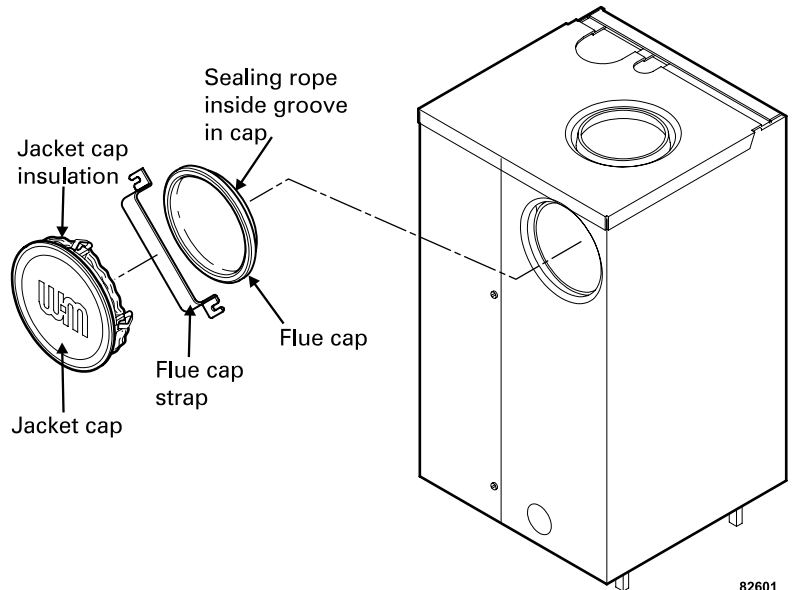
WARNING Do not leave boiler unattended. Cold water fill can expand and damage cast iron, resulting in severe personal injury, death or substantial property damage.

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

WARNING Using petroleum-based compounds to repair leaks can damage system components, resulting in property damage.

9. Retest boiler after repairing leaks.
10. Remove pressure gauge, air vent and plugs. Re-install steam pressure gauge, pressure control and low water cutoff furnished with boiler.

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



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Instructions for packaged boilers continued on page 16.

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

Install boiler — non-packaged boilers only

▲WARNING Fiberglass wool and ceramic fiber materials are possible cancer hazards. See warning on page 37.

Place boiler

1. Non-Packaged SGO-3 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.

- a. Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 5, page 13):
 - Loosen two screws holding flue cap strap to collector hood. Remove strap and flue cap from opening. Re-tighten screws.
 - Check rope placement inside flue cap. (Read **▲WARNING** under step #3 at right).
 - Loosen two 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.
2. Non-Packaged SGO-7, 8 & 9 — split the assembled block for easier handling (see Figure 5):
 - a. Open burner mounting door and using utility knife, slit floor insulation at joint to be separated.
 - b. 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.
 - c. Move divided block to location.
 - d. 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.

- e. Place rings in port openings. If ring slips out of groove, stretch ring gently for several seconds, then place in groove.
- f. Position sections so aligning lugs fit into sockets of next section. Make sure sealing rope is in good condition and in position.
- g. Oil threads on draw rods. Install washer and nut on end to be tightened. Use nut only on other end.
- h. 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.

- a. 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.
- b. Metal-to-metal contact should be made around port openings. If gap does exist, it should be less than .020". Check with feeler gauge.
- c. 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 your Weil-McLain distributor or sales office before continuing installation.

3. Non-Packaged SGO-7, 8 & 9 — install flue collector hood (see Figure 5):

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

- a. Thread Tinnerman clip on screw so that clip fits snugly in notch of hold-down lug. Screw must not turn.
 - b. 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.
 - c. Position flue collector hood on top of boiler sections and over screws and clips as shown in Figure 5.
 - d. Install washers and nuts. Tighten nuts until collector hood makes contact with Tinnerman clip.
 - e. Position 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.
4. Check level. Shim legs, if needed.

Tankless heater, if used

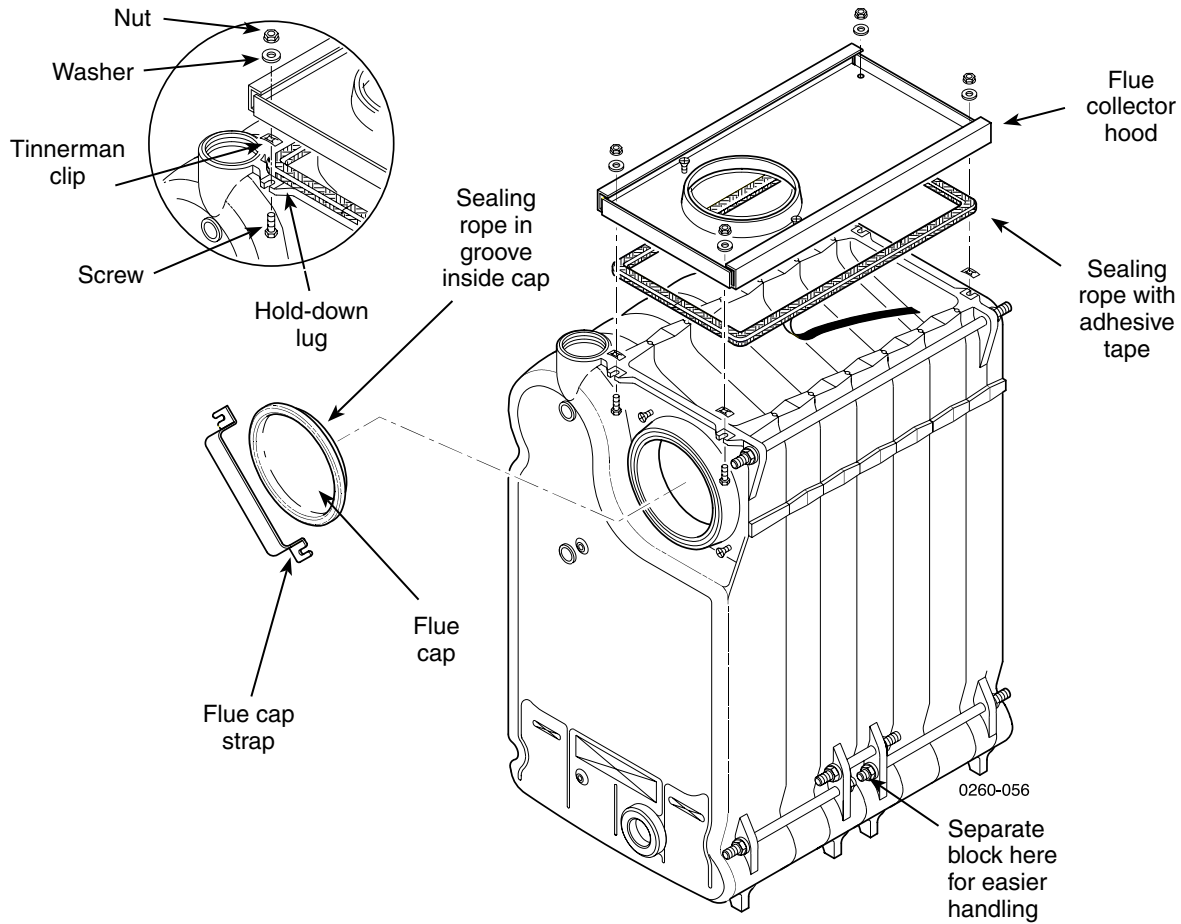
1. SGO-3 through 6 — remove knockout in left side jacket panel, and for SGO-6 only, remove tankless heater control knockout.
2. Remove tankless heater cover plate and gasket.
3. Install new gasket and tankless heater over studs around opening. Secure with 3/8" nuts.



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler — non-packaged boilers only (continued)

Figure 5 Change from back flue outlet to top flue outlet (optional)





▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler — non-packaged boilers only (continued)

Perform hydrostatic pressure test

1. Refer to Figure 6 and Control Tapping Table 2, to install:
 - a. Boiler drain.
 - b. Water pressure gauge (test only). Be sure gauge can handle test pressure.
 - c. Air vent in tapping on top of boiler.
 - d. Plugs in remaining tappings.
2. Fill boiler. Vent all air. Pressure test boiler at 45-55 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 (sizes 7 through 9 only)

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

Install boiler controls

See control tapping location, Figure 6, control tappings, Table 2, and Figure 7 or Figure 8 on page 15 to install controls.

1. Do not use Teflon tape to install probe-type low water cutoff; it will cause low water cutoff to work improperly.
2. Install tankless heater control if tankless heater is used. If not furnished, use operating control with maximum 10°F differential.
3. Make sure gauge glass is last control installed to prevent breakage.
4. Affix CP number label(s) on jacket front panel.

Table 2 Control tappings (see Figure 6, page 15 for locations)

Location	Size	Function
A1	1½"	Skim tapping
A2	2½"	Supply piping (sizes 3 - 9)
A3	2½"	Supply piping (sizes 6 - 9)
B1	1½"	Plugged
B2	2"	Return piping
E1 & E2	½"	Float LWCO
E1	½"	Steam pressure gauge and limit Control when using probe LWCO
E2	½"	Plugged when using probe LWCO
H	¾"	Drain valve
L	¾"	Steam pressure gauge and limit Control when using float LWCO Plugged when using probe LWCO
P	¾"	Probe LWCO (plugged when using float LWCO)
R	¾"	Relief valve
S1 & S2	½"	Gauge glass
U1	1"	Indirect-fired water heater/ hot water baseboard supply
U2	¾"	Operating control for tankless heater (sizes 6-9) or operating control for indirect-fired water heater (sizes 3-9)
U3	¾"	Operating control for tankless heater (located in heater plate — sizes 3-5)



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Install boiler — non-packaged boilers only (continued)

Figure 6 Control tapping locations (for use with Table 2, page 14)

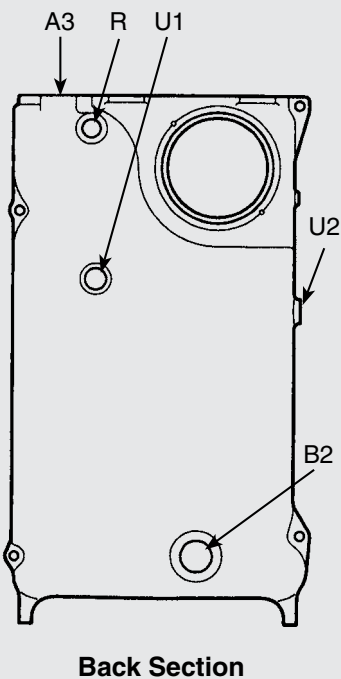
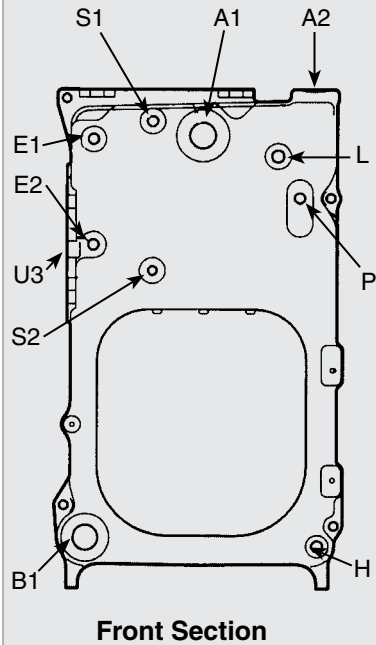


Figure 7 Steam boiler controls with float-type LWCO (optional tankless heater control)

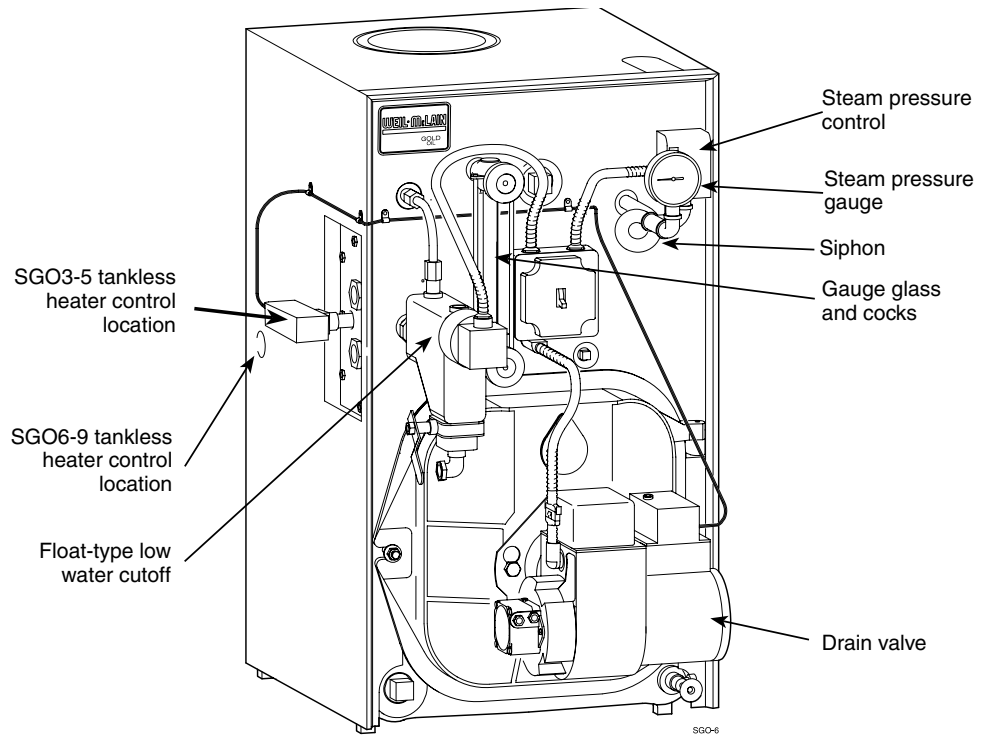
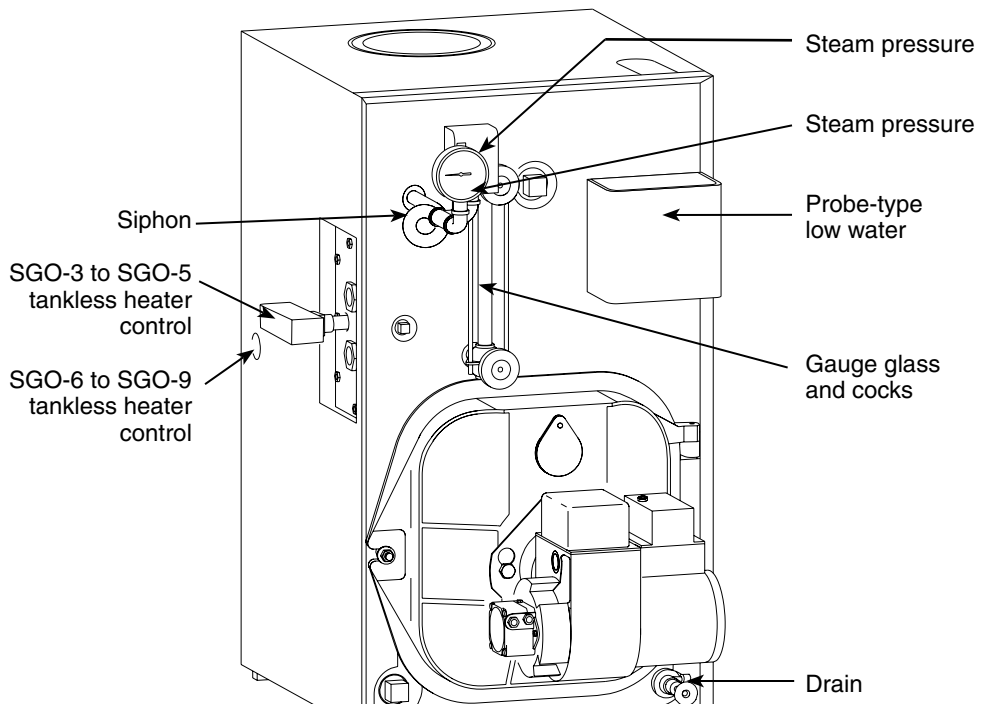


Figure 8 Steam boiler controls with probe-type LWCO (optional tankless heater control)





▲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 GOLD oil boilers. DO NOT use burners specified for use on Weil-McLain Model 68 boilers. Contact individual burner manufacturers for proper burner selections.

For P-SGO and A-SGO boiler:

1. Secure universal mounting flange and gasket to burner mounting door. Use three bolts provided.
2. Secure burner on flange with three 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. Securely close door.

General chimney requirements

- Designed for natural draft firing. Connect boiler to vertical chimney.

▲DANGER 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, Installation of Oil-Burning Equipment.
 - NFPA 211, 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.

Table 3 Minimum chimney sizes

Boiler model number	Minimum breeching diameter (Note 3)	Minimum chimney size		Minimum chimney height
		Rect.	Round	
SGO-3	5"	8" x 8" (Note 1)	6"	15'
SGO-4	6"			
SGO-5	6"	8" x 8" (Note 1)	7"	15'
SGO-6	7"			
SGO-7				
SGO-8	7"	8" x 12" (Note 2)	7"	20'
SGO-9				
Note 1	6¾" x 6¾" inside liner			
Note 2	6½" x 10½" inside liner			
Note 3	Flue collar on boiler is 7' diameter			

▲DANGER 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.



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect breeching

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 Table.
 - Back outlet — see Figure 9.
 - Top outlet — see Figure 10.
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.
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.

Figure 9 Back outlet breeching connection

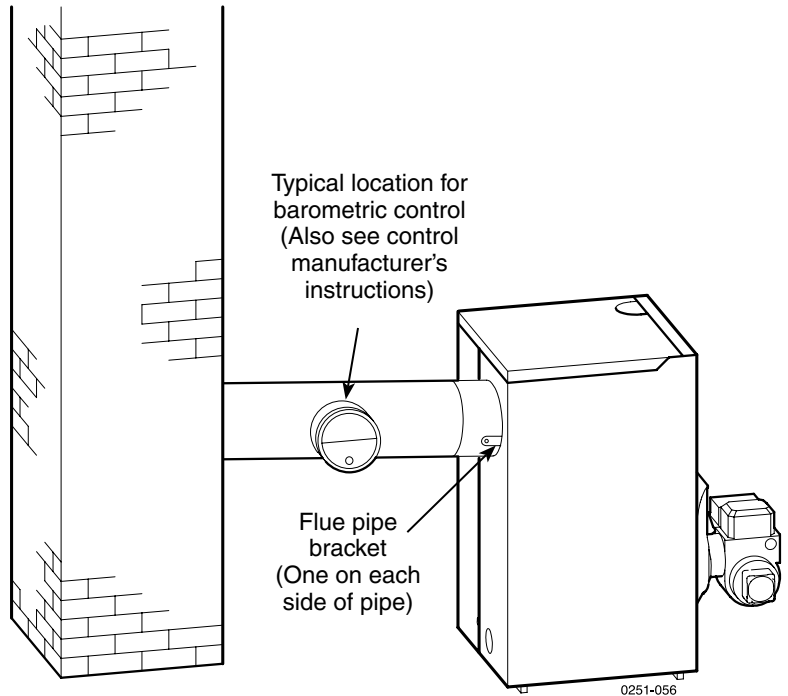
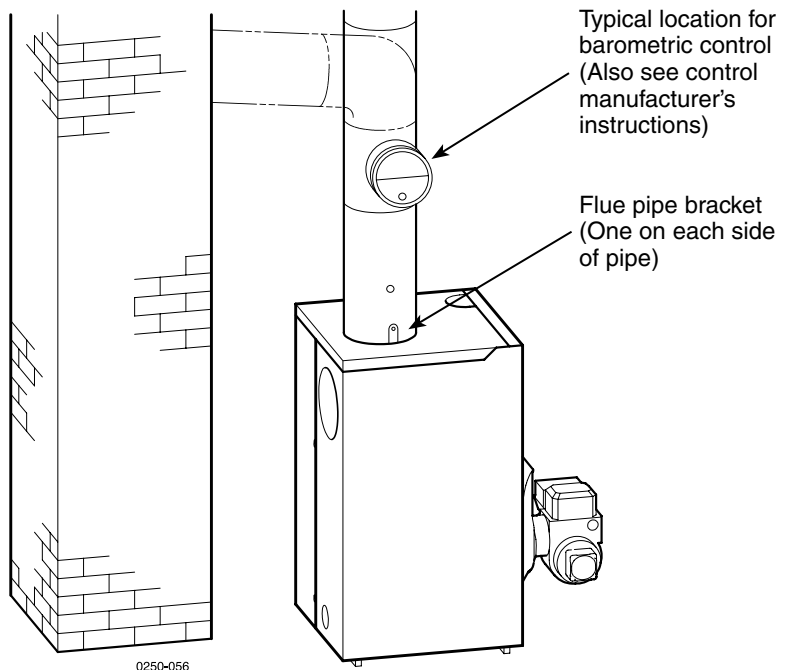


Figure 10 Top outlet breeching connection





▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect steam piping

General piping information

- Hartford Loop piping arrangement and wet return are required for steam boilers.
- Maintain 24-inch minimum from waterline to bottom of header (minimum 50⁷/₈" from floor or top of foundation).
- When using condensate receiver, feed pump must be energized by boiler-mounted pump control.
- Use swing joints in steam piping.
- If installation is to comply with ASME or Canadian requirements, an additional pressure limit control is needed. Install control between existing pressure control and pressure gauge. Control must be installed with siphon (supplied with boiler) between control and boiler. Set control to minimum of 5 psi above setpoint of existing control and maximum setting of 15 psi. Wire as shown on boiler wiring diagram.

Install piping

1. See Table 4 at right and Figure 11, page 19 or Figure 12, page 20.

▲WARNING Improperly piped systems or undersized piping can contribute to erratic boiler operation and possible boiler or system damage. Piping system must be installed as shown, using minimum pipe sizes shown. Consult your Weil-McLain distributor or sales office before installing alternate piping.

2. Install relief valve vertically in “R” tapping on back 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.

3. Float-type low water cutoff only — install blowdown line in bottom of cutoff. See Figure 11 or Figure 12 and also refer to low water cutoff manufacturer’s instructions for details.

▲WARNING Pipe blowdown 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.

To connect SGO boilers to indirect-fired water heaters

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

If boiler already has a tankless heater installed:

- Remove tankless heater and install cover plate.

OR

- Leave tankless heater installed. Drain coil and remove piping. Do not plug holes in tankless heater front plate.

Table 4 Steam piping size table

One and two-pipe systems				
Boiler Model Number	Riser Pipe Size (Note 1)		Header Pipe Size “H” (Note 2)	Equalizer Pipe Size “J”
	A	B		
SGO-3	2½" (Note 3)	—	2½"	1½"
SGO-4	2½" (Note 3)	—	2½"	1½"
SGO-5	2½"	—	3"	1½"
SGO-6	2½"	2½"	3"	1½"
SGO-7	2½"	2½"	3"	1½"
SGO-8	2½"	2½"	3"	1½"
SGO-9	2½"	2½"	3"	1½"

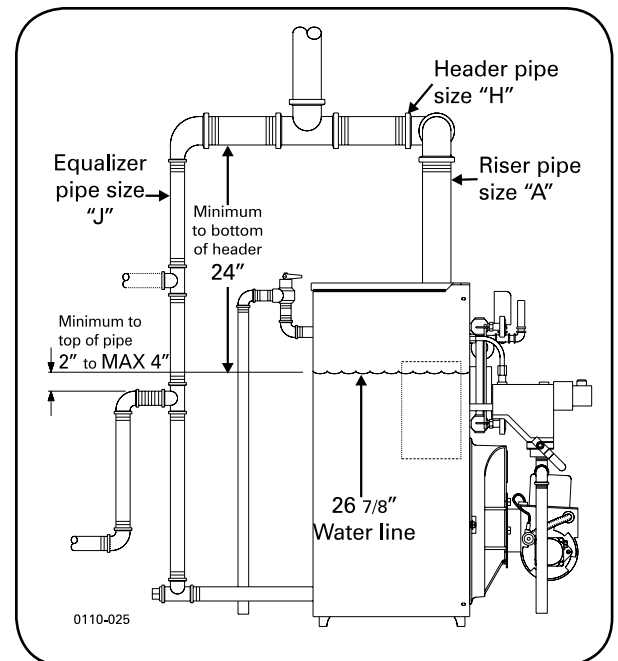
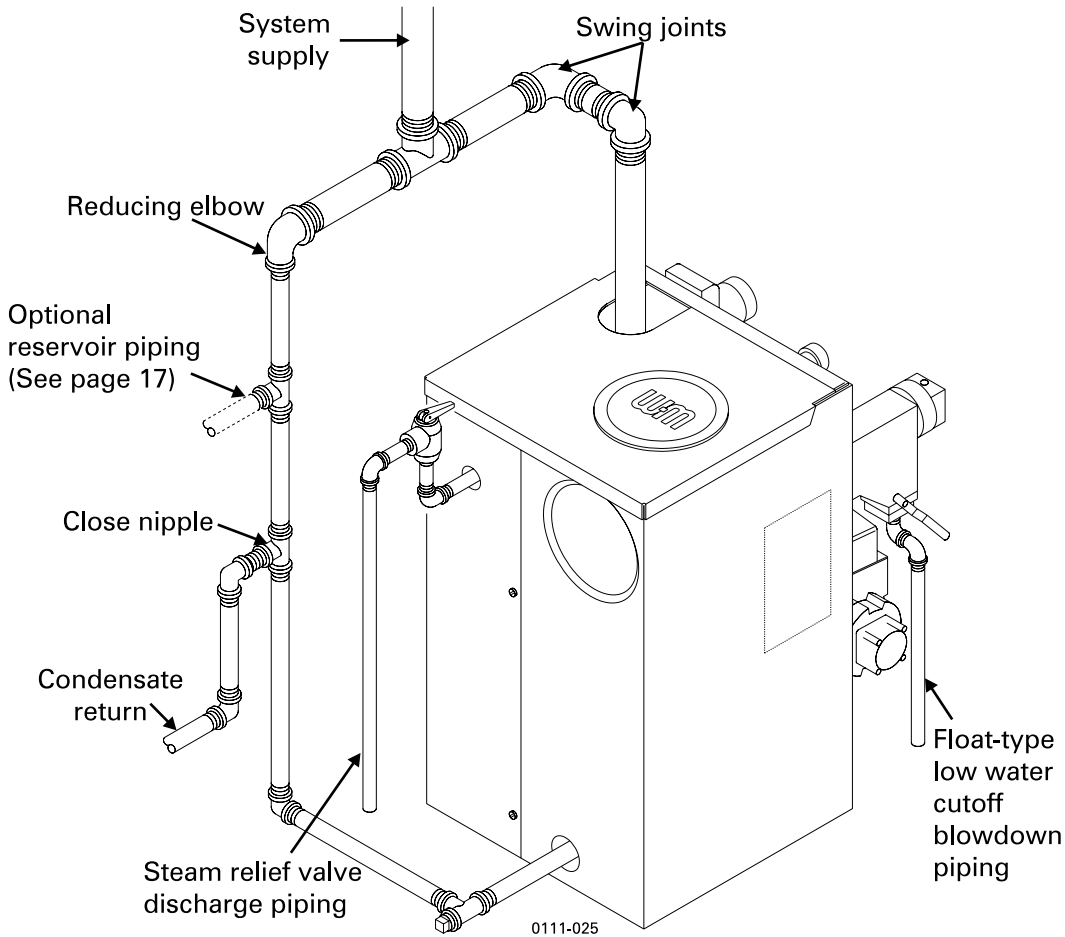
One-pipe counterflow systems				
SGO-3	2½"	—	2½"	1½"
SGO-4	2½"	—	2½"	1½"
SGO-5	2½"	—	3"	1½"
SGO-6	2½"	2½"	4"	1½"
SGO-7	2½"	2½"	4"	1½"
SGO-8	2½"	2½"	4"	1½"
SGO-9	2½"	2½"	4"	1½"
Note 1	Based on ASHRAE Fundamentals Handbook recommendations, allowing ½ oz. pressure drop at 0 psig.			
Note 2	Based on ASHRAE Fundamentals Handbook recommendations, allowing 2 oz. pressure drop per 100 feet of pipe at 3.5 psig. Maintain minimum 24" height from waterline to bottom of header.			
Note 3	Can be reduced to 2"			



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect steam piping (continued)

Figure 11 Steam piping for sizes 3 through 5 (see Figure 12, page 20, for sizes 6 through 9)

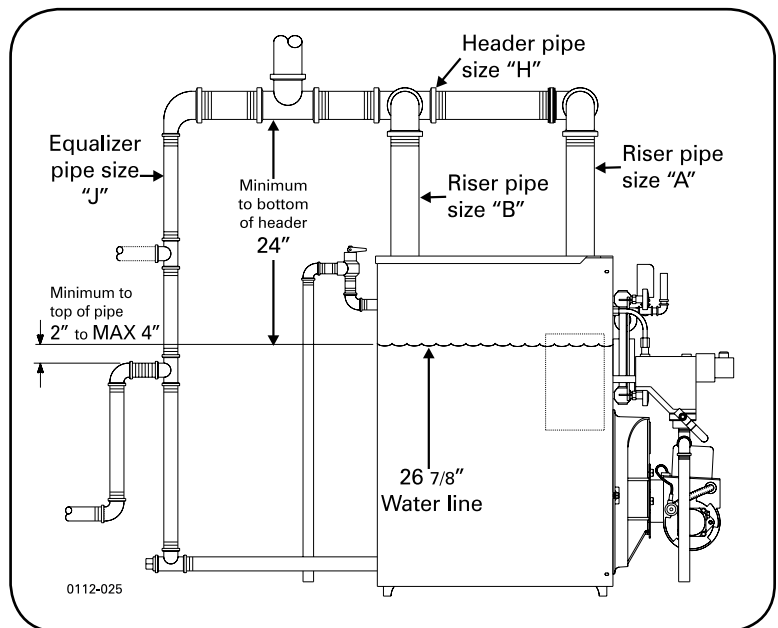
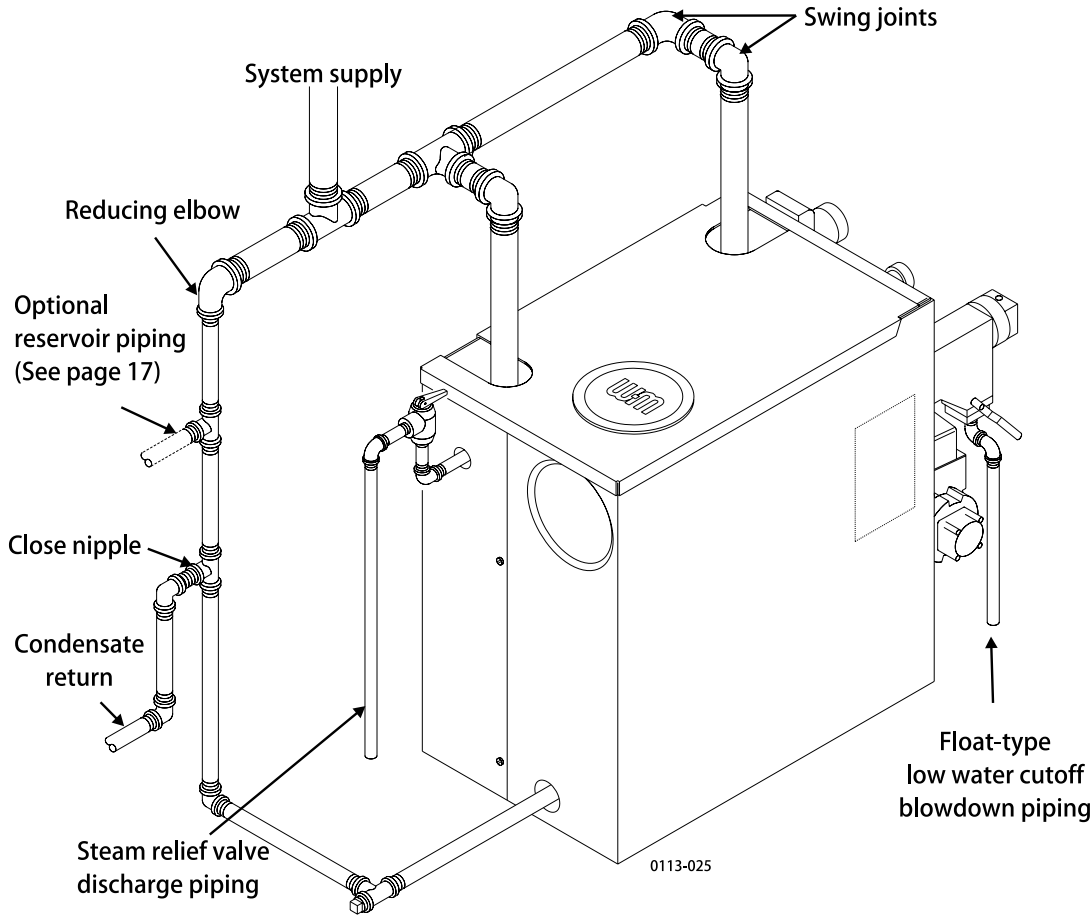




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect steam piping (continued)

Figure 12 Steam piping for sizes 6 through 9 (see Figure 11, page 19 for sizes 3 through 5)

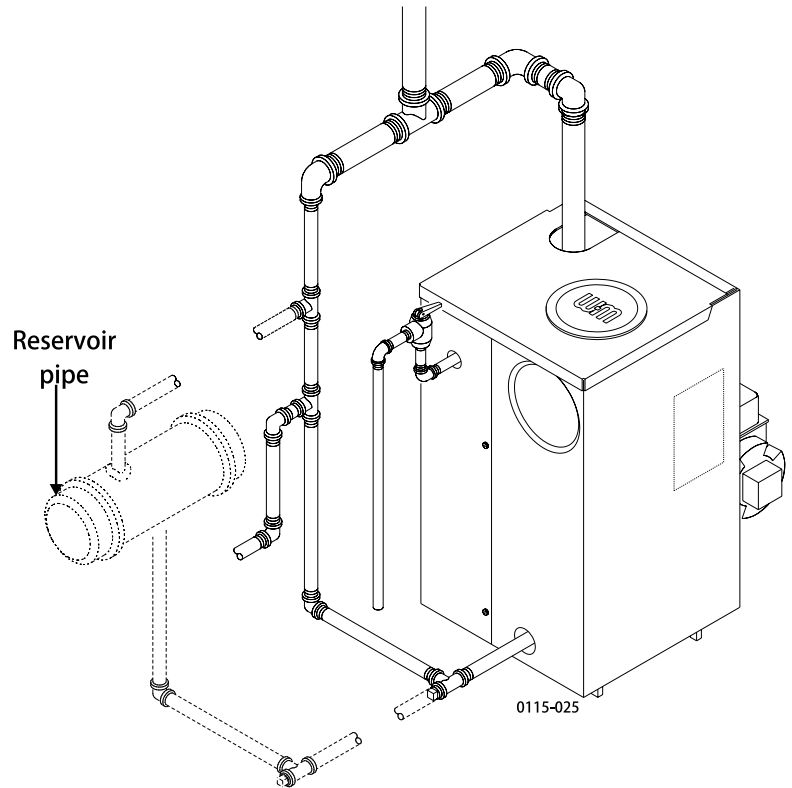
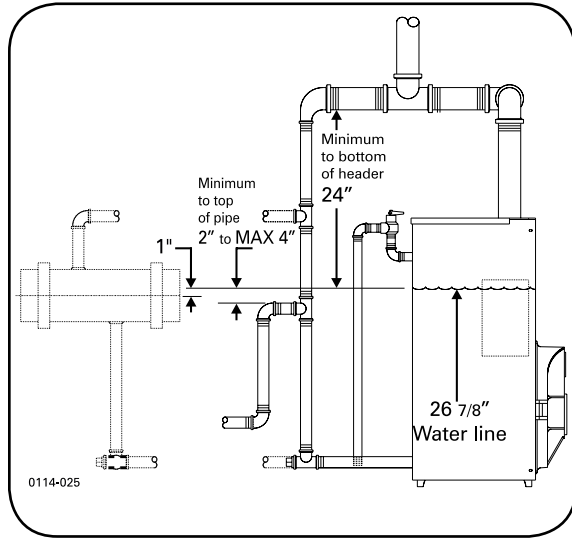




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect steam piping (continued)

Figure 13 Typical piping (one riser shown on boiler)



Optional reservoir piping

Modern steam boilers are designed to steam for less time than older, larger boilers. When replacing an older steam boiler, the system condensate return time may be longer than the steaming time. This can cause the following problems:

- Boilers fitted with an automatic water feed could overflow.
- Units fitted with only a low water cutoff would shut down and cycle while waiting for condensate to return.

To size and install reservoir piping, see Figure 13 and Tech Bulletin SB-0606 (available through your Weil-McLain distributor or sales office):

1. Pipe boiler as shown on page 18 through page 20.
2. Use 8" diameter reservoir pipe.
3. Locate centerline of reservoir pipe 1" below 26⁷/₈" boiler waterline.

Table 5 Condensate receiver capacity

Boiler Model	Gross Output lbs steam per hour	Gallons condensate per hour	Minimum condensate receiver capacity – gal.				Recommended condensate feed pumping rate gpm at 15 psi
			15 Min.* Boiler operation	30 Min.* Boiler operation	45 Min.* Boiler operation	60 Min.* Boiler operation	
SGO-3	114	14	4	8	12	16	0.5
SGO-4	150	18	5	11	16	22	0.6
SGO-5	180	22	6	13	19	26	0.7
SGO-6	216	26	8	16	23	31	0.9
SGO-7	246	30	9	18	27	35	1.0
SGO-8	274	33	10	20	30	39	1.1
SGO-9	303	36	11	22	33	44	1.2

* Maximum time to when condensate returns to boiler.



▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect tankless heater piping

▲DANGER Hot Water Can Scald!

- Consumer Product Safety Commission and some states recommend domestic hot water temperature of 130°F or less.
- When installing an automatic mixing valve, selection and installation must comply with valve manufacturer’s recommendations and instructions.
- Water heated to a temperature suitable for clothes washing, dish washing and other sanitizing needs will scald and cause injury.
- Children, elderly, infirm or physically handicapped persons are more likely to be injured by hot water. Never leave them unattended in or near a bathtub, shower or sink. Never allow small children to use a hot water faucet or draw their own bath. If anyone using hot water in the building fits this description, or if state laws or local codes require certain water temperatures at hot water faucets, take special precautions:
 - Install automatic mixing valve set according to those standards.
 - Use lowest practical temperature setting.
 - Check water temperature immediately after first heating cycle and after any adjustment.

To pipe tankless heater

1. Size piping no smaller than tankless heater inlet and outlet.
2. Following controls (furnished by others) must be installed:
 - a. Automatic mixing valve. See Figure 14. (Read **▲DANGER** at left.)
 - b. Flow regulating valve. Size according to intermittent draw of tankless heater. See Table 6 below. Follow valve manufacturer’s instructions to install.
3. Additional anti-scald devices may be installed at each hot water faucet, bath and shower outlet.
4. In hard water areas, soften cold domestic supply water to heaters to prevent lime build-up.

▲WARNING

Studies have indicated that dangerous bacteria can form in potable water distribution systems if certain minimum water temperatures are not maintained. Contact local health department for more information.

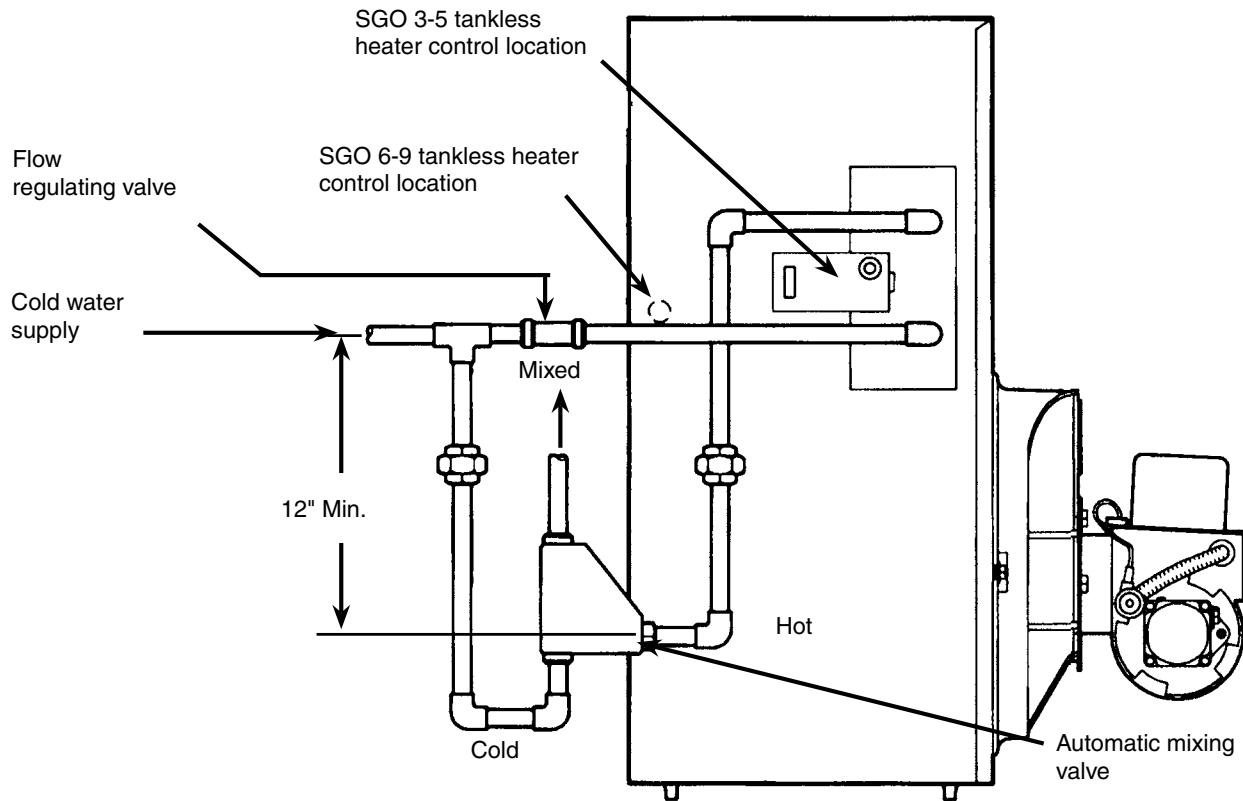
Table 6 Tankless heater ratings

Boiler model number	Heater number	Intermittent draw ratings (gpm)*	Inlet and outlet tapping sizes
SGO-3	35-S-29	3.25	¾"
SGO-4	35-S-29	3.50	¾"
SGO-5	35-S-29	3.75	¾"
SGO-6	35-S-29	4.00	¾"
SGO-7	35-S-29	4.00	¾"
SGO-8	35-S-29	4.00	¾"
SGO-9	35-S-29	4.00	¾"
Note 1	To avoid supplying steam to system during summer tankless operation, raise water level to one inch above normal water line.		
Note 2	Gallons of water per minute heated from 40°F to 140°F with 200°F boiler water temperature. Tested in accordance with I=W=H testing and rating standard for indirect tankless water heaters tested with boilers.		

▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect tankless heater piping

Figure 14 Tankless heater piping



These single wall heat exchangers comply with National Standard Plumbing Code provided that:

- Boiler water (including additives) is practically non-toxic, having a toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products.
- Boiler water pressure is limited to max. 15 psig by approved steam relief valve.

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

Connect wiring — general information

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 One and any local codes.
- Wiring must be N.E.C. 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 ga. 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.

Junction box (furnished)

- Junction box houses electrical connections for all boiler components.
- “P” boilers have harnesses furnished.
- “A” boilers are furnished with burner and limit harnesses.
- 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.
- Service switch (15 amp) is provided with boiler. “A” boilers — install switch as shown.
- 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 “P” boilers have a power disconnect plug installed on burner.
- On “A” boilers, mount the plug (provided in steam trim carton) on the burner housing as shown in Figure 18, page 27, or Figure 20, page 29. For Carlin burners, screw burner plug into threaded conduit coupling, then mount this assembly to the burner housing using the chase nipple. Route wires through housing and make 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 26 (float-type LWCO) or page 28 (probe-type LWCO).

Connect wiring — general information (continued)

Blocked vent shutoff switch

NOTICE In Canada, a blocked vent shutoff switch kit must be installed (see parts list page 38). See Figure 15.

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.

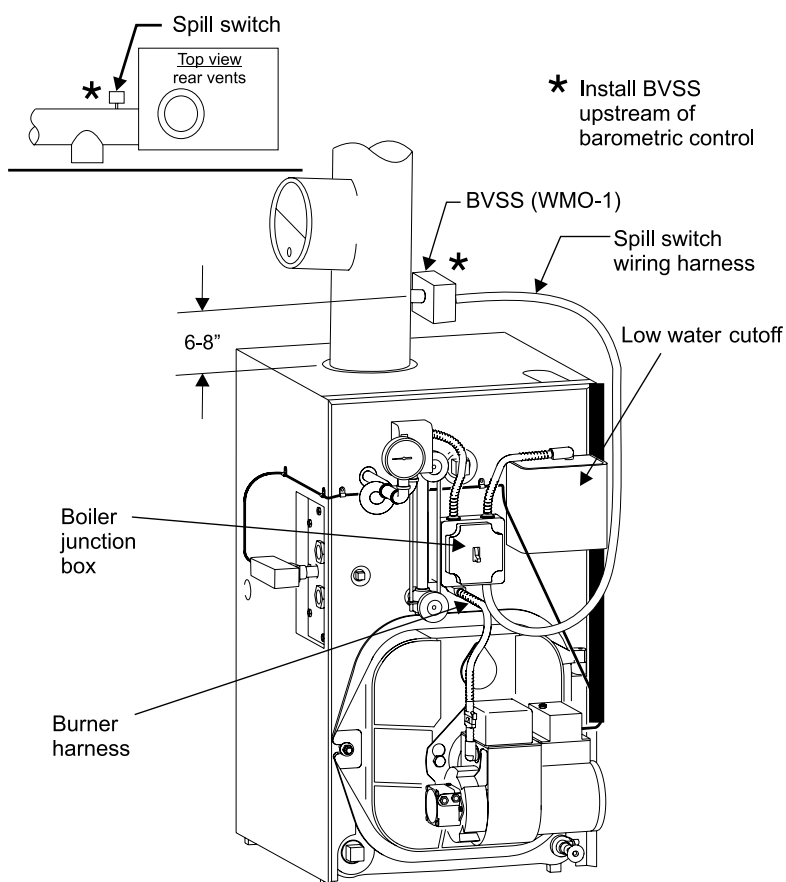
After installing BVSS switch, proceed as follows

1. Disconnect power.
2. Install Spill Switch (BVSS) Wiring Harness (P/N 591-391-942) 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 Boiler Junction Box (see Figure 15).
 - c. Install both the fork ends to the screw terminals on the BVSS Switch as per the wiring diagram, (see Figure 17).
 - d. Replace BVSS box cover.

To wire blocked vent safety switch, see:

Figure 16, page 26 for float-type LWCO
Figure 19, page 28 for probe-type LWCO

Figure 15 Blocked vent shutoff switch installation

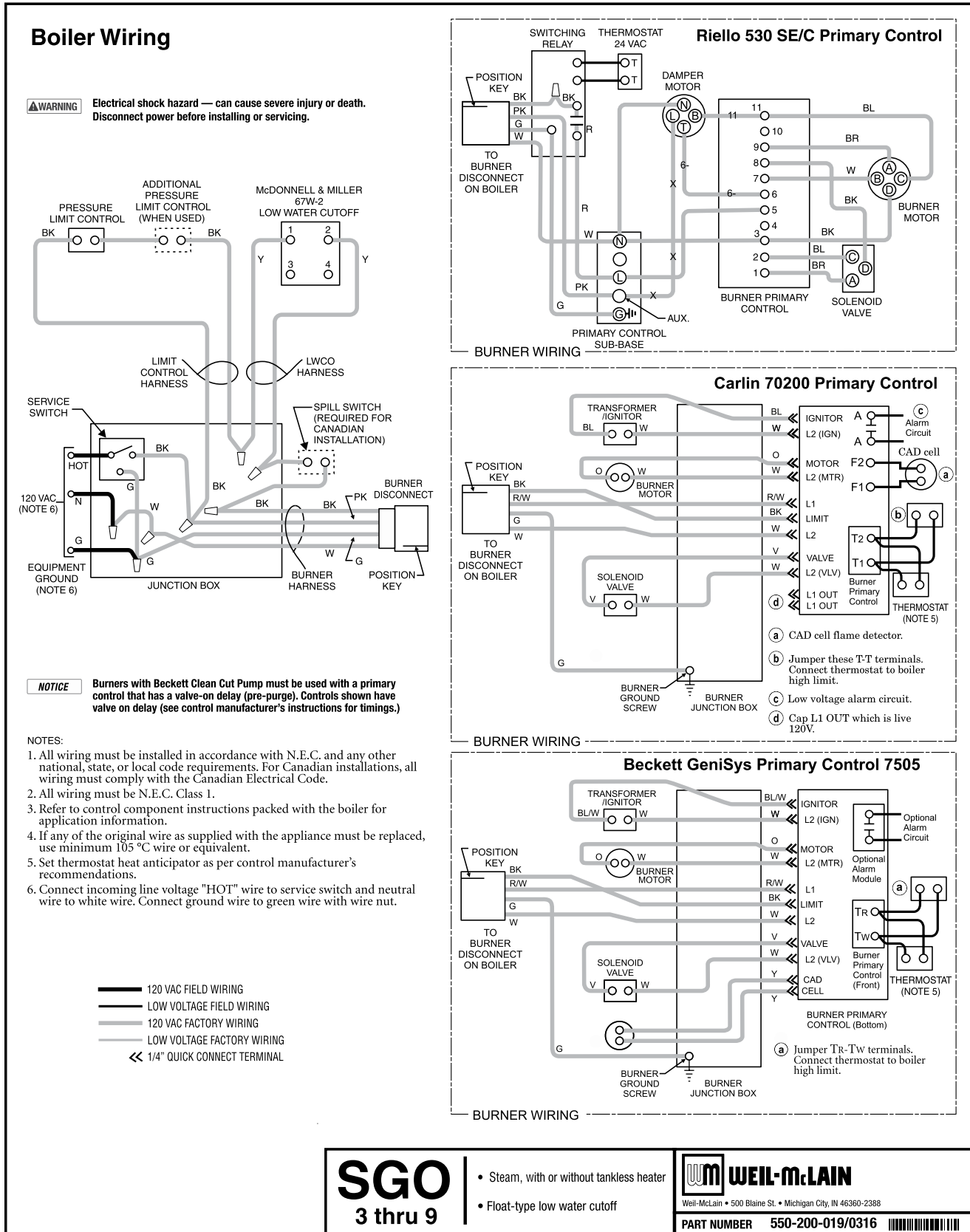




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect wiring (Float-type LWCO)

Figure 16 Boiler wiring for float-type LWCO — see Figure 18, page 27 for component locations

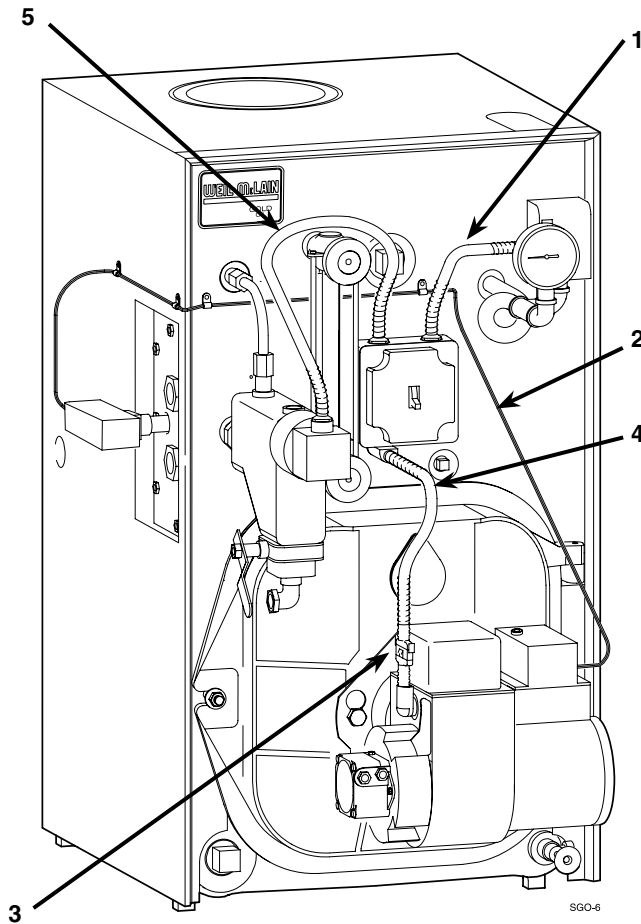




WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect wiring (Float-type LWCO) (continued)

Figure 18 Boiler wiring for float-type LWCO — component locations for wiring diagram, Figure 16, page 26



- 1 Pressure control wiring harness
- 2 Tankless heater control wiring
- 3 Burner disconnect plug
- 4 Burner wiring harness
- 5 Low water cutoff wiring harness (not furnished on "A" boilers)

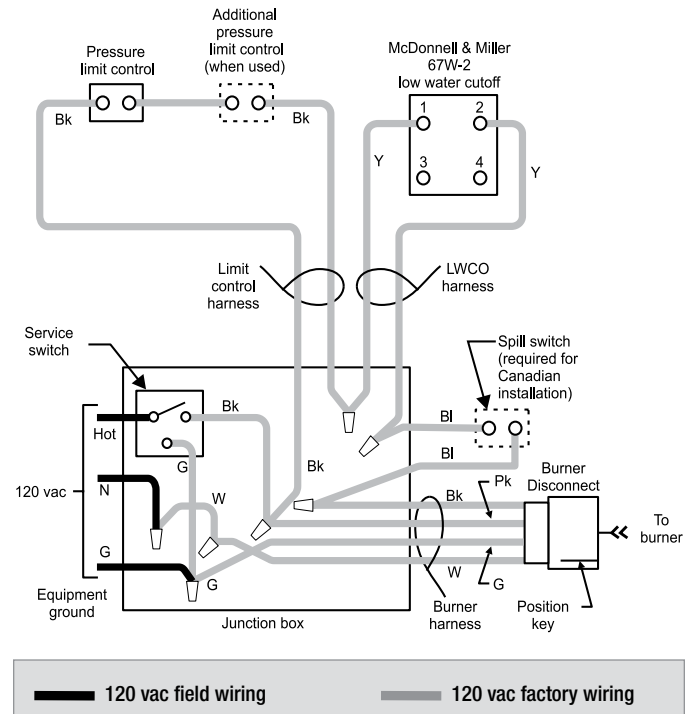
Blocked vent safety switch (BVSS), when required

NOTICE In Canada, a blocked vent shutoff switch kit must be installed (see parts list page 38). See Figure 15, page 25.

The BVSS wiring diagram in Figure 17 shows boiler wiring only up to the burner disconnect. For additional information, refer to manufacturer's instructions.

1. Locate and remove boiler junction box cover.
2. Locate wire nut with yellow and black wire (if more than one exists, pick the one with black wire going to burner harness). Clip the wire nut.
3. Strip 1/2" from the ends of both the black and the yellow wires.
4. Clip the quick connects from the blue wires coming from the BVSS Harness and strip 1/2" from the ends.
5. Using two wire nuts from the kit, wire the blue wires in series with the black and yellow wires (see Figure 17).
6. Replace junction box cover.
7. Turn on power and verify safe operation of the appliance per GO Boiler Manual.
8. Restore boiler to normal operation.

Figure 17 BVSS wiring diagram (float-type LWCO)

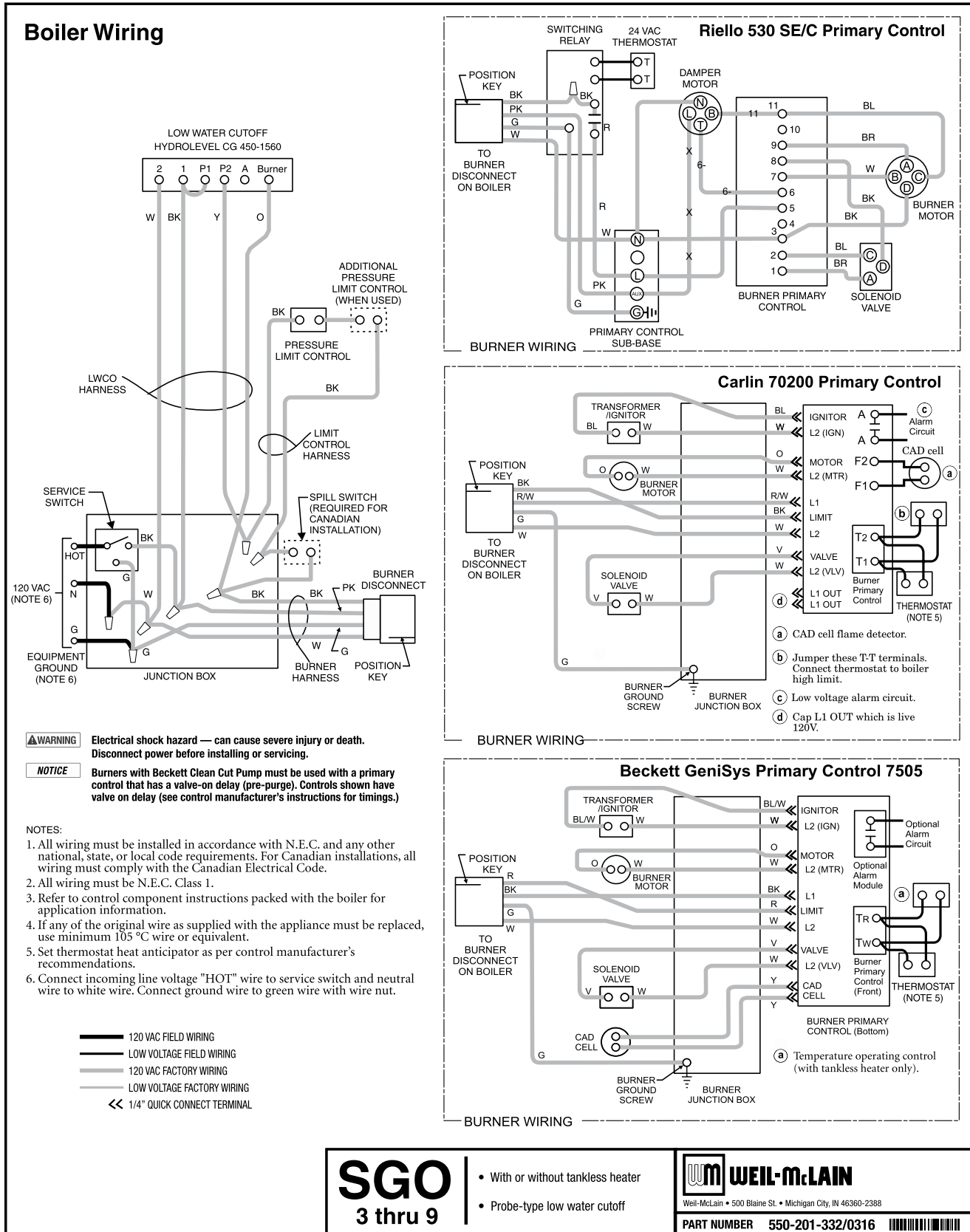




▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect wiring (Probe-type LWCO)

Figure 19 Boiler wiring for probe-type LWCO — see Figure 20, page 29 for component locations



SGO

3 thru 9

- With or without tankless heater
- Probe-type low water cutoff

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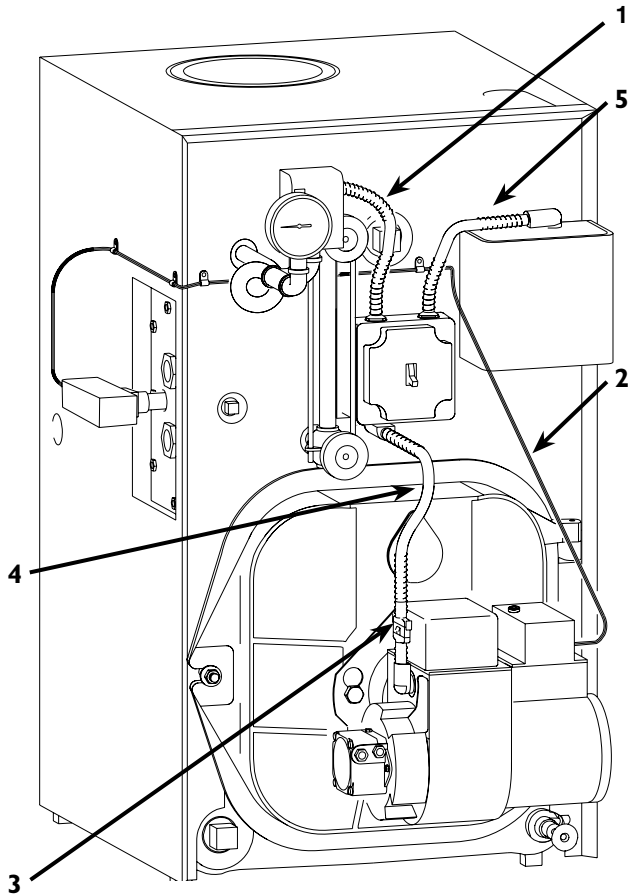
PART NUMBER 550-201-332/0316



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect wiring (Probe-type LWCO) (continued)

Figure 20 Boiler wiring for probe-type LWCO — component locations for wiring diagram, Figure 19, page 28



- 1 Pressure control wiring harness
- 2 Tankless heater control wiring
- 3 Burner disconnect plug
- 4 Burner wiring harness
- 5 Low water cutoff wiring harness (not furnished on "A" boilers)

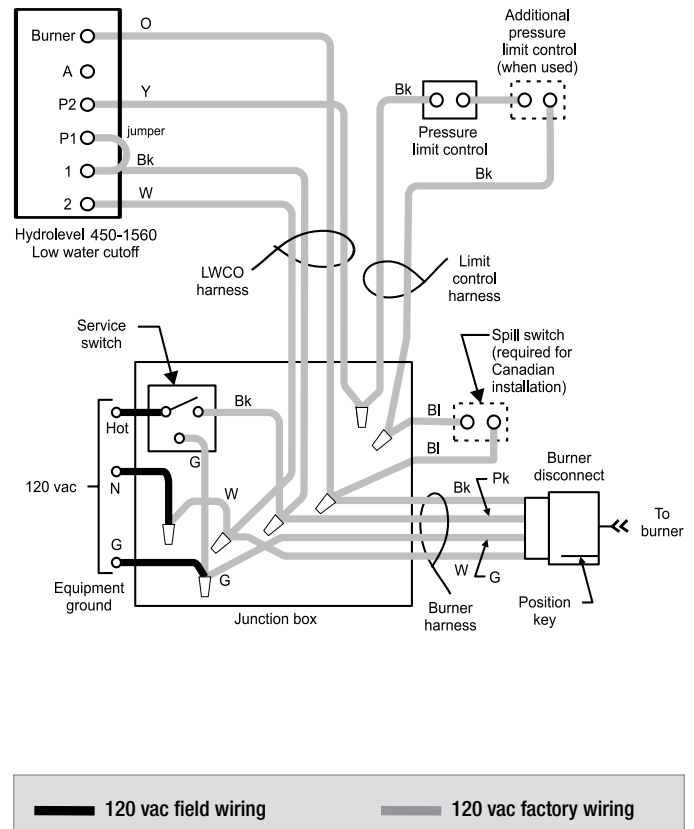
Blocked vent safety switch (BVSS), when required

NOTICE In Canada, a blocked vent shutoff switch kit must be installed (see parts list page 38). See Figure 15, page 25.

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

1. Locate and remove boiler junction box cover.
2. Locate wire nut with two black wires (if more than one exists, pick the one with black wire going to the burner harness). Clip the wire nut.
3. Strip 1/2" from the end of both the black wires.
4. Clip the quick connects from the blue wires coming from the BVSS Harness and strip 1/2" from the ends.
5. Using two wire nuts from the kit, connect the blue wires in series with the two black wires (see Figure 21).
6. Replace junction box cover.
7. Turn on power and verify safe operation of the appliance.
8. Restore boiler to normal operation.

Figure 21 BVSS wiring diagram (probe-type LWCO)





WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Connect oil piping

General oil piping requirements

- Location and installation of oil tanks, oil piping and burners must follow:
 - NFPA 31, 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 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.

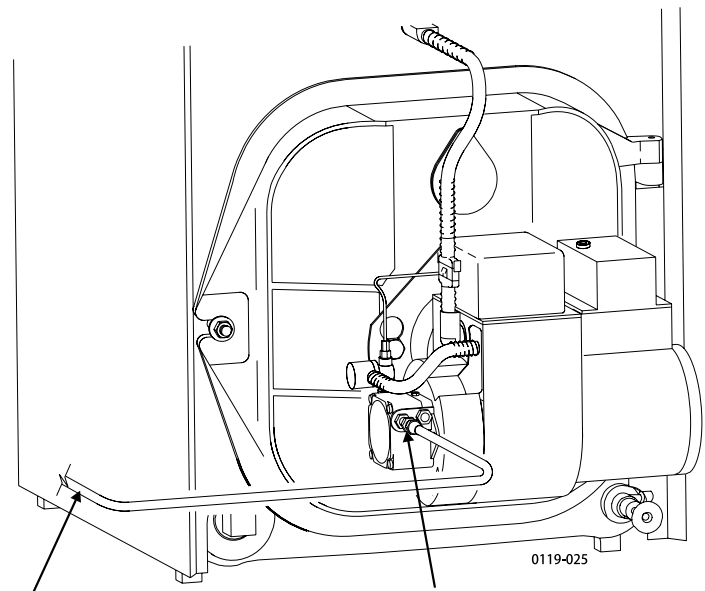
WARNING Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Do not use compression fittings, only flare fittings.

- 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 22 for recommended connection at burner, allowing burner mounting door to swing open completely for servicing.

Figure 22 Recommended oil piping connection to burner



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

Flare fitting

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

Start up

Fill the system

1. Do not fill (except for leakage tests) until boiler is ready to be fired.
2. Fill to normal water line as indicated on jacket front panel.
3. Boiler water pH 7.0 to 8.5 is recommended.

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

4. Follow “Skim steam boiler” to assure proper operation.

Tips for steam 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 system. Damage to system components can result.

- For pH conditions outside 7.0 to 8.5 range or unusually hard water areas (above 7 grains hardness), consult local water treatment company.

Skim steam boiler

NOTICE Clean new steam boilers to remove any impurities. Failure to properly clean can result in violent water level fluctuations, water passing into steam mains, or high maintenance costs on strainers, traps or vents. Skim boiler only. Do not clean old piping or leaks can occur.

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

1. Provide 1½" skim piping from skim tapping to floor drain. Add a tee in piping to observe skim water level. Raise waterline to midpoint of skim tapping.

2. Fire burner to maintain water temperature below steaming temperature during skimming process.
3. Feed in water to maintain water level. Cycle burner to prevent rise in steam pressure. Continue skimming until discharge is clear.
4. While boiler is warm, but not hot, drain boiler through drain valve.
5. Remove skim piping. Close drain valve. Fill with fresh water to normal waterline. Start burner and steam for 15 minutes to remove dissolved gases. Stop burner.
6. Check traps and air vents for proper operation.
7. Process may need to be repeated after several weeks of operation.

To place in operation

1. Verify boiler is filled with water to normal waterline as indicated on jacket front panel.
2. Open burner door and verify rear target wall, floor and burner door insulations are in proper position and condition.
3. Verify burner mounting door is closed tightly and burner wiring harness is connected to junction box.
4. Factory burner adjustment and settings may not be suitable for specific job conditions. See “Burner adjustments for packaged and non-packaged boilers” on page 36.

▲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. Check boiler and system piping for leaks. See “Tips for steam systems.”
6. Inspect breeching and venting for proper operation.



▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Check out procedure

Check off steps as completed

- Boiler properly filled with water?
- Boiler piping checked for leaks (including tankless heater, if used)?
- System vents operating properly?
- Boiler properly skimmed?
- 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?

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

- Proper draft and burner flame? Final adjustment made with combustion test equipment?
- Test pressure control: While burner is operating, move indicator on limit control below actual boiler steam pressure. Burner should go off. Raise setting on pressure control above steam pressure and burner should re-ignite.
- Test low water cutoff(s): Follow control manufacturer's instructions for testing procedures. Make sure burner goes off when control responds to low water condition. Burner should re-ignite when proper water level is restored.
- Test additional field-installed controls: If boiler has additional operating control or other controls, test for operation as outlined by control 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 pressure requirements?
- Thermostat heat anticipator setting (if available) set properly? Refer to "Connect wiring," page 24.
- 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 (page 33)?
- Reviewed Maintenance and Service Manual 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?



▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Installation and service certificate

Installation and service certificate

Date Installed: _____

Boiler Model Number: _____ Series: _____

CP Number(s): _____

Measured Btu or GPH Input: _____

- 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.

Installer: _____

(Company)

(Address)

(Phone)

(Installer's Signature)



▲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 flueways. See page 35.												
5	Perform service on low water cutoff, relief valve and gauge glass. See page 36.												
6	Check boiler and piping for leaks and repair if found.												
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. See page 31.												
9	Start unit and verify combustion settings with combustion test equipment. See page 31.												
10	Verify operation of all controls on boiler. See page 31.												

Any parts of the boiler furnished by Weil-McLain must be replaced by parts listed in Weil-McLain Boiler and Repair Parts Book.

▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Detailed service procedures

Cleaning boiler flueways

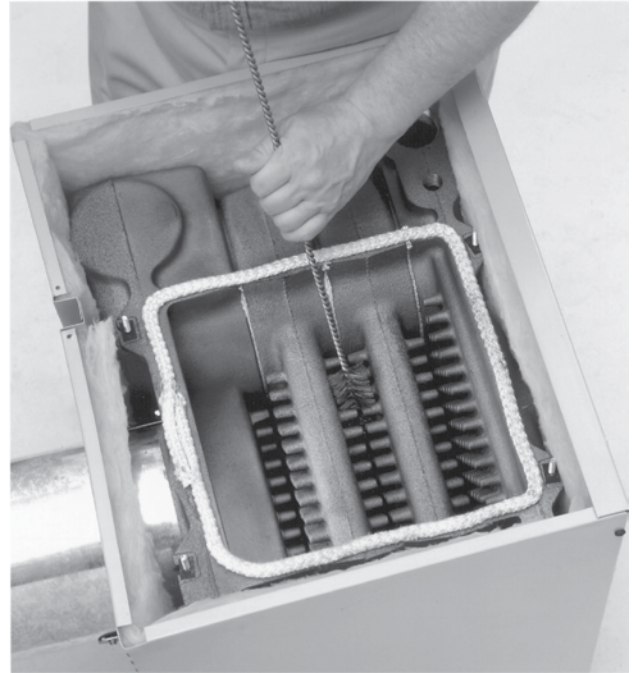
▲DANGER Make sure all electrical connections to boiler are turned off and wait until boiler is warm, not hot, before cleaning. Failure to do so will result in severe personal injury, death or substantial property damage.

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 wall of rear refractory.
6. Move to the bottom of the flueways and clean up between the sections to reach pins left uncleaned in step #5.
7. Once the flueways 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.

Figure 23 Thoroughly clean flueways between all pins at all angles. Start on top of boiler, finish from the bottom.



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

Detailed service procedures (continued)

General description of control operation

Low water cutoff

Shuts down boiler if there is a low water condition.

Steam relief valve

Provides discharge if boiler pressure exceeds 15 psig.

Pressure limit control

If high steam pressure occurs, control shuts down burners until pressure drops. Limit should be set higher than design pressure of system. Operating control can be set at 5 psig and adjusted to comfort level. Normal operation is usually less than 5 psig. At certain times the system may operate under vacuum conditions.

Gauge glass

Indicates boiler water level. Cold fill water level should correspond to line stamped on boiler jacket. When boiler operates, water level will fluctuate.

Pressure gauge

Provides reading of boiler pressure. Maximum boiler pressure is 15 psig.

Tankless water heater

Weil-McLain tankless heater ratings are based on 200°F boiler water temperature. To get rated output, set tankless heater control to 200°F. Control can be adjusted to meet system hot water requirements.

Burner adjustments for packaged and non-packaged boilers

▲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.

Controls requiring annual service

Float-type low water cutoff

Follow instructions to blowdown cutoff on page 4. Also refer to instructions from cutoff manufacturer in envelope assembly provided with boiler.

Probe-type low water cutoff

Cutoff must be removed and inspected and cleaned annually. Refer to cutoff manufacturer's instructions in envelope assembly provided with boiler.

Steam relief valve

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

▲DANGER 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.

Gauge Glass

To clean glass:

1. Close lower gauge glass cock and carefully open petcock below glass to blow water and sediment out of glass by steam pressure.
2. Slowly open lower gauge glass cock and allow a small amount of water to flush out through the open petcock.
3. Close petcock and fully open lower gauge cock. The water level should immediately rise to its proper level.
4. If gauge glass breaks, close off both gauge cocks and loosen glass retaining nuts to remove gauge glass. Do not use thin glass tubing as a replacement.

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

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



▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Parts list

Table 7 Series 3 section and flue collector parts

Item	Description	Part No.
A	Wide front section (7011)	316-700-245
B	Regular 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)	316-700-227
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 complete, for SGO-3 with jacket	386-700-665
	Section assembly complete, for SGO-4 with jacket	386-700-666
	Section assembly complete, for SGO-5 with jacket	386-700-667
	Section assembly complete, for SGO-6 with jacket	386-700-668
	Section assembly complete, for SGO-7 less jacket	386-700-669
	Section assembly complete, for SGO-8 less jacket	386-700-670
	Section assembly complete, for SGO-9 less jacket	386-700-671
	F	Collector hood kit for SGO-3*
F	Collector hood kit for SGO-4*	386-700-341
F	Collector hood kit for SGO-5*	386-700-342
F	Collector hood kit for SGO-6*	386-700-343
F	Collector hood kit for SGO-7*	450-020-191
F	Collector hood kit for SGO-8*	450-020-192
F	Collector hood kit for SGO-9*	450-020-193
G	Tie rod ½ x 5½ (SGO-7, 8, 9)	560-234-464
G	Tie rod ½ x 10¾ (SGO-7)	560-234-491

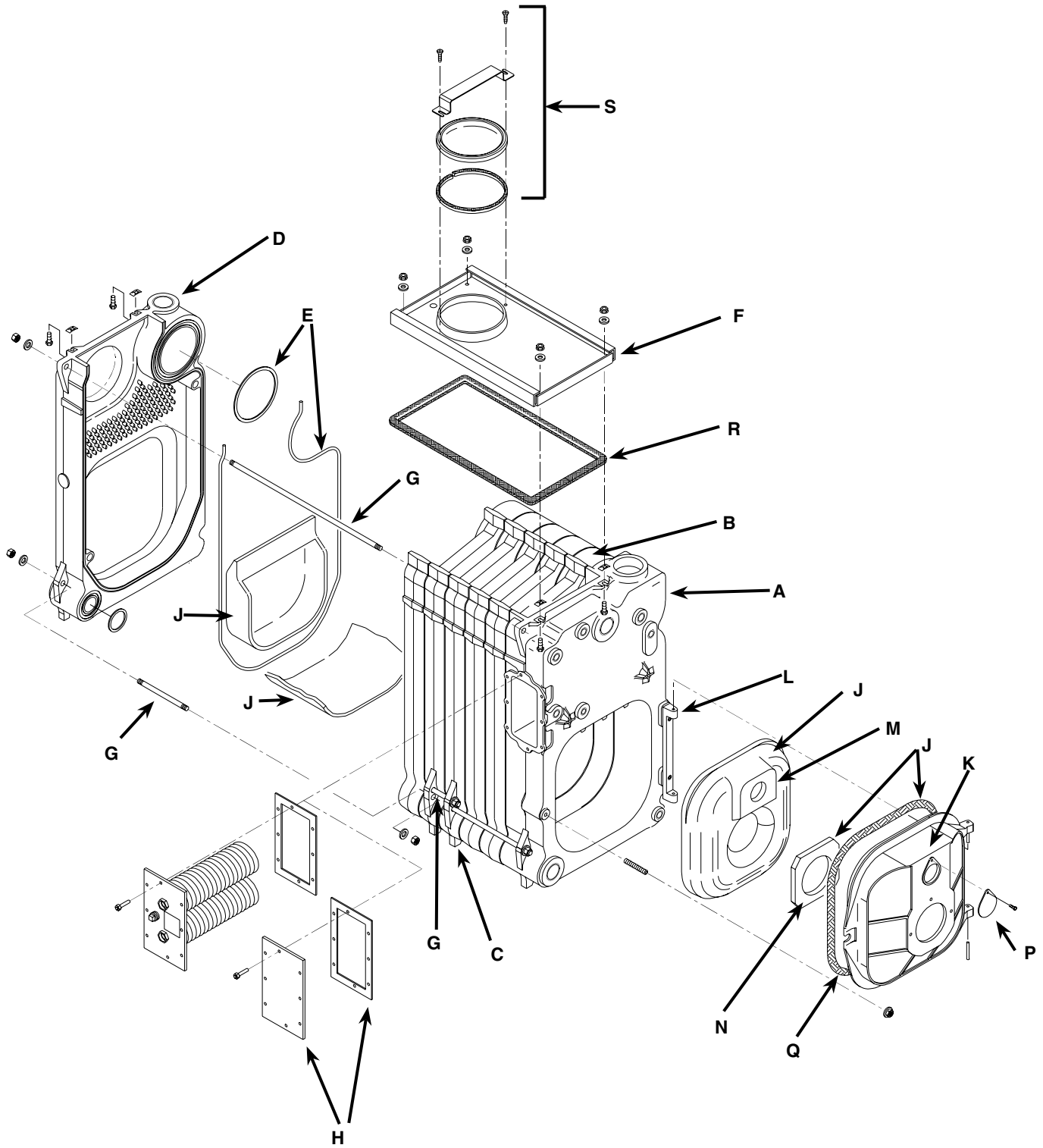
Item	Description	Part No.
G	Tie rod ½ x 12¼ (SGO-3)	560-234-493
G	Tie rod ½ x 13¾ (SGO-7 & 8)	560-234-494
G	Tie rod ½ x 14 (SGO-8, 9)	560-234-470
G	Tie rod ½ x 15 (SGO-9)	560-234-495
G	Tie rod ½ x 15¾ (SGO-4)	560-234-532
G	Tie rod ½ x 16½ (SGO-9)	560-234-496
G	Tie rod ½ x 18½ (SGO-5)	560-234-475
G	Tie rod ½ x 21½ (SGO-6)	560-234-536
G	Tie rod ½ x 24¾ (SGO-7)	560-234-540
G	Tie rod ½ x 28 (SGO-8)	560-234-544
G	Tie rod ½ x 31 (SGO-9)	560-234-546
H	Heater cover plate carton (cover plate, gasket, studs & nuts)	389-900-103
J	Combustion chamber kit (rear & frt ref., Door refractory blanket, rope, blanket & water glass)	386-700-355
K	Burner mounting door assembly (door, obs. Port, rope, ins. And pins)	386-700-358
L	Door hinge (7054)	330-054-300
M	Door refractory	386-700-359
N	Door refractory blanket	591-222-115
P	Observation port shutter	460-039-867
Q	Door seal rope 5'	590-735-104
R	¾" Glass rope for collector hood (7' for largest size hood)	590-735-109
S	Flue cap assembly (cap, strap, rope and 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.

Parts drawing

Table 8 Series 3 section and flue collector parts



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

Table 9 Series 3 trim parts

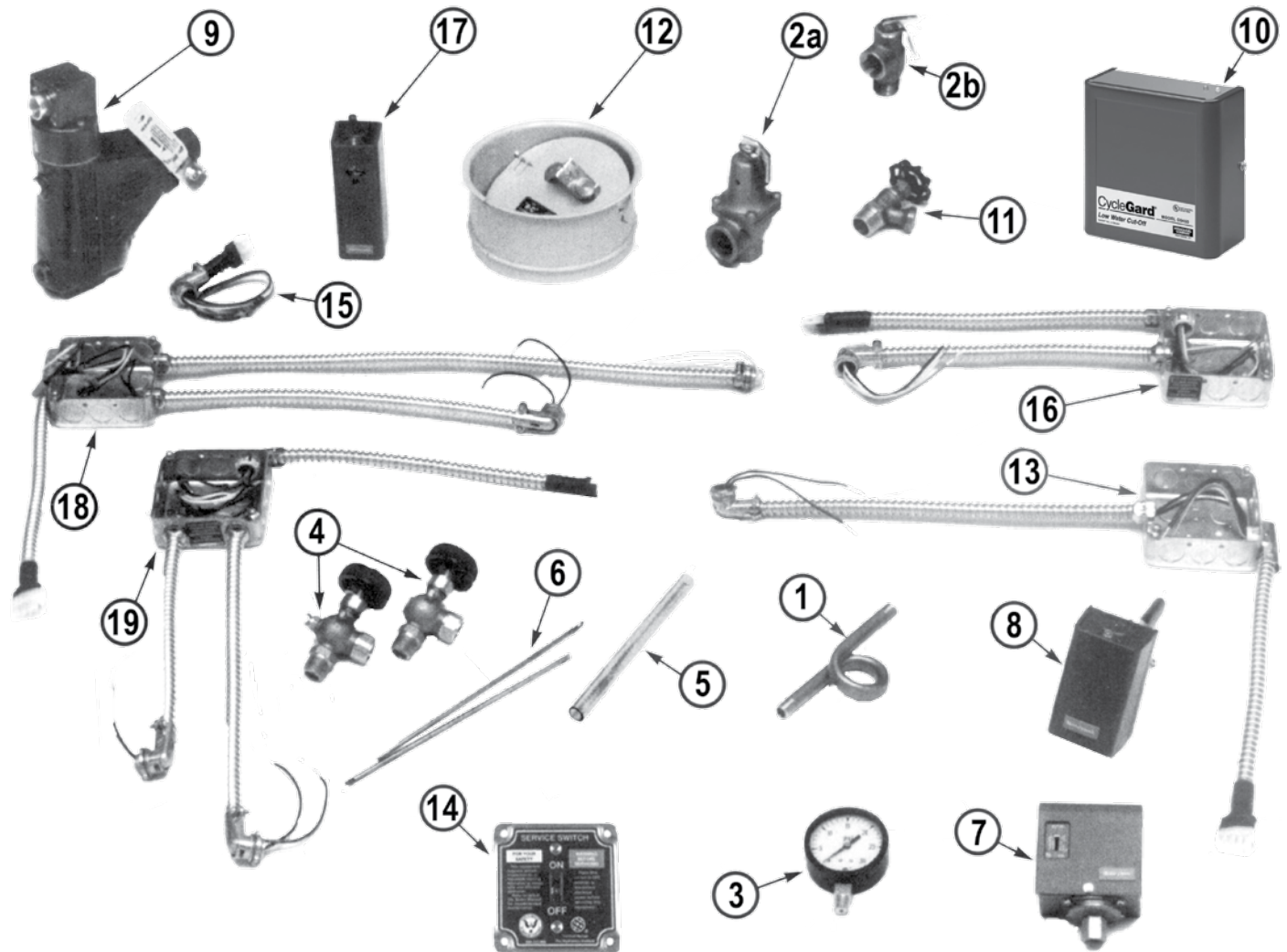
Fig. No.	Part no.	Description	Mfr.	Mfr. part no.
1	560-640-698	Syphon, 180° Bend, ¼" brass pipe		
2a	511-548-023	Steam relief valve, set to relieve at 15 PSIG., ¼" NPT inlet ¾" NPT side outlet, 300 lbs./hr steam capacity	Watts	315
2b		Steam relief valve, set to relieve at 15 PSIG., ¼" NPT male inlet ¾" NPT female side outlet, 407 lbs./hr steam capacity	Conbraco	13-511-08
3	510-218-045	Steam pressure gauge, 0-30 PSIG.	Ametek	PSOSK
4	510-218-135	Gauge cock set, B15, standard stem	Conbraco	20-205-03B15
5	383-600-001	Gauge glass kit, includes glass, gaskets and brass washers	Weil-McLain	
6	563-334-597	Water gauge glass guard, 10⅝" long	Weil-McLain	
7	510-312-135	High pressure limit control, operating range 0.5-9 PSI., additive differential 1-5 PSI	Honeywell	PA404A1009
		High pressure limit control, operating range 0-15 PSI., differential 2-8 PSI.	Johnson Controls	P-47AA-25D
8	510-312-209	High temperature limit control, spst, automatic recycle with ¾" well (used in tankless heater kit)	Honeywell	L4080B131
		High temperature limit control, spst, automatic recycle with ¾" well (used in tankless heater kit)	White-Rogers	11B83-16
9	511-114-495	Low water cutoff, float type	McDonnell-Miller	67W-2
10	511-100-007	Low water cutoff, probe type	Hydrolevel	45-469-1560
11	511-210-423	Drain cock, ¾", 1½" shank	Conbraco	31-606-01
	511-246-392	Drain cock, ¾"	Hammond	710
		Drain cock, ¾"	Watts	BD2C
		Drain cock, ¾"	Matco-Norca	
		Drain cock, ¾"	Nibco	#74
12	510-512-267	Balanced draft damper (barometric) 7"	Effikal	ESOC
13	591-391-848	Junction box wiring harness assembly (A & B only)	Weil-McLain	
14	591-391-854	Junction box cover assembly with service switch	Weil-McLain	
15	591-391-850	Burner harness assembly	Weil-McLain	
16	591-391-837	SGO water harness	Weil-McLain	
17	510-311-024	Limit control without well, spdt (for tankless heater)	Honeywell	L6006A1251
18	591-391-842	Junction box-wiring harness assembly (S-GO float low water cutoff only - packaged only)	Weil-McLain	
19	591-391-965	Junction box-wiring harness assembly (S-GO probe low water cutoff only - packaged only)	Weil-McLain	
20	426-700-268	(Not shown) Flue pipe brackets (requires 2 of this item)	Weil-McLain	
21	590-921-903	(Not shown) Tankless Heater - steam boiler, includes heater, gasket, nuts and studs. For SGO-3 thru 9	Heat Transfer Products	35-S-29



WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Replacement parts (continued)

Figure 24 Series 3 trim parts



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 10 Boiler jacket

Model	Jacket panel with insulation — front	Left side and rear	Right side and rear	Top panel with cap
SGO-3	381-355-521	381-355-522	426-700-252	381-355-524
SGO-4	381-355-521	381-355-525	426-700-254	381-355-527
SGO-5	381-355-521	381-355-528	426-700-256	381-355-530
SGO-6	381-355-521	381-355-531	426-700-258	381-355-533

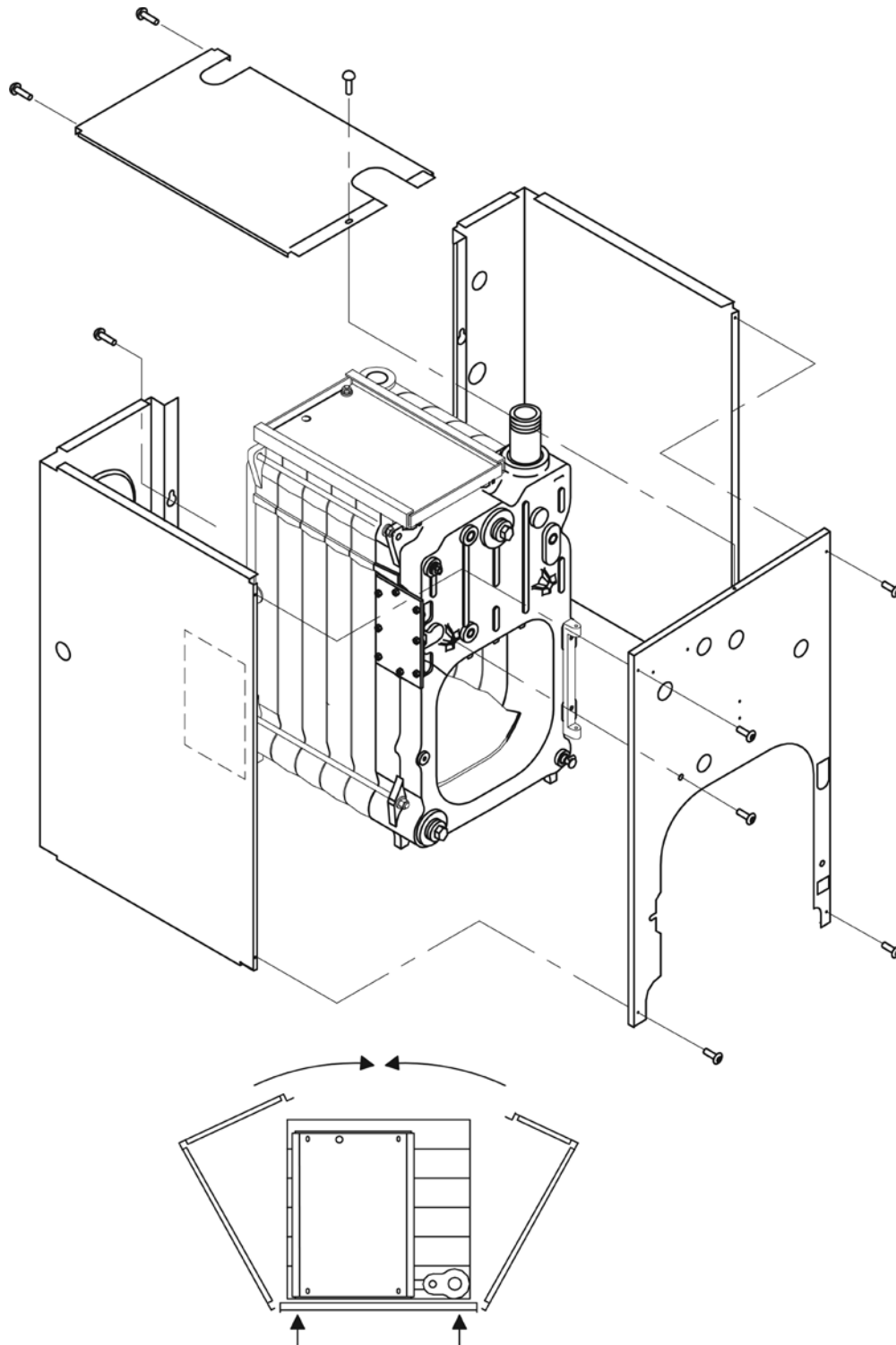
Complete Jacket cartons	
7 section	416-700-182
8 section	416-700-184
9 section	416-700-186

Common jacket parts for all boilers	
Plastic flue cap cover w/insulation	560-907-687
Jacket hardware kit	386-700-853
Touch up paint, gold spray can	592-000-000

WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Replacement parts (continued)

Figure 25 Boiler jacket



NOTICE

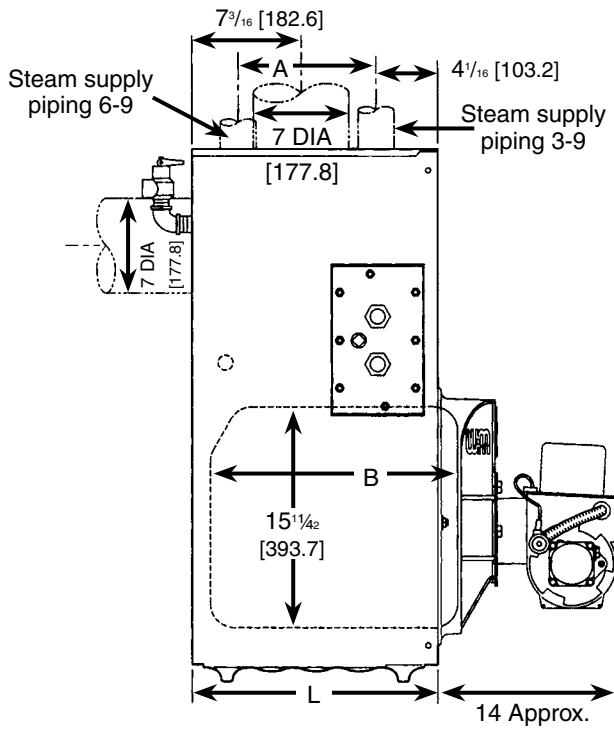
Repair parts must be purchased through Weil-McLain for the specific boiler as indicated in the list below. Results from using modified or other manufactured parts will not be covered by warranty and may damage boiler or impair operation.



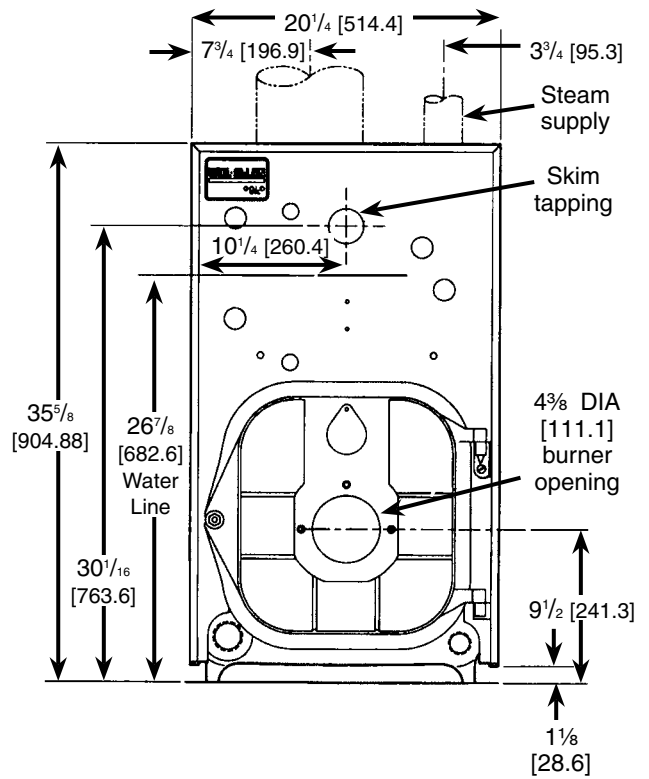
WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Dimensions

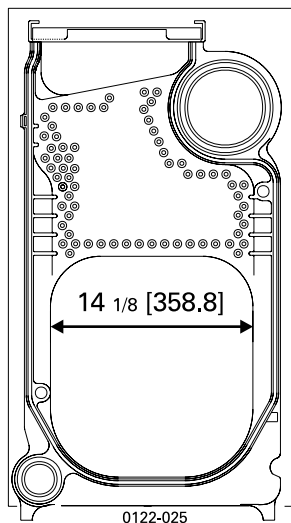
Figure 26 SGO dimensions — inches (mm) — see Table 11, page 45



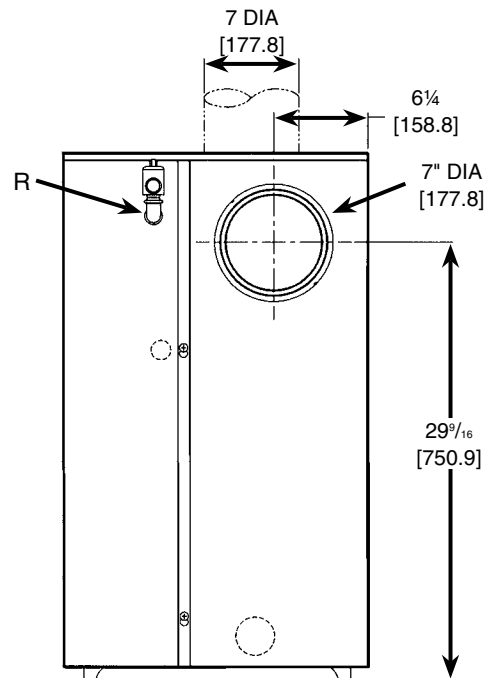
SGO side with burner



SGO "A" front



Intermediate



SGO back



⚠ WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Dimensions (continued)

Table 11 Dimensions

Boiler model number	A		B		L	
	Inches	mm.	Inches	mm.	Inches	mm.
SGO-3	—	—	13½	342.9	16⅞	428.7
SGO-4	—	—	16⅝	422.1	20	508.0
SGO-5	—	—	19⅞	504.9	22⅞	587.2
SGO-6	19	482.6	23½	584.2	26¼	666.7
SGO-7	22⅞	561.8	26⅞	663.4	29⅞	746.2
SGO-8	25¼	641.4	29¼	742.9	32½	825.5
SGO-9	28⅞	720.9	32⅞	822.4	35⅝	904.7



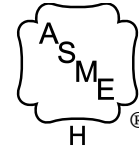
▲WARNING SERVICE TECHNICIAN ONLY — read and follow completely.

Ratings

Table 12 SGO GOLD Oil steam boiler ratings



DOE



AHRI Certified Rating

Boiler Model Number	Burner Capacity GPH (3)	Heating Capacity MBH (2, 4)	Net Ratings (5)		Seasonal Efficiency % AFUE	Minimum Chimney Dimensions			Round Flue Outlet Size In (1, 7)	Steam Boiler Water Content Gal (8)	Draft Loss Thru Boiler In W.C.(9)
			Steam sq. ft.	Steam MBH		Rect In	Round In	Height Ft			
*-SGO-3	0.95	114	354	85	84.0	8x8	6	15	7	10.7	.020
*-SGO-4	1.20	144	450	108	84.0	8x8	6	15	7	12.5	.010
*-SGO-5	1.45	174	546	131	83.9	8x8	7	15	7	14.2	.015
*-SGO-6	1.75	210	658	158	83.7	8x8	7	15	7	16	.015
** -SGO-7	2.00	240	750	180	83.6	8x8	8	15	7	17.7	.015
** -SGO-8	2.30	266 (6)	833	200	—	8x12	8	20	7	19.4	.025
** -SGO-9	2.55	295 (6)	921	221	—	8x12	8	20	7	21.2	.030

* Substitute “P” for completely assembled packaged steam boiler without burner (SGO-3 through SGO-6 only). Substitute “A” for boiler only for use with approved burners as listed with AHRI.
 ** Available only as an “A” unit.

- (1) SGO 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 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. Steam ratings are based on a piping and pick-up allowance of 1.33. An additional allowance should be made for unusual piping and pick-up loads. Consult local Weil-McLain Sales Office.
- (6) Gross output
- (7) See page 12 for minimum breeching diameter.
- (8) To water line.
- (9) Listed draft losses are for factory-shipped settings.

