This manual must only be used by a qualified heating installer/service technician. Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.
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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.
1. Stainless steel firetube heat exchanger
   The corrosion resistant fire tube heat exchanger is our method of
   transferring heat from the combustion chamber to the water.

2. Heat exchanger cover plate/burner mounting plate
   Note 1: Combi shows cover plate (Item 2) (insulation removed for clarity),
   Heating Only has insulation covering shown.

3. Blower
   The advanced blower design and air inlet silencer on ECO Tec boilers
   results in very quiet operation. Air enters the boiler enclosure through
   the air intake adapter (Item 21), flows through the enclosure, enters
   the air inlet silencer (Item 5), then enters the venturi (Item 6) where it
   mixes with gas before entering the blower. The blower pulls air through
   these components and then pushes it through the cover plate (Item 2)
   to the burner (Item 13- not shown).

4. Gas valve
   The automatic gas valve references the pressure in the cabinet and
   allows gas to flow when the control (Item 18) applies power. (An on/
   off switch is attached to the gas valve. It allows the shutting off of the
   gas supply for servicing or shut down).

5. Air inlet silencer
   The horn-shaped air inlet silencer significantly reduces fan noise,
   providing exceptionally quiet operation.

6. Venturi
   When air flows through the venturi, a negative pressure is created.
   This causes gas to flow from the gas valve into the venturi, where it
   is mixed with the air. The gas/air mixture then continues into the blower.

7. Boiler Circulator
   The pump is used to circulate hot water from the boiler, and then pass
   it into heating system or the brazed plate heat exchanger.

8. Boiler Out water temperature dual sensor
   This dual sensor monitors boiler outlet water temperature. The control
   adjusts boiler firing rate so the outlet water temperature is correct,
   based on the calculated (if outdoor reset used — see page 149) or
   fixed target temperature.

9. Boiler In -water temperature sensor
   This sensor monitors boiler in water temperature. The Control may
   reduce boiler input depending on if the boiler in and boiler out water
   temperature difference is too large.

10. Electronic display
    The electronic color touch screen display is used to configure boiler
    settings and monitor boiler operation. This display allows changing
    display mode, selecting and adjusting control settings, and resetting
    the control after lockout.

11. Flue adapter (fits 3" PVC, 3" PP, and 3" SS)
12. Boiler Flue pipe
    Internal flue pipe that carries exhaust gasses from heat exchanger to
    vent/flue adapter.

13. Burner (not shown)
    Made with high-grade stainless steel construction, the burner uses pre-
    mixed air and gas. The burner and control provide modulating firing.

14. Boiler water outlet pipe 1" Male NPT (Boiler Supply)
15. Boiler water inlet pipe 1" Male NPT (Boiler Return)
16. LWCO port/plug 3/4"NPT
    This plug can be removed to install a low water cut-off (LWCO).

17. Gas line
    This stainless steel flexible gas line connects the incoming gas line to the
    gas valve. The gas line has a ½" Male NPT connection for installation.

18. Circuit board module (see page 72)

19. Air pressure switch
    Air pressure switch monitors maximum flue pressure.

20. High voltage junction box — 120VAC field wiring connections.

21. Air intake adapter (fits 3" PVC, 3" PP, and 3" SS)
22. Electrical lines (line voltage)
    The bottom middle knockouts are designated for line voltage wiring
    only. Ensure all wiring entrances are sealed.

22b. Electrical lines (low voltage)
    The bottom right side and top right knockouts are designated for
    low voltage wiring only. Ensure all wiring entrances are sealed.

23. Boiler drain valve (not shown)
    Shipped loose for field piping. Pipe drain valve on reducing tee at the
    lowest point of return piping to boiler. See instructions, page 13 in
    this manual.

24. Condensate tube
    The outlet at the bottom of the boiler to drain condensate. The
    condensate trap assembly attaches here.

25. Flue gas condensate drain trap assembly (not shown)
    The condensate trap assembly is field-installed, condensate drain trap
    is connected to the condensate tube (Item 24) as shown in this manual.

26. Jacket door
    The jacket door is sealed to the boiler assembly around its entire
    perimeter.

27. Front door latches
    Two (2) latches secure the door in place.

28. Ignition electrode/flame sensor (shown on Combi, page 5)
    The burner flame is ignited by applying a high voltage to the ignition
    electrode. This causes a spark (from electrode to ground). After
    ignition, the electrode measures flame signal.

29. Flame inspection window (shown on Combi, page 5)
    The quartz glass window provides a view of the burner surface and
    the flame.

30. Flue gas dual sensor
    This dual sensor monitors the flue gas exit temperature. The control
    will shut down the boiler if flue gas temperature gets too hot.
    This protects the flue pipe and the heat exchanger from overheating.

31. Transformer
    The 120V/24V transformer provides 24V to low voltage control
    circuitry. Do NOT splice wiring into transformer.

32. Air baffle
    The air baffle protects internal boiler components by diverting any
    incoming moisture or debris away from critical components.

33. DHW - Brazed plate (Combi Only)
    This secondary heat exchanger allows heat to transfer from the boiler
    to the domestic water.

34. DHW - Outlet water temperature sensor (Combi Only)
    (not shown)
    This sensor monitors domestic hot water leaving the brazed plate. The
    control reduces or increases boiler input, depending on how close the
    water is to target set point.

35. DHW - 3-way valve (Combi Only)
    This valve will change boiler water flow either through the brazed plate
    or bypass the braze plate and out to the heating system.

36. DHW - 3-way valve Actuator (Combi Only)
    This valve will change boiler water flow either through the brazed plate
    or bypass the braze plate and out to the heating system.

37. DHW - Flow sensor (Combi Only)
    This sensor monitors the DHW (domestic hot water) flow rate. When
    flows 0.5 GPM or greater are detected, the boiler control will allow the
    boiler to turn on and modulate accordingly.

38. Water pipe — Air Elimination/Relief Valve Connection 3/4" Male NPT
    Use 3/4" tee and 3/4" street elbow to connect relief valve. It is
    recommended to connect an automatic air vent to top tee connection.

39. DHW Inlet Pipe - 3/4" NPT (Combi Only)
40. DHW Outlet Pipe - 3/4" NPT (Combi Only)
The ECO Tec Heating Only Gas-fired water boilers
(ECO Tec 80 model shown below)
The ECO Tec Combi Gas-fired water boilers
(ECO Tec 80 model shown below)
Please read before proceeding

**WARNING** Installer—Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given. **User** — This manual is for use only by a qualified heating installer/service technician. Refer to User’s Information Manual for your reference. **User** — Have this boiler serviced/inspected by a qualified service technician, at least annually. Failure to comply with the above could result in severe personal injury, death or substantial property damage.

**NOTICE** Write in the Consumer Protection (CP) number in the space provided on the Installation certificate on page 151 if not already shown. When calling or writing about the boiler—Please have the boiler model number from the boiler rating label and CP number from the boiler jacket. Consider piping and installation when determining boiler location. Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

If any part of a boiler, burner or its controls has been sprayed with or submerged under water, either partially or fully, DO NOT attempt to operate the boiler until the boiler has been either replaced or completely repaired, inspected, and you are sure that the boiler and all components are in good condition and fully reliable. Otherwise, by operating this boiler, you will cause a fire or explosion hazard, and an electrical shock hazard, leading to serious injury, death, or substantial property damage. See the instructions at right.

**DANGER** 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.

**WARNING** Failure to adhere to the guidelines below can result in severe personal injury, death or substantial property damage.

**EXPANSION TANK**
- Relieve pressure from the system before isolating the expansion tank.
- When servicing boiler —
  - To avoid electric shock, disconnect all electrical supplies to the boiler before performing maintenance.
  - To avoid severe burns, allow boiler to cool before performing maintenance.
  - This boiler contains ceramic fiber and fiberglass materials. Refer to the WARNINGs and instructions on page 106.
- Boiler operation —
  - Do not block flow of combustion or ventilation air to boiler.
  - Should overheating occur or gas supply fail to shut off, do not turn off or disconnect electrical supply to circulator. Instead, shut off the gas supply at a location external to the appliance.
- Combustion air —
  - DO NOT install combustion air intake where there is a risk of combustion air contamination.
- Carbon monoxide detector —
  - A carbon monoxide detector that is wired on the same electrical circuit as the boiler is strongly recommended.

**SURGE PROTECTOR**
- Provide surge protection in the boiler power supply. This will reduce the possibility of damage to the boiler control.

**Boiler water**
- The ECO Tec heat exchanger is made of stainless steel, and requires that system water chemistry be within the limits in this manual. **ADDITIONAL CHEMICAL TREATMENT MAY BE NECESSARY.** See page 97 for details.
  - Thoroughly flush the system (BEFORE connecting boiler) to remove sediment. The high-efficiency heat exchanger can be damaged by build-up or corrosion due to sediment.
  - Do not use petroleum-based cleaning or sealing compounds in boiler system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
  - Continual fresh make-up water will reduce boiler life. Mineral buildup in eat exchanger reduces heat transfer, overheats the stainless steel heat exchanger, and causes failure. Addition of oxygen carried in by make-up water can cause internal corrosion. Leaks in boiler or piping must be repaired at once to prevent make-up water. Use this boiler ONLY in a closed-loop system.
  - Do not add cold water to a hot boiler. Thermal shock can cause the heat exchanger to crack.

**Freeze protection fluids**
- NEVER use automotive or standard glycol antifreeze. Use only freeze-protection fluids made for hydronic systems. Follow all guidelines given by the antifreeze manufacturer. Thoroughly clean and flush any replacement boiler system that has used glycol before installing the new boiler. Use only the products listed by Weil-McLain for use with this boiler. See page 98 for details.

**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.

**Commonwealth of Massachusetts**
When the boiler is installed within the Commonwealth of Massachusetts:
- This product must be installed by a licensed plumber or gas fitter.
- If antifreeze is used, a reduced pressure back-flow preventer device shall be used.
- Sidewall vent air installations — see instruction on page 24.
**Boiler location**

**Installations must comply with:**

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Fuel Gas Code, ANSI Z223.1, Part 1, Canadian Electrical Code, and/or local codes.
- For Canada only: CAN/CSA B149.1, Natural Gas and Propane Installation Code, CSA B149.1 and B149.2 for Canadian installations.
- Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.


**Before locating the boiler, check:**

1. The boiler can be floor-standing with optional kit or wall mounted.
2. Wall construction — If the boiler is wall-mounted, make sure the wall construction is suitable to carry the weight of the boiler and components. See page 10 for instructions.
3. The boiler is suitable for INDOOR installation only.
4. Check for nearby connection to:
   - System water piping
   - Gas supply piping
   - Condensate drain
5. 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.

6. The boiler must be installed so that gas control system components are protected from dripping or spraying water or rain during operation or service.
7. If new boiler will replace existing boiler, check for and correct system problems, such as:
   - Sediment or corrosion in system piping — clean and flush piping BEFORE connecting the new boiler. See page 97.
   - System leaks causing oxygen corrosion or heat exchanger cracks from hard water deposits.
   - Incorrectly-sized expansion tank.
   - Lack of freeze protection in boiler water causing system and boiler to freeze and leak.

**Residential garage installation Precautions**

Take the following special precautions when installing the boiler in a residential garage. If the boiler is located in a residential garage:

- Mount the boiler with its burner and igniter are at least 18 inches above the floor. Follow the National Fuel Gas Code, ANSI Z223.1 for U. S. installations, or Natural Gas and Propane Installation Code, CSA B149.1 and B149.2 for Canadian installations.
- Locate or protect the boiler so it cannot be damaged by a moving vehicle.
- Ensure that the installation complies with all applicable codes.
- Prevent boiler water and condensate from freezing.

**Combustion air requirements**

The ECO Tec boiler is certified as a Direct Vent appliance. It can be converted to Direct Exhaust by using the Approved Weil-McLain Direct Exhaust kit.

- Direct vent (sealed combustion) where combustion air is ducted from outdoors.
- Direct exhaust where combustion air is obtained directly from the boiler room.

**Provide air openings to room**

**ECO Tec boiler alone in boiler room**

1. No air ventilation openings into boiler room are needed if Direct vent and clearances around boiler are at least equal to the SERVICE clearances shown in Figure 1, page 8.
2. For spaces that DO NOT supply the minimum service clearances, provide two openings as shown in Figure 2, page 8. Each opening must provide 1 square inch free area per 1,000 Btuh of boiler input.

**WARNING** The space must be provided with combustion/ventilation air openings correctly sized for all appliances located in the same space as the ECO Tec boiler.

Reinstall boiler jacket door after servicing. The boiler jacket door must be securely fastened to the boiler to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances.

Failure to comply with the above warnings could result in severe personal injury, death or substantial property damage.

**ECO Tec boiler in same space with other gas or oil-fired appliances**

Follow the sizing requirements shown in Figure 29, page 26.

**Vent and air piping**

1. The boiler requires a special vent system, designed for pressurized venting. The boilers are rated ANSI Z21.13 Category IV (pressurized vent, likely to condense in the vent). See instructions beginning on page 20.
2. You must also install air piping from outdoors to the boiler air intake adapter. The resultant installation is categorized as direct vent (sealed combustion). Note prevention of combustion air contamination on page 20 when considering vent/air termination.
3. Direct exhaust venting can be done with the approved Weil-McLain Direct Exhaust Kit, please see page 137 for kit information.
4. Vent and air must terminate near one another unless otherwise specified in this manual. Vent and air piping may be routed vertically through the roof or out a side wall, following the options given in this manual. You may use any of the vent/air piping methods covered in this manual. Do not attempt to install the boiler using any other means.
5. Be sure to locate the boiler such that the vent and air piping can be routed through the building and properly terminated. The vent/air piping lengths, routing and termination method must all comply with the methods and limits in instructions beginning on page 20.
Boiler location (continued)

Provide clearances for service access — RECOMMENDED

1. See Figure 1 for recommended service clearances.
2. If you do not provide minimum service clearances shown, it might not be possible to service the boiler without removing it from the space.

Closet or small-enclosure installations which do not provide at least these recommended clearances require the specially-sized and placed air openings shown in Figure 2.

Provide clearances from combustible materials — REQUIRED

1. See Figure 2 for REQUIRED minimum clearances. ALL installation must provide at least these minimums.
2. Hot water pipes — at least ½ inches from combustible materials.
3. Vent pipe — at least 3/16 inches from combustible materials.
4. See Figure 1 for service clearance minimums.

WARNING Closet or small-enclosure installations which do not provide at least the recommended service clearances shown in Figure 1 require the specially-sized and placed air openings shown in Figure 2.

---

**Figure 1**  RECOMMENDED service clearances  (all dimensions are in inches)

- A. Left side service clearance = 3 inches minimum.
- B. Service clearance above top of boiler = 15 inches minimum.
- C. Right side service clearance = 3 inches minimum.
- D. Service clearance below the boiler = 12 inches minimum for wall hung installation, 0 inches minimum for floor standing installation.
- E. Service clearance in front of the boiler = 24 inches minimum.

**NOTICE** ADDITIONAL service clearance may be needed, depending on how piping is routed to the boiler.

---

**Figure 2**  REQUIRED minimum clearances  (all dimensions are in inches)

- A. Provide combustion air/ventilation openings per Figure 29, page 26 or as otherwise directed in this manual or by applicable codes. [NOTICE] If the installation does not provide the minimum clearances in Figure 1, then the enclosure MUST HAVE air openings located per Figure 2, above. Each of these air openings must have free area of at least 1 square inch per 1,000 MBH of boiler input.
- B. Left side clearance to combustibles =2.5 inches minimum.
- C. Top of boiler clearance to combustibles = 13.00 inches minimum.
- D. Right side clearance to combustibles = 2.5 inches minimum.
- E. Bottom of boiler clearance to combustibles = 8.75 inches minimum (must be 18 inches above floor for garage installations) for wall hung installation, 0 inches minimum for floor standing installation.
- F. Clearance in front of the boiler = 0.5 inches, but 24 inches minimum required for service.
- G. Air openings must be located in the FRONT of the enclosure, as shown. They must be no more than 12 inches from the floor or ceiling, as shown.
- H. Vent pipe must be minimum 3/16 inch from combustibles. Opening in combustible wall, floor, ceiling or roof must be 3/8 inches larger than flue pipe diameter, fitted with corrosion resistant steel thimble, or larger if required by codes or as specified by vent pipe manufacturer.
Prepare boiler location

Flooring and foundation
(with Kit option only)

Flooring
With the optional floor standing pedestal kit, the boiler is approved for installation on combustible flooring, but must never be installed on carpeting.

**WARNING** Do not install boiler on carpeting even if foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.

Foundation
1. Provide a solid foundation pad, at least 2 inches above the floor, if any of the following is true:
   - floor can become flooded,
   - the floor is dirt, sand, gravel or other loose material,
   - the boiler mounting area is severely uneven or sloped.
2. The minimum foundation size is:
   - ECO Tec: 20 inches wide x 20 inches deep.
3. Foundation may be of wood, brick or concrete (minimum 2 inches thick) construction.
   If flooding is possible, elevate boiler sufficiently to prevent water from reaching boiler.

Remove boiler from crate

**WARNING** The boiler is heavy. Use caution not to drop the boiler or cause bodily injury while lifting and handling. Verify that the boiler is securely attached to prevent possibility of boiler falling after installation.

**WARNING** After the boiler is removed from the shipping carton, **DO NOT** allow the boiler to sit on its bottom. This would cause pressure on protruding plastic, resulting in interior damage. Either lay the boiler on its back or leave on the styrofoam protective shipping base.

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

**CAUTION** Cold weather handling — If boiler has been stored in a very cold location (below 0°F) before installation, handle with care until the plastic components come to room temperature.

1. The ECO Tec boiler is generally easier to handle and maneuver after removing the shipping container.
2. Remove Items 1, 2, 3, 4, and 6 in Figure 3. Remove trim kit and parts from Item 4.
3. **Leave the boiler resting on the styrofoam protective base** (Item 7) and bottom cardboard cap (Item 8), until ready to place on the wall. If removing the boiler from the shipping base, rest the boiler on its back, NOT on its bottom.

**WARNING** Failure to comply with the procedure given could result in severe personal injury, death or substantial property damage.

---

**Table 1** Boiler operating weights

<table>
<thead>
<tr>
<th>ECO Tec Boiler Model</th>
<th>Heating Only</th>
<th>Combi</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110</td>
<td>141</td>
<td>163</td>
</tr>
<tr>
<td>150</td>
<td>162</td>
<td>184</td>
</tr>
<tr>
<td>199</td>
<td>178</td>
<td>200</td>
</tr>
</tbody>
</table>

**Figure 3** Boiler shipping container

1. Cardboard cap, top
2. Cardboard angles
3. Pad
4. Styrofoam protective cap
5. Boiler
6. Cardboard sleeve
7. Styrofoam protective base
8. Cardboard cap, bottom
Wall-mounting the boiler

Wall-mounting requirements

WARNING DO NOT attempt to attach the wall mount bracket using anchors or any means other than directly securing to the wall studs (or equivalent wood structure if studs are not on 16-inch centers).

The wall must be vertically plumb and capable of carrying the weight of the boiler and any attached piping components.

1. This boiler includes a wall template to aid in installation, unfold the template and place it against the wall to aid in locating mounting holes and ensuring proper clearance.
2. Stud spacing: Bracket holes are spaced for studs on 16-inch centers. For other stud spacing, provide secure, solid mounting surface on which to attach the boiler wall-mounting bracket.
3. Wood stud wall: Install bracket with lag screws (3/8" x 3") included in kit, only into the studs.
4. Metal stud wall: Secure bracket and spacer board to studs with the appropriate size bolts and washers that can handle the boiler’s operating weight listed on page 9 and any additional weight from venting and gas/water piping to be determined by contractor/installer (hardware not included with kit).

WARNING Verify that the studs are suitable for carrying a wall-mounted load. Some metal studs are not designed for this purpose.

5. If the mounting wall has exposed studs, installer must provide a backer board to mount boiler. Boiler cannot be leveled without a backing surface.
6. Mount the boiler on the wall following these instructions. The boiler mounting bracket must engage with the wall-mount bracket. Make sure the bracket is not just resting on the edge of the boiler mounting bracket. Perform all procedures given in the Boiler Manual on previous pages before mounting the boiler.

Install the wall-mount bracket (by installer)

1. See Figure 4.
2. Locate the studs — must be on 16-inch centers. See previous page instructions if studs are not on 16-inch centers.
3. Place the wall-mount bracket (Figure 4, Item 2) on the wall, using a level to align correctly.
4. Place the wall-mount bracket so the mounting slots are centered over the studs.
5. Level the bracket and trace the outline of the screw slots with a pencil.
6. Remove the mounting bracket and drill holes 1/4" diameter by 3 inches deep, centered on the screw slot outlines. (For metal stud walls, drill required clearance holes.)
7. Position the wall-mount bracket on the wall. Insert and loosely tighten the two (2) lag screws (or toggle bolts for metal studs).
8. Level the wall-mounting bracket. Then tighten lag screws securely. For drywall or plaster lathe installations, avoid tightening so much that the bracket digs into the wall surface.
9. Once bracket is installed and leveled it is recommended to install additional screws in center holes to fully secure to mounting surface.

Place boiler on bracket

1. See Figure 5. The wall-mount bracket must be installed before mounting the boiler.
2. Measure 17 1/2 inches below the bottom edge of the wall-mount bracket (Item 2). Strike a line or place a piece of masking tape with its top edge even with the 17 1/2-inch mark. (This line, or tape, will indicate whether the boiler has been properly seated onto the wall-mount bracket.)

WARNING The boiler is heavy, and requires two people to lift and place. Wear non-slip leather gloves to prevent possibility of cuts from sheet metal edges.
Wall-mounting the boiler
(continued)

Figure 6  Boiler mounting bracket

Pedestal floor stand assembly

Pedestal floor stand (w/Kit option only)

**WARNING**  The boiler is heavy, and requires two people to lift and place upright. Use caution not to drop the boiler or cause bodily injury while lifting and handling. Wear non-slip gloves to prevent possibility of cuts from sheet metal edges. After the boiler is removed from the shipping carton, DO NOT allow the boiler to sit on its bottom, before stand is installed. Doing so may result in damage to the water pipes.

1. Carefully remove boiler from the styrofoam protective base and set on back. Remove door from front of boiler by unfastening latches on side of cabinet.

2. Remove four (4) 5/16” studs from floor stand hardware trim bag. Install studs by hand in rivet nuts on bottom of boiler. See Figure 7.

3. Remove front access panel from pedestal assembly by sliding it up.

4. Align holes in top of pedestal with studs on bottom of boiler. Slide stand over studs. Remove 5/16” nuts from trim bag. Install nuts on studs using ½” socket or wrench. Make sure to align sides of pedestal with cabinet before tightening down nuts. Do not overtighten.

5. Install the condensate trap assembly following instructions on page 56.

6. After confirming nuts are tightened, obtain assistance and lift the boiler into upright position.

7. Set boiler in place and level by adjusting leveling legs with flat head screwdriver.

---

3. **Obtain assistance to lift the boiler into position.**

4. Lift the boiler high enough that its mounting bracket (Figure 6, Item 3) will be above the wall-mount bracket (Figure 5, page 10, Item 2).

5. Let the rear of the boiler slide against the wall bracket as you lower the boiler into place.

6. Adjust the boiler properly until engaged with the wall bracket and the boiler slips into the correct position.

7. When the brackets are engaged correctly, the bottom of the boiler enclosure will be at or near the pencil line, or tape, you applied in step 2.

**WARNING**  When mounting the boiler, use the method described on step 2, page 10 to ensure the boiler bracket and the wall bracket are properly engaged. If not, the boiler could fall. Failure to comply could result in severe personal injury, death or substantial property damage.

8. Ensure boiler is level front-to-back.

**WARNING**  Ensure boiler is NOT pitched downward with the front of the boiler lower than the back of the boiler. This can prevent condensate from draining properly. Failure to comply could result in severe personal injury, death or substantial property damage.
**Boiler hydrostatic test**

**WARNING**
DO NOT install a relief valve with a pressure higher than 50 PSIG. This is the maximum allowable relief valve setting for the boiler. Failure to comply could prevent the relief valve from operating as needed, resulting in possibility of severe personal injury, death or substantial property damage.

**WARNING**
Use two wrenches when tightening any pipe connection to the boiler. Failure to prevent the boiler pipes from turning could damage pipes or heat exchanger, resulting in possible severe personal injury, death or substantial property damage.

**Hydrostatic pressure test**
Pressure test the boiler before permanently attaching water or gas piping or electrical supply.

**Install pipe fittings for relief valve and P/T gauge**
1. Install the reducer bushings (150/199), reducing tees, and close nipples, shipped loose with the boiler, located and oriented as shown in Figure 8, page 13.

**NOTICE**
Boilers installed in locations with less than the RECOMMENDED service clearances will need to adjust piping layout to meet space requirements.

2. Apply pipe dope to all fittings sparingly.

**WARNING**
DO NOT install the relief valve until after the hydrostatic test. Temporarily install a ¾” pipe cap in the boiler top outlet pipe location as directed in these instructions. The cap must be removed after the test.

Failure to comply with the above could prevent the relief valve from operating as needed, resulting in possibility of severe personal injury, death or substantial property damage.

3. Install the pressure/temperature gauge to the reducing tee as shown in Figure 8, page 13.

**Install fittings and valves required for hydrostatic testing**
1. The following piping components (supplied by installer) are required for the test configuration:
   a. Two shut-off valves (1” NPT on 80/110, 1¼” NPT on 150/199).
   b. Two close nipples (1” NPT on 80/110, 1¼” NPT on 150/199).
   c. ¾” NPT pipe cap.

2. TEMPORARILY install a ¾” NPT pipe cap on the boiler top outlet pipe. After the hydrostatic test, this cap must be removed and the relief valve, tee and elbow must be installed.

**Fill and pressure test**
1. See Figure 9, page 13 for use with the following instructions.
2. CLOSE the boiler drain valve (Item 11). Connect a hose to fresh water supply and to the drain valve.
3. Place a bucket under the ends of the isolation valves (Item 9 and 10) to catch water drippings.
4. CLOSE isolation valve Item 10, then crack open the 3/4” cap (Item 3a) slightly. Leave isolation valve Item 9 open.
5. Slowly open the boiler drain valve (Item 11) and fresh water supply to fill boiler with water. The boiler and piping will fill quickly because of the low water content.
6. When water begins to seep from 3/4” cap (Item 3a), tighten the cap.
7. Continue filling until water flows from supply isolation valve (Item 9), then close the valve.
8. The test pressure should be 1-1/2 times the pressure setting of the relief valve to be installed on the boiler (45 psig for a 30-psig relief valve; 75 psig for a 50-psig relief valve). Open boiler drain valve until desired pressure is achieved.
9. Hold at test pressure for 10 minutes.

**WARNING**
Do not leave boiler unattended. A cold water fill could expand and cause excessive pressure, resulting in severe personal injury, death or substantial property damage.

10. Make sure constant gauge pressure has been maintained throughout test. Check for leaks. Repair if found.

**Leaks must be repaired at once.** Failure to do so can damage boiler, resulting in substantial property damage.

**WARNING**
Do not use petroleum-based cleaning or sealing compounds in boiler system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.

**Drain and remove fittings**
1. Disconnect fill water hose from water source.
2. Drain boiler through drain valve (Item 11).

**WARNING**
Use caution when releasing pressure from the boiler. Rapid water flow could cause injury.

3. Remove hose after draining.
4. Remove nipples and valves unless they will remain for use in the system piping.
5. Remove cap and install relief valve, tee and elbow as specified in the following WARNING.
6. If any internal leaks occurred, make sure all water has been cleaned up and electronic components, including the boiler control, is completely dry.

**WARNING**
Remove cap from Air Elimination/Relief Valve Connection Water Pipe (1a). Install the relief valve in the ¾” elbow. See page 48 or page 51 to install relief valve discharge piping. Failure to install the boiler relief valve could result in severe personal injury, death or substantial property damage.
Boiler hydrostatic test (continued)

Figure 8 Install pipe fittings for relief valve and pressure/temperature gauge — DO NOT mount relief valve until AFTER hydrostatic testing (see legend below)

Figure 9 Install piping components required for hydrostatic test (see legend below)

1 Boiler Out (Supply) connection, (male, 1" NPT)
2 Boiler In (Return) connection, (male, 1" NPT)
3 Boiler relief valve, shipped loose with boiler — DO NOT mount relief valve until AFTER hydrostatic testing.
3a TEMPORARILY ONLY — Install a ¾" NPT cap in the Air Elimination/Relief Valve Connection Water Pipe.
   This MUST BE REMOVED after the test and the relief valve mounted here.
4 Pressure/temperature gauge, shipped loose with boiler.
5a Reducing tee, NPT, 1" x 1" x ¼" on 80/110, & 1 ¼" x 1 ¼" x ¼" on 150/199, shipped loose with boiler.
5b Reducing tee, NPT, 1" x 1" x ¾" on 80/110, & 1 ¼" x 1 ¼" x ¾" on 150/199, shipped loose with boiler.
7 Bushing, NPT, 1 ¼" x 1", shipped loose with boiler (150/199 only).
8 Nipple, NPT 1" x close on 80/110, & 1 ¼" x close on 150/199, by installer.
9 Isolation valve on supply connection, by installer (1" NPT on 80/110, 1¼" NPT on 150/199).
10 Isolation valve on return connection, by installer (1" NPT on 80/110, 1¼" NPT on 150/199).
11 ¾" NPT boiler drain valve, shipped loose with boiler — after hydrostatic testing, move drain valve to lowest point on the return piping if not already there.
12 Auto air vent, by installer.
13 Bushing, NPT 3/4", by installer.
15 Street elbow, NPT 3/4" x 3/4", shipped loose with boiler.
Gas conversions

Prepare boiler for propane — ECO Tec 80/110/150/199 (if required)

Propane operation

---

**WARNING**

ALL boilers must be converted for propane operation.

Converting an existing natural gas-fired boiler for propane — For a boiler already installed, you must turn off gas supply, turn off power and allow boiler to cool before proceeding. You must also completely test the boiler after conversion to adjust gas valve to proper setting, verify performance, and start up the boiler following instructions beginning on page 102 of this manual.

Verify propane gas venturi — See Figure 10, page 15. LP gas venturi will have a black label and will be clearly labeled “LP”.

Must change control settings to proper gas type.

Failure to comply could result in severe personal injury, death or substantial property damage.

---

**WARNING**

This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer’s instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, an explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer’s instructions.

---

Natural Gas to Liquefied Petroleum (Propane) conversion kits

**ECO Tec 80/110 LP** P/N 510-811-415 NG to Propane Gas Conversion Kit contents:

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>511-050-233</td>
<td>Venturi - Liquefied Petroleum (Propane) Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304</td>
<td>Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
<td>3</td>
</tr>
<tr>
<td>562-248-776</td>
<td>Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
</tr>
<tr>
<td>590-318-136</td>
<td>O-Ring 3.533mm x 63.50 I. D. mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018</td>
<td>Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336</td>
<td>Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>560-529-139</td>
<td>Orifice Gas Liquefied Petroleum (Propane) 80/110 ECO TEC</td>
<td>1</td>
</tr>
<tr>
<td>550-142-978</td>
<td>Instructions Conversion Nat to LP Gas</td>
<td>1</td>
</tr>
</tbody>
</table>

**ECO Tec 150 LP** P/N 510-811-416 NG to Propane Gas Conversion Kit contents:

<table>
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<tr>
<th>Part number</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>511-050-234</td>
<td>Venturi - Liquefied Petroleum (Propane) Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304</td>
<td>Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
<td>3</td>
</tr>
<tr>
<td>562-248-776</td>
<td>Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
</tr>
<tr>
<td>590-318-136</td>
<td>O-Ring 3.533mm x 63.50 I. D. mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018</td>
<td>Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336</td>
<td>Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>560-529-140</td>
<td>Orifice Gas Liquefied Petroleum (Propane) 150/199 ECO TEC</td>
<td>1</td>
</tr>
<tr>
<td>550-142-978</td>
<td>Instructions Conversion Nat to LP Gas</td>
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</tr>
</tbody>
</table>

**ECO Tec 199 LP** P/N 510-811-417 NG to Propane Gas Conversion Kit contents:

<table>
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<tr>
<th>Part number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>511-050-235</td>
<td>Venturi - Liquefied Petroleum (Propane) Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304</td>
<td>Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
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<tr>
<td>562-248-776</td>
<td>Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
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<tr>
<td>590-318-102</td>
<td>O-Ring 3mm x 70mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018</td>
<td>Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336</td>
<td>Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>560-529-140</td>
<td>Orifice Gas Liquefied Petroleum (Propane) 150/199 ECO TEC</td>
<td>1</td>
</tr>
<tr>
<td>550-142-978</td>
<td>Instructions Conversion Nat to LP Gas</td>
<td>1</td>
</tr>
</tbody>
</table>

Pipe sizing for propane gas

Contact gas supplier to size pipes, tanks and 100% lockup gas pressure regulator.

Natural and Propane supply pressure

1. Adjust propane supply regulator provided by gas supplier between the pressure listed below:
2. Pressure required at gas valve inlet pressure port:
   a. Maximum: 14” (356 mm) w.c. with no flow (lockup).
   b. Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire): 3 ½” (89 mm) w.c.
Gas conversions  (continued)

Liquefied Petroleum (Propane) to Natural Gas conversion kits

<table>
<thead>
<tr>
<th>ECO Tec 80/110 NG P/N 510-814-418</th>
<th>LP to Natural Gas Conversion Kit contents:</th>
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<tbody>
<tr>
<td>511-050-230 Venturi - Natural Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304 Screw Pan Ht T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
<td>3</td>
</tr>
<tr>
<td>562-248-776 Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
</tr>
<tr>
<td>590-318-136 O-Ring 3.53mm x 63.50 I.D. mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018 Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336 Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>550-142-979 Instructions Conversion LP to Natural Gas</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECO Tec 150 NG P/N 510-814-419</th>
<th>LP to Natural Gas Conversion Kit contents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>511-050-231 Venturi - Natural Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304 Screw Pan Ht T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
<td>3</td>
</tr>
<tr>
<td>562-248-776 Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
</tr>
<tr>
<td>590-318-136 O-Ring 3.53mm x 63.50 I.D. mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018 Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336 Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>550-142-979 Instructions Conversion LP to Natural Gas</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECO Tec 199 NG P/N 510-814-420</th>
<th>LP to Natural Gas Conversion Kit contents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>511-050-232 Venturi - Natural Gas</td>
<td>1</td>
</tr>
<tr>
<td>562-150-304 Screw Pan Ht T20 M4-.7x12mm w/Sq. Con. Lock Washer</td>
<td>3</td>
</tr>
<tr>
<td>562-248-776 Washer .64 I.D. x .93 O.D. Garlock</td>
<td>1</td>
</tr>
<tr>
<td>590-318-102 O-Ring 3mm x 70mm Black</td>
<td>1</td>
</tr>
<tr>
<td>590-318-018 Gasket 2-Lips EPDM Ring 50 Dia. mm</td>
<td>1</td>
</tr>
<tr>
<td>550-225-336 Label Gas Conversion</td>
<td>1</td>
</tr>
<tr>
<td>550-142-979 Instructions Conversion LP to Natural Gas</td>
<td>1</td>
</tr>
</tbody>
</table>

Installing propane venturi —

1. Propane venturi will have a black label identifying venturi part number. See Figure 10 for correct part number.
2. Verify that the label on the propane venturi is correct for the model size (see Figure 10 below).
3. Shut off the gas supply prior to disconnecting the electrical power, before proceeding with the conversion.
4. If the jacket front door was not already removed, remove it.
5. Locate the blower and venturi (see Figure 12).

Figure 10  Propane gas venturi label identification (Black label)

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>Part Number</th>
<th>Gas Type</th>
<th>Venturi Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110</td>
<td>511-050-233</td>
<td>LPG</td>
<td>20</td>
</tr>
<tr>
<td>150</td>
<td>511-050-234</td>
<td>LPG</td>
<td>26</td>
</tr>
<tr>
<td>199</td>
<td>511-050-235</td>
<td>LPG</td>
<td>28</td>
</tr>
</tbody>
</table>

Figure 11  Natural gas venturi label identification (White label)

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>Part Number</th>
<th>Gas Type</th>
<th>Venturi Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110</td>
<td>511-050-230</td>
<td>NG</td>
<td>22</td>
</tr>
<tr>
<td>150</td>
<td>511-050-231</td>
<td>NG</td>
<td>26</td>
</tr>
<tr>
<td>199</td>
<td>511-050-232</td>
<td>NG</td>
<td>28</td>
</tr>
</tbody>
</table>

LEGEND for Figures 12, 13, 14, 15, 16 and 17

1. Air Silencer
2. Air silencer clip
3. Venturi
4. Blower
5. Gas valve
6. Gas pipe
7. Swivel nut
8. Fiber Washer
9. O-Ring
10. LP Orifice

Figure 12  Blower, gas valve, venturi assembly

6. Gently open up the "U" part of the silencer clip and remove from venturi / silencer assembly, see Figures 12 and 13.

Figure 13  Air silencer removal
Gas conversions (continued)

Label wires before removing

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

7. Disconnect wire harness from gas valve.
8. Loosen swivel nut (Figure 14, Item 7) on venturi-gas valve connection (Item 6). See Figure 14. Gently set gas valve aside.

**Figure 14** Gas pipe swivel nut loosened for propane conversion (silencer removed)

**WARNING** Use two wrenches when loosening swivel nut at venturi, using pipe wrench on gas pipe (Item 6) to prevent the gas pipe connection from turning. Failure to support the gas connection pipe to prevent it from turning could damage gas line components.

9. Remove three (3) T20 Torx screws holding the venturi, (Item 3) in place. Remove venturi, change o-ring (Item 9), change fiber washer (Item 8) and inspect blower surface. Discard old o-ring and fiber washer, see Figure 16.
10. Install new propane venturi and o-ring from conversion kit.
11. Ensure o-ring (Item 9) is seated properly in groove on blower.

**Figure 15** Gas valve separated from venturi (Note - fiber washer location)

12. Insert three (3) new Torx screws from conversion kit to hold venturi in place. Torque screws to no more than 23 inch-pounds.
13. Install LP orifice (Item 10) into venturi gas inlet, see Figure 17.
14. Reassemble gas pipe with new fiber washer(Item 8) from conversion kit to the venturi connection, using two wrenches to tighten swivel nut. Change silencer gasket (Item 130, page 143) and re-attach air silencer to venturi. See Figure 13, page 15.

**Figure 17** Installing the new propane gas orifice.

15. Replace silencer clip locking silencer to venturi. Ensure silencer clip is seated on the silencer/venturi correctly.

**DANGER** Inspect the gas pipe fitting connections on the gas valve and new venturi (Item 3, Figure 17, page 16). Check the seal of the connections. Failure to comply will cause a gas leak, resulting in severe personal injury or death.

**WARNING** Do not check for gas leaks with an open flame — use bubble test. Failure to use bubble test or check for gas leaks can cause severe personal injury, death or substantial property damage.

Part number 550-100-260/0520
Gas conversions (continued)

**Gas Valve Course Adjustments**

1. Prior to the boiler’s first ignition, adjust the throttle adjustment screw (2.5mm Allen Head) by first turning the screw clockwise (⟳) until it bottoms out – do not apply any additional or excess torque. Adjust the throttle screw in a counterclockwise (⟲) direction with precisely the number of turns listed in Table 2, according to the boiler model/size.

2. After the throttle has been adjusted coarsely, the offset regulating screw must be adjusted for the 80 and 110 models. Remove the sealed, Allen (4mm) head cap protecting the offset regulating screw before making adjustments. It is critical to be precise for the adjustment of the offset regulating screw. DO NOT attempt to bottom out the offset regulating screw as was done for the throttle adjustment. Adjustments to the offset regulating screw should be made from the factory-provided natural gas position.

3. Reconnect wire harness to gas valve.

4. Restore electrical power, turn on gas by opening manual gas valve and check for leaks and ensure all calls for heat & DHW have been shut off.

### Table 2 Course adjustment settings — Throttle and offset adjustments to be made prior to first ignition, by size.

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>Throttle Turns (Counterclockwise ⟲ from Bottom-out Position)</th>
<th>Offset Turns (Counterclockwise ⟲ Factory NG Position)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110 LP</td>
<td>6-3/4</td>
<td>1/8</td>
</tr>
<tr>
<td>150 LP</td>
<td>10-3/4</td>
<td>0</td>
</tr>
<tr>
<td>199 LP</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

5. After the throttle has been adjusted coarsely, the offset regulating screw must be adjusted for the 80 and 110 models. Remove the sealed, Allen (4mm) head cap protecting the offset regulating screw before making adjustments. It is critical to be precise for the adjustment of the offset regulating screw. DO NOT attempt to bottom out the offset regulating screw as was done for the throttle adjustment. Adjustments to the offset regulating screw should be made from the factory-provided natural gas position.

6. Reconnect wire harness to gas valve.

7. Restore electrical power, turn on gas by opening manual gas valve and check for leaks and ensure all calls for heat & DHW have been shut off.

---

**Figure 18** Gas valve adjustment locations—ONLY for use by a qualified technician, using properly working, calibrated combustion test instruments.

---

**Adjust the offset regulating screw using the following steps, referencing Figure 19:**

1. After removing cap, insert Allen wrench into offset hex feature (4mm Allen Head) and mark position of wrench on offset housing.

2. Turn the offset regulating screw counterclockwise (⟲), according to Figure 19, ensuring that the Allen wrench is moved accordingly, as shown in Figure 19b.

### Figure 19 Offset regulating screw adjustment—(a) Marking factory-provided NG position. (b) View after turn CCW adjustment.

---

**Final Conversion Steps**

1. When boiler has not been fired, follow instructions on the initial screens to select propane as the gas type and ensure all calls for heat & DHW have been shut off. If natural gas was already selected in the boiler control, the gas type parameter will need to be adjusted. In the contractor menu, under the Boiler Settings menu, adjust the “Fuel Type” setting to “Propane”, see Figure 81, page 88.

2. Before firing, verify that the Boiler Settings are for LP gas, “Max Rate” for the input (priority) used to fire the boiler is set between 96% and 100%. Also verify that the ‘Min Rate” is set to 10%. Adjust control settings if not at proper rate. Verify that boiler is operating at the expected firing rate at both high- and low-fire during combustion analysis. Refer to Figure 99, page 111 for proper low-fire rate based on altitude settings.

---

**Figure 20 ECO Tec fuel type setting screen**

**DANGER** The use of a flue gas analyzer is required to convert this unit and determine proper gas valve settings. Do not perform this conversion without a flue gas analyzer. Improper gas valve settings can cause severe personal injury, death, or property damage.

4. Do NOT allow the boiler to modulate freely until the combustion analysis and adjustment is complete. Turn on and connect properly working, calibrated combustion analyzer to the boiler flue pipe. Fire the boiler and force it to High Fire in Manual Test Mode. Adjust the high fire combustion first, using the throttle adjustment screw, to the CO₂ and CO ranges specified in Figure 94, page 103, by model size. Then, force the boiler to Low Fire and adjust the offset regulating screw to the CO₂ and CO ranges specified in Figure 94, page 103, by model size. Reinstall the cap over the offset adjustment screw. Follow the full startup instructions found in this Boiler Manual including the section titled “Re-check the Maximum and Minimum CO₂ and CO rate” on page 103.

5. The coarse adjustment prescribed by this manual should result in combustion settings that allow for ignition and are a starting point for further adjustment. If, after making the coarse adjustments prescribed above, the boiler will not light, turn the throttle screw only counterclockwise (\( \frac{1}{4} \)) an additional 1/4 turn and attempt to light again. Repeat for a total of up to one full turn. If, after following the procedure above, the boiler still will not ignite or, during combustion analysis, the analyzer reads less than 1.0% O₂, contact Weil-McLain Technical Services for assistance.

6. Check for gas leaks and confirming proper performance.

**Perform Boiler Manual start-up**

Perform complete start-up sequence (beginning on page 97), including check for gas leaks and checking for proper operation. After placing the boiler in operation, the ignition system safety shutoff device must be tested, page 103.

**Install front door**

Install front door after servicing. The front door must be securely fastened to the boiler frame to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances. Failure to keep the door securely fastened could result in severe personal injury or death.

**Apply installer conversion label**

1. After installation is complete and boiler is set up for propane gas, fill out and attach the propane conversion label next to the boiler rating label (right side of cabinet).

2. Contractor/installer is responsible for completing the information required on label (provided in kit) and attaching installer conversion label next to the boiler rating label.
Gas piping — sizing gas lines

GNOSTICE Boiler gas connection is ½” NPT. Size gas lines large enough to provide gas to all connected appliances.

Natural Gas:

Pipe sizing for natural gas
1. Size gas piping from meter outlet to entrance of boiler in accordance with Figure 23 and Figure 24.
2. Use total input of all connected appliances. Divide total input in Btu/h by 1,000 to obtain cubic feet per hour of natural gas.
   a. Pipe lengths in Figure 23 are equivalent length of straight pipe. Convert pipe fittings to equivalent lengths using data from Figure 24.
   b. Figure 23 is only for natural gas with specific gravity 0.60, with a pressure drop through the gas piping as listed in the table.
   c. For additional gas pipe sizing information, refer to ANSI Z223.1 NFPA 54 – latest edition (or Natural Gas and Propane Installation CAN/CSA B149.1 or B149.2 for Canadian installations).

Natural gas supply pressure
1. Pressure required at gas valve inlet pressure port, see Figure 93, page 102:
   a. Maximum: 14” (355 mm) w.c. with no flow (lockup).
   b. Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire):
      ECO Tec 80: 3½” (89 mm) w.c.
      ECO Tec 110: 3½” (89 mm) w.c.
      ECO Tec 150/199: 3½” (89 mm) w.c.
   c. Nominal gas pressure: 7.0” (178 mm) w.c.
2. Install 100% lockup gas pressure regulator in supply line if inlet pressure can exceed 14” w.c. at any time. Adjust lockup regulator for 14” w.c. maximum.

Propane Gas:

WARNING You must follow the instructions, beginning on page 14, to operate the boiler on propane. Failure to comply could result in severe personal injury, death or substantial property damage.

Pipe sizing for propane gas
1. Contact gas supplier to size pipes, tanks and 100% lockup gas pressure regulator.

Propane supply pressure
1. Adjust propane supply regulator provided by gas supplier for 14” (355 mm) w.c. maximum pressure.
2. Pressure required at gas valve inlet pressure port, see Figure 93, page 102:
   a. Maximum: 14” (355 mm) w.c. with no flow (lockup).
   b. Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire):
      ECO Tec 80: 3½” (89 mm) w.c.
      ECO Tec 110: 3½” (89 mm) w.c.
      ECO Tec 150/199: 3½” (89 mm) w.c.
   c. Nominal gas pressure: 11.0” (279 mm) w.c.

---

### Figure 23
Pipe capacity for 0.60 specific gravity natural gas; pipe length is in equivalent feet.

<table>
<thead>
<tr>
<th>Gas pipe total length, feet</th>
<th>Capacity</th>
<th>Cubic feet per hour, natural gas, 0.60 specific gravity</th>
<th>Gas pressure 13” (330 mm) w.c. or less</th>
<th>Pressure drop 0.3 inches (7.6 mm) w.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>½&quot;</td>
<td>10 132</td>
<td>132 278</td>
<td>278 520</td>
<td>520 1050</td>
</tr>
<tr>
<td>¾&quot;</td>
<td>20 92</td>
<td>92 190</td>
<td>190 350</td>
<td>350 710</td>
</tr>
<tr>
<td>1&quot;</td>
<td>30 73</td>
<td>73 152</td>
<td>152 285</td>
<td>285 560</td>
</tr>
<tr>
<td>1¼&quot;</td>
<td>N/A 130</td>
<td>130 245</td>
<td>245 485</td>
<td>485 970</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>50 N/A</td>
<td>115 215</td>
<td>215 430</td>
<td>430 860</td>
</tr>
<tr>
<td>2&quot;</td>
<td>75 N/A</td>
<td>105 175</td>
<td>175 350</td>
<td>350 700</td>
</tr>
<tr>
<td>2½&quot;</td>
<td>100 N/A</td>
<td>96 150</td>
<td>150 305</td>
<td>305 610</td>
</tr>
<tr>
<td></td>
<td>150 N/A</td>
<td>90 120</td>
<td>120 250</td>
<td>250 500</td>
</tr>
</tbody>
</table>

### Figure 24
Equivalent lengths of straight pipe for typical gas line fittings.

<table>
<thead>
<tr>
<th>Pipe size inches</th>
<th>Equivalent length, feet</th>
<th>90° Elbow</th>
<th>Tee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>short radius</td>
<td>long radius</td>
<td>line flow</td>
</tr>
<tr>
<td>½&quot;</td>
<td>3.6</td>
<td>2.2</td>
<td>1.7</td>
</tr>
<tr>
<td>¾&quot;</td>
<td>4.4</td>
<td>2.3</td>
<td>2.4</td>
</tr>
<tr>
<td>1&quot;</td>
<td>5.2</td>
<td>2.7</td>
<td>3.2</td>
</tr>
<tr>
<td>1¼&quot;</td>
<td>6.6</td>
<td>3.2</td>
<td>4.6</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>7.4</td>
<td>3.4</td>
<td>5.6</td>
</tr>
<tr>
<td>2&quot;</td>
<td>8.5</td>
<td>3.6</td>
<td>7.7</td>
</tr>
<tr>
<td>2½&quot;</td>
<td>9.3</td>
<td>4.0</td>
<td>9.3</td>
</tr>
</tbody>
</table>
Venting/air piping — general

Any improper operation of a common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition, and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1. When resizing any portion of a common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Chapter 13 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition, and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1.

DANGER
Do not install the ECO Tec boiler into a common vent with any other appliance. This will cause flue gas spillage or appliance malfunction, resulting in possible severe personal injury, death or substantial property damage.

WARNING
Existing common vent systems may be too large for the appliances remaining connected after the existing boiler is removed.

WARNING
Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

When removing a boiler from an existing common vent system

The ECO Tec boiler cannot be common vented with any other appliance. When an existing boiler is replaced with an ECO Tec boiler, the ECO Tec boiler CANNOT use the existing common vent. The boiler requires its own vent and air piping, as specified in this manual. This may cause a problem for the appliances that remain on the old common vent, because the vent may be too large. The following test is intended to check for proper operation of the appliances remaining on the old common vent system.

Vent system verification

Perform the test sequence below for each appliance remaining on the original common vent system. Operate each appliance individually, with other appliances turned off. This procedure will test whether the common vent system can properly vent each appliance.

Existing vent test procedure

(The following is intended to test whether the appliances remaining on an existing vent system will operate satisfactorily.)

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Test vent system — Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined herein, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous conditions of use.

Figure 25 Corrosive contaminants and sources

<table>
<thead>
<tr>
<th>Products to avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray cans containing chloro/fluorocarbons</td>
</tr>
<tr>
<td>Permanent wave solutions</td>
</tr>
<tr>
<td>Chlorinated waxes/cleaners</td>
</tr>
<tr>
<td>Chlorine-based swimming pool chemicals</td>
</tr>
<tr>
<td>Calcium chloride used for thawing</td>
</tr>
<tr>
<td>Sodium chloride used for water softening</td>
</tr>
<tr>
<td>Refrigerant leaks</td>
</tr>
<tr>
<td>Paint or varnish removers</td>
</tr>
<tr>
<td>Hydrochloric acid/muriatic acid</td>
</tr>
<tr>
<td>Cements and glues</td>
</tr>
<tr>
<td>Antistatic fabric softeners used in clothes dryers</td>
</tr>
<tr>
<td>Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms</td>
</tr>
<tr>
<td>Adhesives used to fasten building products and other similar products</td>
</tr>
<tr>
<td>Excessive dust and dirt</td>
</tr>
</tbody>
</table>

Areas likely to have contaminants

<table>
<thead>
<tr>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry cleaning/laundry areas and establishments</td>
</tr>
<tr>
<td>Swimming pools</td>
</tr>
<tr>
<td>Metal fabrication plants</td>
</tr>
<tr>
<td>Beauty shops</td>
</tr>
<tr>
<td>Refrigeration repair shops</td>
</tr>
<tr>
<td>Photo processing plants</td>
</tr>
<tr>
<td>Auto body shops</td>
</tr>
<tr>
<td>Plastic manufacturing plants</td>
</tr>
<tr>
<td>Furniture refinishing areas and establishments</td>
</tr>
<tr>
<td>New building construction</td>
</tr>
<tr>
<td>Remodeling areas</td>
</tr>
<tr>
<td>Garages with workshops</td>
</tr>
</tbody>
</table>
Venting/air piping — general

You must pipe combustion air to the boiler air intake unless using the Weil-McLain Direct Exhaust kit and meeting the Direct Exhaust requirements.

Install air inlet piping for the ECO Tec boiler as described in this manual.

The air termination fitting must be installed with the clearances and geometry relative to the vent outlet depicted in this manual to ensure that flue products do not enter the air intake.

Ensure that the combustion air will not contain any of the contaminants in Figure 25, page 20. Do not pipe combustion air near a swimming pool, for example. Avoid areas subject to exhaust fumes from laundry facilities. These areas will always contain contaminants.

Contaminated combustion air will damage the boiler, resulting in possible severe personal injury, death or substantial property damage.

Installing vent and air piping

Polypropylene

For polypropylene applications, comply with any additional requirements in the vent system manufacturer’s instructions. 3” PP can be used for vent and air connections. Install a locking collar at every joint.

Provide 3” transitions at the boiler connections if using 2” piping.

Refer to page 137 for a list of compliant adapters.

3” to 2” PP adapter must have smooth, straight section of pipe to insert in to the boiler vent and air connections and must fit and seal tightly. PP adapters with their own seal which would interfere with the internal seal of the boiler vent or air connections must not be used.

Additional vent and air transition pieces at termination may be required if different material and/or size is used for termination.

AL29-4C S.S.

For AL29-4C vent pipe applications, comply with any additional requirements in the vent system manufacturer’s instructions.

3” Simpson Duravent can be used at the vent and air connections. All other stainless steel manufacturer’s venting will require a transition piece as per manufacturer’s recommendation when transitioning from PVC to SS.

Additional vent and air transition pieces at termination may be required if different material and/or size is used for termination.

Provide 3” transitions at the boiler connections if using 2” piping.

Refer to page 137 for a list of compliant adapters.

Venting with flexible polypropylene

For boilers allowed to utilize polypropylene vent systems.

Tests have determined that flex vent has a greater pressure drop than rigid polypropylene vent which changes the maximum allowable length of venting. Below are the equivalent lengths.

<table>
<thead>
<tr>
<th>Flex Pipe Vent Length - Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier and Size of Flex Pipe Vent Length - Equivalent</td>
</tr>
<tr>
<td>Duravent 2” diameter</td>
</tr>
<tr>
<td>Duravent 3” diameter</td>
</tr>
<tr>
<td>Centrotherm 2” diameter</td>
</tr>
<tr>
<td>Centrotherm 3” diameter</td>
</tr>
</tbody>
</table>

Example: Using 20 feet of Duravent 3”: 20’ x 1.7 = 34’ of equivalent length of straight pipe

Knowing and identifying the correct equivalent length is essential to ensure the proper operation of our high efficiency boilers. The equivalent vent lengths for each specific size and manufacturer of venting.

Calculated equivalent feet shall not exceed maximum values listed in boiler manual.

All current boiler installations using polypropylene flex venting with concerns/questions should contact Weil-McLain Technical Service for assistance, if our boiler is having operation issues that may be related to excess vent lengths.

Code Compliance

Venting / Combustion air piping – Installations must provide provisions for combustion and ventilation air in accordance with the section “Venting of Equipment”, of the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 – latest edition, or “Venting Systems and Air Supply for appliances” of the Natural Gas and Propane Installation Code, CAN/CSA B149.1, or applicable provisions of the local building codes.
Venting & air — general (continued)

The table below lists the acceptable vent/air pipe terminations described in this manual. Follow all instructions provided to install the vent/air system. NOT SHOWN below, but also approved, are the polypropylene piping and terminations listed in Figure 27, page 23. For these applications, use ONLY the manufacturers’ parts listed and follow all instructions provided by the pipe manufacturer.

### Maximum vent and air pipe length (for each)
- **80/110/150 - 2" & 3" = 100 feet**
- **199 - 3" = 100 feet**
- **199 - 2" = 50 feet**

(Minimum length for all applications is 2 feet)

(All applications include allowance for the termination fittings plus one elbow in air piping and one elbow in vent piping).

### USE SWEEP ELBOWS ONLY

See Figure 27, page 23 for material specifications | See Figure 125, page 137 for part/kit numbers

### Vent and air pipe sizes:
- Maximum vent lengths apply for either 2" or 3" vent and air pipe.

If using 2" pipe, provide 3"x 2" tapered reducers at boiler connections and at Weil-McLain vent/air cap or at concentric terminations.

Boilers will derate as vent/air pipe length increases — see rating data on Figure 138, page 149 for derate amounts.

<table>
<thead>
<tr>
<th>ECO Tec Model</th>
<th>Maximum vent and air pipe length (for each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110</td>
<td>80/110/150 - 2&quot; &amp; 3&quot; = 100 feet</td>
</tr>
<tr>
<td>150</td>
<td>199 - 3&quot; = 100 feet</td>
</tr>
<tr>
<td>199</td>
<td>199 - 2&quot; = 50 feet</td>
</tr>
</tbody>
</table>

### Vent and air piping — DIRECT VENT ONLY — OPTIONS and PIPING LIMITS

#### SIDEWALL termination

- Separate pipes
- PVC or PP Concentric
- 3"Weil-McLain PVC vent/air cap

#### VERTICAL termination

- Separate pipes
- PVC or PP Concentric
- Vertical vent, Side Air

---

### Equivalent feet for elbows (USE SWEEP ELBOWS ONLY)
- Deduct from max. equivalent length of piping (does not apply to termination fittings).
- PVC - 7 feet per for each additional 90° sweep elbow or 45° elbow — If piping contains more than 1 elbow in air or vent piping, other than terminations fittings.
- PP & SS — See manufacturers recommendations for equivalent vent length per elbow.

---

**Note 1:**
- Use only Weil-McLain approved termination kits listed in Figure 125, page 137
Venting & air — general

Figure 27 Vent and air piping materials — Use only the materials listed below, ensuring that all materials meet local codes (see Figure 125, page 137 for part/kit numbers)

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>Standards for installations in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic piping materials</td>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Vent or air pipe &amp; fittings</td>
<td>PVC schedule 40 (Note 1)</td>
<td>ANSI/ASTM D1785</td>
</tr>
<tr>
<td></td>
<td>PVC-DWV schedule 40 (Note 1)</td>
<td>ANSI/ASTM D2665</td>
</tr>
<tr>
<td></td>
<td>CPVC schedule 40 (Note 1)</td>
<td>ANSI/ASTM F441</td>
</tr>
<tr>
<td></td>
<td>ABS-DWV schedule 40 (Intake Only)</td>
<td>ANSI/ASTM D2661</td>
</tr>
<tr>
<td>PVC &amp; ABS pipe cement &amp; primer</td>
<td>PVC (Note 1)</td>
<td>ANSI/ASTM D2564/F656</td>
</tr>
<tr>
<td></td>
<td>CPVC (Note 1)</td>
<td>ANSI/ASTM F493</td>
</tr>
<tr>
<td></td>
<td>ABS schedule 40 (Note 1)</td>
<td>ANSI/ASTM D2235</td>
</tr>
<tr>
<td>Polypropylene vent pipe, fittings, terminations and cement</td>
<td>Simpson-Duravent — Obtain all materials from M&amp;G Simpson-Duravent</td>
<td>See manufacturer's literature for detailed information</td>
</tr>
<tr>
<td></td>
<td>Centrotherm Eco Systems InnoFlue® Single-wall — Obtain all materials from Centrotherm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: See page 137 for correct appliance adapters to be used.</td>
<td></td>
</tr>
</tbody>
</table>

AL29-4C stainless steel piping materials

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>Standards for installations in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent pipe AL29-4C stainless steel</td>
<td>Heat Fab, Inc. — Saf-T-Vent®</td>
<td>Certified for Category IV and direct vent appliance venting</td>
</tr>
<tr>
<td></td>
<td>Z-Flex, Inc. — Z-Vent®</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dura-Vent — FasNSeal™</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metal-Fab, Inc. — CORR/GUARD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See Figure 125, page 137 for Mfg’s adapter part numbers.</td>
<td></td>
</tr>
</tbody>
</table>

Weil-McLain stainless steel bird screens, 2" or 3" (purchase separately) — see Figure 125, page 137 for part numbers.

Note 1: Weil-McLain concentric vent kits are made from PVC pipe and fittings.

Note 2: System 636 PVC concentric terminations utilize PVC pipe/fittings certified to ULC S636. If ULC S636 compliance is required, use only System 636 pipe, fittings and cement.

WARNING — Do not mix piping from different pipe manufacturers unless using adapters specifically designed for the purpose by the manufacturer.

WARNING — Every joint on polypropylene vent piping must include a locking collar.

WARNING — Do not use cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenol sulfone) in venting systems.

WARNING — Do not cover non-metallic vent pipe and fittings with thermal insulation.

ADAPTERS — The boiler comes with a 3" 3-in-1 adapter as standard. This adapter allows the installation of 3" PVC schedule 40, CPVC schedule 40, PVC-DWV schedule 40, AL29-4C stainless steel (from Simpson-Duravent only) and Polypropylene (from Simpson-Duravent & Centrotherm only) piping without the need for extra adapters.

ADAPTERS — It may require additional adapters at the terminations if using different venting materials. (When going from PP to the Weil-McLain side wall plate, for example).

ADAPTERS — If using 2" piping, where approved for the application, provide adapters for a 3" pipe material (mentioned above) connections and at the terminations, if required.

WARNING — USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING — Do not use short radius elbows for vent or air piping. Boiler performance could be affected.

WARNING — All vent and air pipes require a BIRD SCREEN at each termination. Most kits do not include the bird screens. Purchase bird screens separately from Weil-McLain or vent kit supplier if not included. (Note — bird screening is integral to the 3" PVC Weil-McLain sidewall vent cap, available for purchase from Weil-McLain. No additional screening is required.)
Commonwealth of Massachusetts installations

Commonwealth of Massachusetts — When the boiler is installed within the Commonwealth of Massachusetts, the boiler must be installed by a licensed plumber or gas fitter. Read and comply with the instructions below.

(a) For all sidewall horizontally-vented gas-fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS.
   At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gas fitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.
   a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
   b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, “GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS.”

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

(b) EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a)1 through 4:
   1. The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most current edition of NFPA 54 as adopted by the Board; and
   2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS — GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:
   1. Detailed instructions for the installation of the venting system design or the venting system components; and
   2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS — GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies “special venting systems”, the following requirements shall be satisfied by the manufacturer:
   1. The referenced “special venting system” instructions shall be included with the appliance or equipment installation instructions; and
   2. The “special venting systems” shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.
Vent termination requirements

Figure 28  The vent termination must be located to meet all requirements below (also applies to vertical vent terminations). The minimum distance from adjacent public walkways, adjacent buildings, open able windows and building in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1. The vent termination clearances below are for U.S.A., for Canadian vent termination clearances please refer to the requirements of CAN/CSA B149.1 Natural Gas and Propane Installation Code. Consideration should be given to avoid possible damage caused by vent plumes and condensate when choosing a venting configuration and location. Maintain a minimum clearance of 4 ft. (1.22m) horizontally from, and in no case above or below, unless a 4 ft. (1.22m) horizontal distance is maintained, from electrical meters, gas meters, regulators, and relief equipment.

![Diagram of vent termination requirements](image-url)

**MINIMUM CLEARANCES**

**DO NOT TERMINATE:**

**CONSIDER**

Avoid possible contact with people or pets
Avoid possible damage to surfaces due to condensate freezing
Avoid spaces where wind eddies can cause recirculation
The vent plume can block the view when the vent is located below a window.

*VENT/ AIR terminations*

DO NOT TERMINATE above a door or window — condensate can freeze and cause ice formations.

DO NOT terminate above a public walkway

**VENT**

- 3 feet above (not below) if within 10 feet horizontally
- 1 foot above or 4 feet below if within 4 feet horizontally

**OPENABLE WINDOWS**

- 12 inches min.

**DOOR**

- 12 inches min.

**PUBLIC WALKWAY**

- 12 inches min.

**GRADE or SNOW LINE**

Keep vents/air intake area clear of accumulating snow.

**ROOF OVERHANG**

- 5 feet min.
- 6 feet min. to a wall or an inside corner
- 10 feet min. if opposite an operable opening in another building

**WALL**

- 12 inches min.

**FORCED AIR INTAKE**

- 3 feet above (not below) if within 10 feet horizontally

**NON-MECHANICAL AIR INTAKE**

- 1 foot above or 4 feet below if within 4 feet horizontally

**METER, REGULATOR, RELIEF VALVE, etc.**

- 3 feet above if within 4 feet horizontally

**PLANTS**

- Avoid possible contact with people or pets

**MECHANICAL EQUIPMENT**

- Avoid possible damage to surfaces due to condensate freezing

**DECK OR BALCONY**

- Avoid spaces where wind eddies can cause recirculation

**DO NOT TERMINATE:**

- DO NOT terminate above a door or window — condensate can freeze and cause ice formations

- The vent plume can block the view when the vent is located below a window.

This page provides detailed guidelines for vent termination requirements, including minimum clearances and locations where vents should not be terminated. It is essential to follow these guidelines to ensure safe and effective venting of the ECO® Tec gas-fired water boiler 80/110/150/199.
**Boiler room air openings**

**Figure 29** Combustion and ventilation air openings for Direct Vent installations. Also follow the National Fuel Gas Code, ANSI Z223.1/NFPA 54 - latest edition, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1 or applicable provisions of the local building codes.

**WARNING** The **ECO Tec** boiler CANNOT be in the same space with other appliances if clearances around the boiler are less than the recommended service clearances shown in Figure 1, page 8.

### Air openings

The required air opening sizes below are FREE AREA, after reduction for louver obstruction. Note the exception below for large spaces.

<table>
<thead>
<tr>
<th><strong>ECOTec boiler</strong></th>
<th><strong>ECOTec boiler</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WITH other appliances in room</strong></td>
<td><strong>WITHOUT other appliances in room</strong></td>
</tr>
</tbody>
</table>

#### a) Outside

- **TWO openings**, each at least: 1 square inch per **1,000 Btuh** of all other appliances in the room  
  (Unless specified otherwise by appliance manufacturer)

#### b) Outside or ventilated attic

- **TWO openings**, each at least: 1 square inch per **4,000 Btuh** of all other appliances in the room  
  **— OR —**  
  **ONE opening**, each at least: 1 square inch per **3,000 Btuh** of all other appliances in the room  
  (Unless specified otherwise by appliance manufacturer)

#### c) Outside or ventilated crawl space

- **TWO openings**, each at least: 1 square inch per **4,000 Btuh** of all other appliances in the room  
  **— OR —**  
  **ONE opening**, each at least: 1 square inch per **3,000 Btuh** of all other appliances in the room  
  (Unless specified otherwise by appliance manufacturer)

#### d) Outside

- **TWO openings**, each at least: 1 square inch per **2,000 Btuh** of all other appliances in the room  
  **— OR —**  
  **ONE opening**, each at least: 1 square inch per **3,000 Btuh** of all other appliances in the room  
  (Unless specified otherwise by appliance manufacturer)

#### **NOTICE:**

**Requirements for using the SINGLE air opening option.**

A single combustion air opening can be used for cases b, c or d above (**ECOTec** with other appliances in room only), sized as listed, provided that:

- The single opening must communicate directly to the outdoors or to a space that communicates directly with outdoors (NOT to an interior space).  
- The top of the opening must be within 12 inches of the ceiling.  
- The free area of the opening must be at least equal to the sum of the areas of all equipment vent connectors in the space.

#### SPECIAL EXCEPTION FOR LARGE SPACES

(**ECO Tec** WITH other appliances in room only):

NO combustion air openings are needed if the boiler (and other appliances) are installed in a space with a volume NO LESS than 50 cubic feet per 1,000 Btuh of all appliances in the space. That is, total the input of all appliances in MBH (1,000's of Btuh), then multiply this total times 50. The building MUST NOT be of tight construction.  

Example: For a total input of 500 MBH (500,000 Btuh), the minimum volume would be 50 x 500 = 25,000 cubic feet.
Vent and air piping and boiler connections

Follow termination instructions

1. Read and follow all instructions for the termination type used before proceeding with this page. Follow all instructions provided by vent pipe manufacturer.

WARNING Use only materials from the manufacturers listed in Figure 27, page 23.

Installing vent and air piping

Polypropylene For polypropylene applications, see venting and air piping notes on page 21.

AL29-4C S.S. For AL29-4C vent pipe applications, See venting and air piping notes on page 21.

1. Work from the boiler to vent or air termination. Do not exceed the lengths given in the previous pages for either the air or vent piping.
2. See Figure 30 for attaching vent (and air) pipes at the boiler. Connections must be 3” PVC or CPVC only — use transitions if needed to adapt to other material or size (2”).
3. Cut pipe to required lengths.
4. Dry assemble entire vent or air piping to ensure proper fit before assembling any joint.
5. Maintain minimum clearance of 3/16 inch between vent pipe and any combustible wall or material.
6. Seal wall or floor penetration openings following local code requirements.
7. Assembling PVC or CPVC: Polypropylene AL29-4C S.S. — follow pipe manufacturer’s instructions for preparation and assembly
   a. Deburr inside and outside of pipe ends.
   b. Chamfer outside of each pipe end to ensure even cement distribution when joining.
   c. Clean all pipe ends and fittings. Dry thoroughly.
   d. For each joint:
      • Handle fittings and pipes carefully to prevent contamination of surfaces.
      • Apply primer liberally to both joint surfaces — pipe end and fitting socket.
      • While primer is still damp, lightly apply approved cement to both surfaces in a uniform coating.
      • Apply a second coat to both surfaces. Avoid using too much cement on sockets to prevent cement buildup inside.
      • With cement still wet, insert pipe into fitting, twisting 1/4 turn. Make sure pipe is fully inserted.
      • Wipe excess cement from joint. Check joint to be sure a smooth bead of cement shows around the entire joint.

WARNING ADAPTERS — Use Adapters if using other than 3” PVC, CPVC, SS (Simpson-Duravent only) and PP (Simpson-Duravent & Centrotherm).

1. Use only 3” PVC, CPVC, SS (Simpson-Duravent only) and PP (Simpson-Duravent & Centrotherm) pipe at boiler connection.
2. Clean and deburr inside and outside of both ends of air and vent pipes. Chamfer boiler end of vent pipe for ease of insertion.
3. Inspect vent or air adapter (above) — verify no obstructions or foreign objects inside.
4. Loosen clamp screw.
5. Measure: PVC or CPVC = 2-1/4” or PP = 3-1/2” or Duravent SS = 4-3/4” from end of pipe and mark with felt-tip pen.
7. Apply a small amount of silicon grease to end of pipe to ease insertion.
8. Insert pipe into adapter.
9. Slide pipe down until the mark is reached.

WARNING Do not apply excessive force or bend the adapter or flue/air pipe when inserting. The adapter or seal could be damaged. If any portion of the vent or air system is damaged, it must be replaced.

10. Secure vent or air pipe by tightening the adapter clamp securely. Do not overtighten.
11. The seal is accomplished with the internal gasket. The clamp is only to hold the pipe in place.

WARNING USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING — DO NOT use short radius elbows for vent or air piping. Boiler performance could be affected.
DIRECT VENT — Sidewall with separate pipes

Allowable vent/air pipe materials & lengths

**WARNING** Use only the vent materials and kits listed in Figure 27, page 23. Provide pipe adapters if specified.

Locate the termination such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 26, page 22.

**Polypropylene** For polypropylene applications, See venting and air piping notes on page 21.

**AL29-4C S.S.** For AL29-4C vent pipe applications, See venting and air piping notes on page 21.

Determine termination location

1. The air and vent terminations must be installed as shown in Figure 31 and Figure 34, page 29.
2. The terminations must comply with clearances and limitations shown in Figure 28, page 25.
3. Locate the terminations so they are not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

**WARNING** Do not exceed the maximum lengths of the outdoor vent piping shown in Figure 31. Excessive length exposed to the outdoor could cause freezing of condensate in the vent pipe, resulting in potential boiler shutdown. In extremely cold climates, install an insulated chase around the vent piping, particularly if using longer lengths. The chase must allow for inspection of the vent pipe, and insulation must be protected from water.

Multiple vent/air terminations

1. When terminating multiple boilers, terminate each vent/air connection as described in this manual.

**WARNING** All vent pipes and air inlets must terminate at the same height to avoid possibility of severe personal injury, death or substantial property damage.

2. Place wall penetrations to obtain minimum clearances shown in Figure 32, page 29 for U.S. installations. For Canadian installations, provide clearances required by CSA B149.1 or B149.2 Installation Code and a ULC S636 compliant vent kit.

3. The air inlet of a boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent boiler vents.

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**Step 1** Read and follow all instructions in this manual. **DO NOT** proceed with vent/air installation until you have read page 20 through page 26. See notices at left and page 21.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected sidewall location.

**Step 3** Make sure the selected sidewall termination location complies with Figure 28, page 25. (Multiple boiler sidewall plates must also comply with Figure 32, page 29.)

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 5** Prepare the sidewall penetrations and secure the sidewall plates as instructed in this section. See “Prepare wall penetrations” on page 29. See notices at left and page 21.

**Step 6** The air piping must terminate in a **down-turned elbow** as shown above. The vent piping must terminate in an **elbow pointed outward or away from the air inlet** as shown above. See illustration above.

**Step 7** Install vent and air piping between the boiler and the sidewall openings. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. See page 27 for general guidelines. See notices at left and page 21.

**Step 8** Install pipe supports every 5 feet on both the horizontal and vertical runs. Install a hanger support within 6 inches of any upturn in the piping, or per vent pipe manufacturer’s instructions. See notices at left and page 21.

**Step 9** Attach the vent termination exterior piping: Use either of the configurations shown above, as needed to ensure clearance above grade or snow line.

**Step 10** The vent and air pipes may run up as high as 4 feet with no enclosure. The vent and air pipes must be secured with braces, and all clearances and lengths must be maintained. Space braces no further than 24 inches apart.

**Step 11** External venting greater than 4 feet requires an insulated enclosure around the vent and air pipes. The vent and air terminations must exit through the enclosure as shown in the illustration above, maintaining all required clearances.

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**WARNING** **USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING** — **DO NOT** use short radius elbows for vent or air piping. Boiler performance could be affected.
Prepare wall penetrations

1. Air pipe penetration:
   a. Cut a hole for the air pipe. Size the air pipe hole as close as desired to the air pipe outside diameter.

2. Vent pipe penetration:
   a. Cut a hole for the vent pipe. For either combustible or noncombustible construction, size the vent pipe hole at least 0.4" larger than the vent pipe diameter.
   b. Insert a corrosion resistant metal thimble in the vent pipe hole as shown in Figure 34.

3. Use the provided paper template for correct location of hole centers.

4. Use of a sidewall termination plate is REQUIRED.
   a. Kits for several vent sizes are available from Weil-McLain. See “VENT/AIR PARTS AND KITS” on page 137.
   b. Plate may be field fabricated from corrosion resistant material of sufficient strength. Plate must allow venting to maintain minimum clearance to combustibles.

**WARNING** Ensure that the plate material is strong enough to prevent the termination from being pushed inward if struck or pushed from the outside.

5. Follow all local codes for isolation of vent pipe when passing through floors or walls.

6. Seal exterior openings thoroughly with exterior caulk.

Termination and fittings

1. Prepare the vent termination elbow and the air termination elbow by inserting bird screens. (See Figure 31, page 28.) Bird screens must be purchased separately. See the parts list at the end of this manual for part numbers.

2. Secure the elbows so they will butt against the sidewall termination plate.

3. When completed, the air termination coupling must be oriented at least 12 inches below the vent termination and at least 12 inches above grade or snow line as shown in Figure 31, page 28.

4. You can orient the vent termination elbow either directly outward or 90 degrees away from the air inlet elbow as shown in Figure 31, page 28.

5. Maintain the required dimensions of the finished termination piping as shown in Figure 31, page 28.

6. For multiple boiler terminations, see Figure 32.

7. Do not extend exposed vent pipe outside of building more than shown in this document. Condensate could freeze and block vent pipe.

**NOTICE** If extending the vent and air pipes out from the wall, install a coupling on each pipe. Mount the piping with the coupling flush with the outer plate.
DIRECT VENT — Sidewall concentric

Allowable vent/air pipe materials & lengths

1. The concentric termination kit must be purchased separately.

**WARNING** Use only the vent materials and kits listed in Figure 27, page 23. Provide pipe adapters if specified.

2. Locate the termination such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 26, page 22.

3. This termination requires a 45-degree elbow that is not supplied with the termination kit. The maximum vent/air pipe lengths include allowance for this elbow.

   - For polypropylene applications, See venting and air piping notes on page 21.
   - For AL29-4C vent pipe applications, See venting and air piping notes on page 21.

**Determine termination location**

1. The concentric termination kit must be installed as shown in Figure 37, page 31.

2. The termination must comply with clearances and limitations shown in Figure 28, page 25.

3. Locate the termination so it is not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

**Multiple vent/air terminations**

1. When terminating multiple boilers, install each concentric termination as described in this manual.

**WARNING** All vent pipes and air inlets must terminate at the same height to avoid possibility of severe personal injury, death or substantial property damage.

2. Place wall penetrations to obtain minimum clearance as shown in Figure 36, page 31 for U.S. installations. For Canadian installations, provide clearances required by CSA B149.1 or B149.2 Installation Code and a ULC S636 compliant vent kit.

3. The air inlet of a boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent boiler vents.

**Figure 35 INSTALLATION SEQUENCE — Concentric horizontal**

**Step 1** Read and follow all instructions in this manual. **DO NOT proceed with vent/air installation until you have read page 20 through page 26. Polypropylene** AL29-4C S.S. See notices at left.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected sidewall location.

**Step 3** Make sure the selected sidewall termination location complies with Figure 28, page 25. (Multiple boiler concentric terminations must also comply with Figure 36, page 31.)

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required.

**Step 5** Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 6** The concentric termination must be assembled and installed before piping from the boiler to the termination.

**Step 7** Prepare the sidewall penetration — assemble the concentric termination kit and secure the cover plates as instructed in this section. Provide the supports indicated and mount the termination assembly. See “Install termination — concentric pipes” on page 31. Polypropylene AL29-4C S.S. See notices at left.

**Step 8** Install vent and air piping between the boiler and the concentric vent/air termination. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. See page 27 for general guidelines.

**Step 9** Install pipe supports every 5 feet on both the horizontal and vertical runs. Polypropylene AL29-4C S.S. See notices at left and page 21.

**Step 10** Install a hanger support within 6 inches of any upturn in the piping. Polypropylene AL29-4C S.S. See notices at left.

**WARNING** **USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING** — **DO NOT** use short radius elbows for vent or air piping. Boiler performance could be affected.
Install termination — concentric pipes

1. Assemble the vent termination as described for concentric terminations, on page 40.

**WARNING** If necessary, you can shorten the lengths of the inner and outer pipes for a shorter finished assembly. But you must ensure the pipes butt correctly at both ends. Failure to properly assemble the concentric termination can result in flue gas recirculation, causing possible severe personal injury or death.

2. Wall penetration:
   a. Preferably, use a thimble with a 4½-inch hole. If not using a thimble, carefully use a hole saw to cut a hole not larger than 4¾ inches in diameter through the wall. The finished hole must provide a solid stop for the rain cap ribs, as shown in the inset to Figure 37.

**WARNING** Ensure that the wall material is strong enough to prevent the rain cap from being pushed inward if struck or pushed from the outside.

3. Secure the termination in place so the rain cap will butt against the outside wall or outer thimble plate as shown in Figure 37.

4. Before beginning vent and air piping from the boiler to the concentric termination, mount and secure the concentric termination as shown in Figure 37.

**WARNING** The vent and air piping must be securely supported, and must not rest its weight on the boiler fittings. Failure to properly support the vent and air piping could result in vent piping damage, resulting in possible severe personal injury, death or substantial property damage.

   The supports/bracing used must support the termination assembly to prevent slippage or movement. See instructions provided with concentric kit for details.

   The clamps used on the outside of the termination pipe must not cut into the pipe or contain sharp edges that could cause a crack to form.

**WARNING** When inserting the partially-assembled termination kit through the wall penetration, wrap plastic or other protection over the end of the exposed assembly to prevent debris from entering the pipes. If the air passages become blocked, the boiler will not operate. Once the rain cap has been cemented to the assembly, there is no way to correct the problem. The assembly would have to be replaced if it were cut to be removed and cleaned. Altering the assembly in any way could result in severe personal injury or death due to toxic flue product emissions.

**WARNING** If using AL29-4C stainless vent pipe, use the vent pipe manufacturer’s PVC adapter if connecting to a PVC concentric vent attachment.

5. After the assembly has been positioned in the opening and all supports have been attached, install a bird screen (purchased separately if not included with the kit) and rain cap as follows:
   a. Place the bird screen on the end of the inner pipe as in Figure 50, page 40, or per concentric kit instructions for polypropylene kits.
   b. Cement the rain cap in place as shown.
**DIRECT VENT — Sidewall with W-M vent/air plate**

**Allowable vent/air pipe materials & lengths**

**WARNING** Use only the vent materials and kits listed in Figure 27, page 23. Provide pipe adapters if specified.

1. Locate the termination such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 26, page 22.

**Polypropylene**

For polypropylene applications, see venting and air piping notes on page 21.

**AL29-4C S.S.**

For AL29-4C vent pipe applications, see venting and air piping notes on page 21.

**Determine termination location**

1. The vent/air cap must be installed as shown in Figure 41, page 33.
2. The termination must comply with clearances and limitations shown in Figure 28, page 25.
3. Locate the termination so it is not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

**Multiple vent/air terminations or termination adjacent to other appliance terminations**

1. When terminating multiple boilers, terminate each vent/air connection as described in this manual.

**WARNING** All vent pipes and air inlets must terminate at the same height to avoid possibility of severe personal injury, death or substantial property damage.

2. Place wall penetrations to obtain minimum clearance as shown in for U.S. installations. For Canadian installations, provide clearances required by CSA B149.1 or B149.2 Installation Code and a UL S636 compliant vent kit.

3. The air inlet of a boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent boiler vents.

**WARNING** For terminations of other appliances, provide at least the clearance shown. The installation must also comply with the manual for the other appliances.

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**Figure 38 INSTALLATION — W-M sidewall vent/air plate**

**Vent/air pipes and vent/air can be oriented as option 1, 2, or 3. DO NOT mount with plate vertical and vent outlet down.**

**Step 1** Read and follow all instructions in this manual. DO NOT proceed with vent/air installation until you have read page 20 through page 26, Polypropylene AL29-4C S.S. See notices at left and page 21.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected sidewall location.

**Step 3** Make sure the selected sidewall termination location complies with Figure 28, page 25. (Multiple boiler sidewall plates must also comply with Figure 39, page 33.)

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required.

**Step 5** Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 6** Prepare the sidewall penetrations and secure the sidewall plates as instructed in this section. See “Install Weil-McLain vent/air cap” on page 33.

**Step 7** The Weil-McLain plate termination must be installed before piping from the boiler to the termination.

**Step 8** Install vent and air piping between the boiler and the vent/air termination plate. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. See page 27 for general guidelines.

**Step 9** Install pipe supports every 5 feet on both the horizontal and vertical runs, or per vent pipe manufacturer’s instructions. Polypropylene AL29-4C S.S. See notices at left and page 21.

**Step 10** Install a hanger support within 6 inches of any upturn in the piping, or per vent pipe manufacturer’s instructions. Polypropylene AL29-4C S.S. See notices at left and page 21.

**WARNING** USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING — DO NOT use short radius elbows for vent or air piping. Boiler performance could be affected.
Install Well-McLain vent/air cap

**WARNING** ADAPTERS — Use adapters if using other than 3-inch PVC or CPVC. This is required for different materials (polypropylene or AL29-4C stainless steel) or if using 2-inch pipe.

**NOTICE** The inside and outside cover plates are stamped to identify the exhaust (vent) and intake (air) openings. Make sure to orient the plates correctly.

1. Locate termination opening and avoid obstructions:
   a. Use the template supplied with the termination kit.
   b. Locate the template on the outside building surface where the penetration is to be made.
   c. Make sure there will be no obstructions that might prevent proper placement of the termination.
   d. Use the template to mark the locations for the four mounting holes, flue pipe and air pipe. Level the template with a level.

2. Drill holes for the screws or plastic anchors to secure the outside plate. Install the outside plate and mount the termination on the plate (temporarily).
   a. Cut the flue pipe so the extension through the wall will cause the vent pipe to fully extend into the termination socket.
   b. Cut the air pipe so the extension through the wall will butt the air pipe against the stops inside the termination.
   c. Temporarily slide the flue and air pipes through the opening(s). Slide the inside wall plate over the two pipes and into position on the inside wall.
   d. Position the inside plate so the flue pipe and air pipe slope downward slightly toward the boiler (1/4" per foot).
   e. Mark the four (4) mounting holes for the plate.
   f. Remove the vent and air pipe, drill the four mounting holes, and mount the inside plate.

3. Test fit the vent/air termination on the vent pipe. Make sure the vent pipe fully penetrates the termination socket and the air pipe butts against the interior stops.

4. Apply silicon RTV sealant to the interior of the vent termination and slide onto vent pipe. Rotate slightly to spread the silicon to ensure a tight seal around the vent pipe.

5. Secure the termination in place using the four (4) #10 x ½" sheet metal screws and lock washers (see Figure 41).
DIRECT VENT — Vertical with separate pipes

Allowable vent/air pipe materials & lengths

**WARNING** Use only the vent materials and kits listed in Figure 27, page 23. Provide pipe adapters if specified.

1. Locate the terminations such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 26, page 22.

**Polypropylene** For polypropylene applications, See venting and air piping notes on page 21.

**AL29-4C S.S.** For AL29-4C vent pipe applications, See venting and air piping notes on page 21.

Determine termination location

1. The air and vent terminations must be installed as shown in Figure 42.
2. The terminations must comply with clearances and limitations shown in Figure 28, page 25.
3. Locate the terminations so they are not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

Multiple vent/air terminations

1. When terminating multiple boilers, terminate each vent/air connection as described in this manual.

**WARNING** Terminate all vent pipes at the same height and all air pipes at the same height to avoid possibility of severe personal injury, death or substantial property damage.

2. Place roof penetrations to obtain minimum clearance of 12 inches between edge of air intake elbow and adjacent vent pipe of another boiler for U.S. installations (see Figure 43, page 35). For Canadian installations, provide clearances required by CSA B149.1 or B149.2 Installation Code and a ULC S636 compliant vent kit.

3. The air inlet of a boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent boiler vents.

Figure 42 Separate pipes vertical termination

**Figure 42** Separate pipes vertical termination

- **a.** AIR INTAKE IS AT LEAST 12 inches below vent outlet.
- **b.** AIR INTAKE IS AT LEAST 12 inches above roof or snow line.
- **c.** Vent and air terminations are fitted with bird screens.

**Step 1** Read and follow all instructions in this manual. DO NOT proceed with vent/air installation until you have read page 20 through page 26. **Polypropylene** See notices at left and page 21.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected sidewall location.

**Step 3** Make sure the selected vertical termination location complies with Figure 28, page 25. (Multiple boiler terminations must also comply with Figure 43, page 35.)

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 5** Prepare the vertical penetrations and secure penetration components as instructed in this section. See "Prepare roof penetrations" on page 35 and "Termination and fittings" on page 33.

**Step 6** The air piping must terminate in a 180-degree return bend or **down-turned elbow** as shown above. The vent piping must terminate in a **coupling pointed upward** as shown above.

**Step 7** Install vent and air piping between the boiler and the vertical terminations. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. Install pipe supports every 5 feet on both the horizontal and vertical runs. Install a hanger support within 6 inches of any upturn in the piping. See page 27 for general guidelines. Also comply with vent pipe manufacturer’s instructions. **Polypropylene** **AL29-4C S.S.** See notices at left and page 21.

**Step 8** Insert the vent and air piping through the vertical penetrations and secure the termination fittings.

**Step 9** Maintain clearances shown above. Vent and air terminations must be fitted with a bird screen as shown.

**WARNING** USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING — DO NOT use short radius elbows for vent or air piping. Boiler performance could be affected.
Prepare roof penetrations
1. Air pipe penetration:
   a. Cut a hole for the air pipe. Size the air pipe hole as close as desired to the air pipe outside diameter.
2. Vent pipe penetration:
   a. Cut a hole for the vent pipe. For either combustible or noncombustible construction, size the vent pipe hole at least 0.4” larger than the vent pipe diameter.
   b. Insert a corrosion resistant metal thimble in the vent pipe hole.
3. Space the air and vent holes no closer than the minimum spacings shown in Figure 43.
4. Follow all local codes and vent pipe manufacturer’s instructions for isolation of vent pipe when passing through floors, ceilings and roofs.
5. Provide flashing and sealing boots sized for the vent pipe and air pipe. Follow all vent pipe manufacturer’s instructions.

Termination and fittings
1. Prepare the vent termination elbow and the air termination elbow (Figure 42, page 34) by inserting bird screens. Bird screens must be purchased separately. See the parts list at the end of this manual for part numbers.
2. The air piping must terminate in a down-turned 180-degree return bend as shown in Figure 42, page 34. The edge of the air inlet elbow must be at least 12 inches above the roof or snow line.
3. The vent piping must terminate in an up-turned coupling as shown in Figure 42, page 34. The top of the coupling must be at least 12 inches above the air intake in order to avoid recirculation of flue products into the combustion air stream.
4. Maintain the required dimensions of the finished termination piping as shown in Figure 42, page 34.
5. Do not extend exposed vent pipe outside of building more than shown in this document. Condensate could freeze and block vent pipe.

Also maintain maximum distances between the vent and air pipes for each boiler as shown in Figure 31, page 28.
DIRECT VENT — Vertical concentric

**Allowable vent/air pipe materials & lengths**

1. The concentric termination kit must be purchased separately.

   **WARNING** Use only the vent materials and kits listed in Figure 27, page 23. Provide pipe adapters if specified.

2. Locate the termination such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 26, page 22.

3. This termination requires a 45-degree elbow that is not supplied with the termination kit. The maximum vent/air pipe lengths include allowance for this elbow.

   - **Polypropylene** For polypropylene applications, see venting and air piping notes on page 21.
   - **AL29-4C S.S.** For AL29-4C vent pipe applications, see venting and air piping notes on page 21.

**Determine termination location**

Locate the concentric vent/air termination using the following guidelines:

1. The concentric vent/air assembly must terminate as shown in Figure 46, page 37.

2. The termination must comply with the clearances and limitations shown in Figure 28, page 25.

3. Locate the termination so it is not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

4. For Canadian installations, follow requirements of CSA B149.1 or B149.2 Installation Code and a ULC S636 compliant vent kit.

**Multiple vent/air terminations**

1. When terminating multiple boilers, install the concentric vent/air termination assemblies as described in this manual.

   **WARNING** All vent outlets must terminate at the same height to avoid possibility of severe personal injury, death or substantial property damage.

2. Place roof penetrations to obtain minimum clearance of 12 inches between the edges of adjacent vent pipes of other boilers for U.S. installations (see Figure 45).

3. For Canadian installations, provide clearances required by CSA B149.1 or B149.2 Installation Code and a ULC S636 compliant vent kit.

4. The air inlet of a boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent boiler vents.

**Prepare roof penetrations**

1. Roof penetration hole:
   a. Cut a clearance hole to clear the termination outside diameter as prescribed in the kit instructions.
   b. Insert a corrosion resistant metal thimble in the vent pipe hole.

**Figure 44 INSTALLATION SEQUENCE — Concentric vertical**

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**Step 1** Read and follow all instructions in this manual. **DO NOT** proceed with vent/air installation until you have read page 20 through page 26. **Polypropylene** **AL29-4C S.S.** See notices at left and page 21.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected sidewall location.

**Step 3** Make sure the selected vertical termination location complies with Figure 28, page 25. (Multiple boiler concentric terminations must also comply with Figure 45, page 37.)

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required.

**Step 5** Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 6** The concentric termination must be assembled and installed before piping from the boiler to the termination.

**Step 7** Prepare the vertical penetration(s) — assemble the concentric termination kit and secure the penetration components as instructed in this section. Provide the supports indicated and mount the termination assembly. See “Prepare roof penetrations” on page 36 and “Mount concentric termination” on page 37. **Polypropylene** **AL29-4C S.S.** See notices at left and page 21.

**Step 8** Install vent and air piping between the boiler and the concentric vent/air termination. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. See page 27 for general guidelines.

**Step 9** Install pipe supports every 5 feet on both the horizontal and vertical runs. **Polypropylene** **AL29-4C S.S.** See notices at left and page 21.

**Step 10** Install a hanger support within 6 inches of any upturn in the piping. **Polypropylene** **AL29-4C S.S.** See notices at left and page 21.

**WARNING** USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING — **DO NOT** use short radius elbows for vent or air piping. Boiler performance could be affected.
2. Follow all local codes for isolation of vent pipe when passing through floors, ceilings and roofs.
3. Provide flashing and sealing boots sized for the concentric termination outside diameter.

**Mount concentric termination**

1. Assemble the vent termination as described for concentric terminations, on page 40.
2. Mount the termination as shown in Figure 46.
3. Support the concentric vent/air termination at the roof penetration as shown in Figure 46 or per concentric kit instructions.
   - The supports/bracing used must support the termination assembly to prevent vertical slippage or sideways movement.
   - The clamps used on the outside of the termination pipe must not cut into the pipe or contain sharp edges that could cause a crack to form.

**WARNING**
The vent and air piping must be securely supported, and must not rest its weight on the boiler fittings. DO NOT drill or screw into either the vent pipe or air pipe. Failure to properly support the vent and air piping could result in vent piping damage, resulting in possible severe personal injury, death or substantial property damage.

**WARNING**
When inserting the partially-assembled termination kit through the roof penetration, wrap plastic or other protection over the end of the exposed assembly to prevent debris from entering the pipes. If the air passages become blocked, the boiler will not operate. Once the rain cap has been cemented to the assembly, there is no way to correct the problem. The assembly would have to be replaced if it were cut to be removed and cleaned. Altering the assembly in any way could result in severe personal injury or death due to toxic flue product emissions.

**WARNING**
If using AL29-4C stainless vent pipe, use the vent pipe manufacturer’s PVC adapter if connecting to a PVC concentric vent attachment.

**WARNING**
Do not connect any other appliance to the vent pipe or multiple boilers to a common vent pipe.

4. After the assembly has been positioned in the roof opening and all supports have been attached, install a bird screen (purchased separately if not included with the kit) and rain cap as follows:
   a. Place the bird screen on the end of the inner pipe as in Figure 50, page 40, or per kit instructions for polypropylene kits.
   b. Cement the rain cap in place.
DIRECT VENT — Vertical vent /sidewall air

Allowable vent/air pipe materials & lengths

**WARNING** Use only the vent materials and kits listed in Figure 23, page 24. Provide pipe adapters if specified.

1. Locate the terminations such that the total air piping and vent piping from the boiler to the termination will not exceed the maximum length given in Figure 22, page 23.

   - For polypropylene applications, See venting and air piping notes on page 21.
   - For AL29-4C vent pipe applications, See venting and air piping notes on page 21.

2. For 3” to 2” transitions, must use appropriate vent material. For polypropylene or stainless steel must use approved suppliers transitions.

Prepare roof penetration

1. Vent pipe penetration:
   a. Cut a hole for the vent pipe. For either combustible or noncombustible construction, size the vent pipe hole at least 0.4” larger than the vent pipe diameter.
   b. Insert a galvanized metal thimble in the vent pipe hole.

2. Follow all local codes for isolation of vent pipe when passing through floors, ceilings and roofs.

3. Provide flashing and sealing boots sized for the vent pipe and air pipe.

Vent termination and fittings

1. Prepare the vent termination coupling by inserting a bird screen. Bird screens must be purchased separately. See the parts list at the end of this manual for part numbers.

2. Maintain the required dimensions of the finished termination piping as shown in Figure 48.

Multiple vent terminations

1. When terminating multiple ECO Tec boilers, terminate each vent/air connection as described in this section.

2. Place adjacent terminations at least 6 inches apart.

3. For Canadian installations, provide clearances required by Natural Gas and Propane Installation CAN/CSA B149.1 or B149.2 Installation Code.

---

**Step 1** Read and follow all instructions in this manual. **DO NOT proceed with vent/air installation until you have read page 20 through page 26.** See notices at left and page 21.

**Step 2** Install the boiler in a location that allows proper routing of all vent and air piping to the selected locations.

**Step 3** Make sure the selected vertical termination location complies with Figure 28, page 25.

**Step 4** Use only the vent materials listed in Figure 27, page 23. Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in Figure 26, page 22.

**Step 5** Prepare the vertical penetration (vent) and sidewall penetration (air) and secure penetration components as instructed in this section.

**Step 6** The air piping must terminate in a 90-degree **down-turned elbow** as shown above. The vent piping must terminate in a **coupling pointed upward** as shown above.

**Step 7** Install vent and air piping between the boiler and the air and vent terminations. Slope horizontal piping downward toward the boiler at least 1/4 inch per foot. Install pipe supports every 5 feet on both the horizontal and vertical runs. Install a hanger support within 6 inches of any upturn in the piping. See page 39 for general guidelines. Also comply with vent pipe manufacturer’s instructions. See notices at left and page 21.

**Step 8** Insert the vent and air piping through the penetrations and secure the termination fittings.

**Step 9** Maintain clearances shown in this section. Vent and air terminations must be fitted with bird screens as shown.

**WARNING** **USE SWEEP ELBOWS FOR ALL VENT AND AIR PIPING** — **DO NOT** use short radius elbows for vent or air piping. Boiler performance could be affected.
**DIRECT VENT — Vertical vent /sidewall air** (continued)

**Determine location for air inlet elbow**

1. The air inlet of an ECO Tec boiler is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent appliance terminations.
2. Locate the air inlet elbow (termination) using the following guidelines.
3. The air piping must terminate in a down-turned elbow as shown in Figure 49.
   a. Apply the configuration on the left side of Figure 49 unless the terminations would fail to meet minimum clearance to grade or snow line.
   b. Apply the configuration on the right side of Figure 49 when the terminations need to be raised higher to meet clearance to grade or snow line.
   c. The air pipe may run up the side of the building, as shown. The vent and air pipes must be secured with braces, and all clearances and lengths must be maintained. Space braces no further than 24 inches apart.
4. You must consider the surroundings when terminating the air connection:
   a. Make sure there are no obstructions for air flow. DO NOT locate the termination where plants could grow and cause obstruction to air flow.
   b. Do not locate the terminations where wind eddies could affect performance or cause recirculation with exhaust from other appliances, such as inside building corners, near adjacent buildings or surfaces, window wells, stairwells, alcoves, courtyards or other recessed areas.
   c. Locate the air inlet termination at least 12 inches below and 12 inches horizontally from any appliance or building vent outlet.
5. Locate terminations so they are not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

**Multiple air terminations**

1. When terminating multiple ECO Tec boiler air connections, terminate each air connection as described in this manual.
2. Place wall penetrations to obtain minimum clearances as instructed in this manual.
3. Place adjacent air inlets for multiple ECO Tec boilers at least 6 inches apart.
4. For Canadian installations, provide clearances required by Natural Gas and Propane Installation CAN/CSA B149.1 or B149.2 Installation Code.

**Prepare wall penetrations**

1. Air pipe penetration:
   a. Cut a hole for the air pipe. Size the air pipe hole as close as desired to the air pipe outside diameter.
   b. Seal exterior openings thoroughly with exterior caulk.

**Termination and fittings**

1. Prepare the air termination elbow (Figure 49) by inserting a bird screen. Bird screens must be purchased separately. See the parts list at the end of this manual for part numbers.
2. Use metal plates (by installer) at inside and outside penetrations using the method shown in Figure 28, page 29.

**NOTICE** If extending the air pipe out from the wall, install a coupling on each pipe. Mount the piping with the coupling flush with the outer plate.
Concentric termination, typical (sidewall or vertical)

**Figure 50** PVC concentric termination assembly — DO NOT attach the rain cap until the termination has been inserted through the roof or wall and all supports have been installed. See LEGEND at right. See kit instructions for details of polypropylene kits.

### Assembling concentric termination

1. Follow all instructions provided with the concentric termination kit. The following are general guidelines for information only.

2. See Figure 50 for the typical assembly of a concentric termination assembly.

3. Prepare the bird screen, Item 4 (purchase separately if not included with the kit). Cut the bird screen to size if required. If the bird screen must be trimmed, cut the bird screen to fit the outside diameter of the PVC inner pipe supplied with the termination kit.

4. Partially assemble the vent termination kit in the sequence shown in Figure 50, or per the concentric kit instructions.

**WARNING** DO NOT install the rain cap and bird screen until the assembly has been inserted through the roof (or sidewall) and all supports have been installed. Follow instructions to cover the end of the assembly with plastic before inserting through the roof penetration to prevent debris from blocking the air passages.

**WARNING** If necessary, you can shorten the lengths of the inner and outer pipes for a shorter finished assembly. But you must ensure the pipes butt correctly at both ends. Failure to properly assemble the concentric termination can result in flue gas recirculation, causing possible severe personal injury or death.

Polypropylene

For polypropylene applications, See venting and air piping notes on page 21.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on page 21.
Install boiler water piping

General piping information
Use piping unions near boiler
We recommend installing 1" NPT piping unions on boiler outlet and return to facilitate future service. Pipe unions are Not included with the boiler.

Additional controls, if required

The control uses temperature sensors to provide both high limit protection and modulating temperature control. The control's high limit function requires manual reset. Some codes/jurisdictions may require additional external controls for high limit protection.

Additional limit controls
Some jurisdictions require an additional high temperature limit. Consult local requirements for other codes/standards to determine if needed.

1. If required, install a manual reset high temperature limit constructed to prevent a temperature setting above 200°F in Boiler In piping between boiler and isolation valve. (Note that the control operating limit function shuts the boiler down at 195°F, or lower if set to a lower value.)

Multi-temperature systems — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits, it is recommended to protect low-temperature circuits with limit controls that are wired to the control external limit circuit terminals. Please note that a combi model installed in a low temperature system is a multi-temperature system.

Low temperature materials — If using temperature-limited materials (such as PEX tubing) in system piping, it is recommended to protect the system with limit controls that are wired to the controls external limit circuit.

2. See instructions beginning on page 58 for wiring information.

3. If using a manual reset limit control or wiring in the manual reset circuit, set control boiler limit at least 20°F less than the external manual reset limit (i.e., set control no higher than 180°F for a 200°F external limit, for example).

Separate low water cutoff

A separate low water cutoff is required. See NOTICE above regarding the inherent protection provided by the Control module. A low water cut-off is to be supplied by the installer.

1. A 3/4" female NPT port is included within the internal boiler piping and it is recommended you install a low water cut off at this location, see Figure 51.

2. Use a low water cutoff designed for water installations. Electrode probe-type is recommended. See Replacement parts section at the end of this manual for the Weil-McLain low water cut-off kit. When using kit, ensure extra wire length is neatly bundled with zip ties and away from internal components.

3. For additional Limit controls wiring, see Field wiring instructions beginning on page 58.

System/zone pipe sizing

For residential space heating applications (other than radiant heating or unit heaters) ONLY, you can use the sizing suggestions in Figure 52.

Separate low water cutoff

1. A separate low water cutoff is required. See NOTICE above regarding the inherent protection provided by the Control module. A low water cut-off is to be supplied by the installer.

2. A 3/4" female NPT port is included within the internal boiler piping and it is recommended you install a low water cut off at this location, see Figure 51.

3. Use a low water cutoff designed for water installations. Electrode probe-type is recommended. See Replacement parts section at the end of this manual for the Weil-McLain low water cut-off kit. When using kit, ensure extra wire length is neatly bundled with zip ties and away from internal components.

4. For additional Limit controls wiring, see Field wiring instructions beginning on page 58.

Backflow preventer

Use backflow preventer in the cold water supply piping if required by local codes.

System/zone pipe sizing
(Boiler Models System header)

For residential space heating applications (other than radiant heating or unit heaters) ONLY, you can use the sizing suggestions in Figure 52.

<table>
<thead>
<tr>
<th>Boiler Models</th>
<th>System header</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/110</td>
<td>1&quot; or larger</td>
</tr>
<tr>
<td>150/199</td>
<td>1 1/4&quot; or larger</td>
</tr>
</tbody>
</table>

Recommendations are based on a 20°F temperature drop through the system.

<table>
<thead>
<tr>
<th>Copper pipe and baseboard size</th>
<th>Maximum recommended feet of baseboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>67</td>
</tr>
<tr>
<td>1&quot;</td>
<td>104</td>
</tr>
</tbody>
</table>

Size zone circulators to handle the required flow and head loss for each zone.
Install boiler water piping (continued)

General Piping Information

Figure 53  Head Loss through Boiler – Tables 4 and 5

<table>
<thead>
<tr>
<th>Table 4</th>
<th>ECO Tec Heat Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rate (GPM)</td>
<td>80/110 HO</td>
</tr>
<tr>
<td>Head Loss (ft. w.c.)</td>
<td>Head Loss (ft. w.c.)</td>
</tr>
<tr>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>8</td>
<td>2.2</td>
</tr>
<tr>
<td>10</td>
<td>3.4</td>
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<tr>
<td>12</td>
<td>4.5</td>
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<td>14</td>
<td>--</td>
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<td>16</td>
<td>--</td>
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<td>18</td>
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<td>20</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5</th>
<th>ECO Tec Combi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rate (GPM)</td>
<td>80/110 C</td>
</tr>
<tr>
<td>Head Loss (ft. w.c.)</td>
<td>Head Loss (ft. w.c.)</td>
</tr>
<tr>
<td>4</td>
<td>0.2</td>
</tr>
<tr>
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<td>1.6</td>
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<td>16</td>
<td>--</td>
</tr>
<tr>
<td>18</td>
<td>--</td>
</tr>
<tr>
<td>20</td>
<td>--</td>
</tr>
</tbody>
</table>

Internal Circulator

This boiler is equipped with an internally installed Taco 0015e3 boiler circulator. In some piping systems, this circulator will provide enough head for a direct connect system. See instructions starting on page 46 for Direct Connect System Piping. In all other cases, this circulator will provide the proper boiler flow for a primary/secondary system piping. See instructions starting on page 50 for Primary/Secondary System Piping.

The Taco 0015e3 is a variable speed, high-efficiency wet rotor circulator with an ECM permanent magnet motor that has three different positions: LOW, MEDIUM, and HIGH. This circulator comes set at HIGH. This is the ideal setting for this boiler in most cases. In some installations, the speed can be reduced, if the boiler temperature rise is smaller than the desired rise at the boiler’s maximum input.

<table>
<thead>
<tr>
<th>LED COLOR</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORANGE</td>
<td>CIRCULATOR ON</td>
</tr>
<tr>
<td>FLASHING WHITE</td>
<td>AIR BOUND OR CAVITATION</td>
</tr>
<tr>
<td>RED</td>
<td>BLOCKED</td>
</tr>
<tr>
<td>OFF</td>
<td>CIRCULATOR OFF</td>
</tr>
</tbody>
</table>
Install boiler water piping (continued)

Domestic Water Piping – Combi Boiler

**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.

If the boiler piping system is connected to heating coils located in air handling units where there may be exposed to refrigerated air circulation then it must be equipped with flow control valves or other automatic devices to prevent gravity circulation of the boiler water during the cooling cycle.

To pipe DHW, see Figure 54, page 44.

1. Size piping for DHW inlet and outlet is 3/4” NPT.
2. In hard water areas – To prevent the formation of scale on the inside of the plate DHW heat exchanger and other components in the domestic hot water system, water with hardness higher than 50 ppm Calcium Carbonate must be treated with a “Water Softener” prior to entering the boiler. Plugging of the domestic system by scaling or accumulation of dirt is not the responsibility of Weil-McLain, and suitable steps must be taken to avoid it.
3. The maximum domestic water pressure rating is 150 PSI for all combi models, on the domestic pipes and internal components.
4. A field supplied pressure relief valve that complies with the standard for relief valves and automatic gas shut-off devices for Hot Water Supply Systems, ANSI Z21.221 CSA4.4 - latest edition, is required to be installed at the supply DHW connection. This pressure relief valve should be capable of at least the Maximum input of the boiler model and Maximum pressure Not exceeding 150 PSIG. The pressure relief valve’s discharge should be per instructions in the Warning box, page 48. DO NOT place any other type valve or shut-off device between the relief valve and the boiler. The pressure relief valve must be manually checked once a year to verify correct operation, 110 MBH, 150 MBH or 199 MBH, depending on the boiler model).
5. Thermostatic Mixing Valve - An ASSE 1070 automatic mixing valve for regulating domestic heating water must be used to regulate the water temperature leaving the plate heat exchanger. NOTE: the valve must be set to supply a domestic water temperature of not more than 120 degrees F. It is the responsibility of the installer to set the valve and remove or lock the dial depending on valve capabilities.
6. Additional anti-scald devices may be installed at each hot water faucet, bath and shower outlet.
7. DHW Filter (Installer Supplied): It is recommend to install a 25 micron or lower domestic water filter in the cold water line which feeds into the combi boiler for domestic hot water production. This filter will protect the DHW flow sensor and prolong the time between cleaning and overall life of the brazed plate heat exchanger and flow sensor. In harsh water conditions a finer filter and/or water softener may be required. Consult your local water quality professional.
8. Drain and Isolation Valves - Install drain and isolation valves on the inlet and outlet of the DHW connections so that the DHW heat exchanger can be flushed and cleaned from possible build-up caused by dirty or hard water, which is a maintenance requirement. See page 52 for Weil-McLain’s DHW Service Valve Kit installation and Figure 125, page 137 for kit part number.
9. Cleaning – refer to the installation manual maintenance section for the proper cleaning procedure for the plate DHW heat exchanger, and the required cleaning frequency.

**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.

**CAUTION** This boiler is NOT intended for connection with a refrigeration system.
Install boiler water piping (continued)

Recirculation (if used)

**NOTICE** Massachusetts code applications require recirculation piping or heat-traced piping if the distance from the water heater to the furthest fixture exceeds 100 feet.

Other jurisdictions may also require. Check local codes.

Maintaining domestic water temperature in the supply piping

1. Recirculation is used to reduce wait time for water use, to minimize hot water and energy waste caused during the waiting period, and to prevent degradation of the Boiler In water temperature. ASPE recommends recirculation when the distance from the water heater to the furthest fixture exceeds 100 feet or the time lag for hot water to reach a fixture(s) exceeds 30 seconds.

Recirculation pump (Figure 55, page 45, Item 8)

1. Circulator size must achieve a flow rate of 0.5 GPM or greater to activate the boiler, the thermostatic mixing valve will vary the flow rate through the boiler and must be considered when sizing the circulator.
2. Minimum flow rates of the thermostatic mixing valve must be maintained.
3. The circulator cannot run continuously as bypass through the anti-scald mixing valve will eventually allow the water temperature in the piping to climb to the water heater temperature during draw periods, (heating performance would be reduced based off of priority switching and priority timers).
4. An aquastat, timer, or occupancy sensor must be used with recirculation pump to prevent continuous flow. Some recirculation pumps may have smart controls that are suitable as well.
5. See Figure 55, page 45 for recommend recirculation pump piping diagram. This piping strategy is for a dedicated DHW return pipe.

Aquastat (Figure 55, page 45, Item 9)

1. An Aquastat is recommended to be used when a recirculation pump is installed. The aquastat is used to control the on-off position of the recirculating circulator. Aquastat is set 5° to 10° lower than mixed water outlet of the anti-scald mixing valve (Item 7).
2. A timer may be used in addition to the aquastat to limit the time of day recirculation is used.

**WARNING** Domestic water supplied to fixtures that could pose an injury hazard due to high temperature, such as showers and faucets, should be equipped with a temperature regulating device, such as an anti-scald mixing valve.

Check valves (Figure 55, page 45, Item 4)

1. Assure the flow of water in one direction.
2. Each check valve functions as follows:
   a. Prevent bypass in the event of pressure drop.
   b. Prevents thermal siphoning of hot water to the cold water supply.
   c. Prevents flow of cold water to the tempered water supply.
   A draw of tempered water will not result in flow of cold water into the return loop.
Install boiler water piping (continued)

Figure 55 Recirculation piping diagram (if used)

1. Combi boiler
2. Union
3. Drain/Purge valve
4. Spring check valve
5. Relief valve (150 PSIG)
6. Isolation valve
7. Three way mixing valve
8. Circulator
9. Aquastat
10. Thermal expansion tank (see Expansion tank warning below).

Expansion tank (Figure 55, Item 10)

**WARNING**

**THERMAL EXPANSION TANK** — If a backflow preventer, check valve, or pressure reducing valve is piped on cold water inlet of water heater, you must install an expansion tank on cold water supply line to prevent normal thermal expansion from repeatedly forcing open T&P relief valve.

The T&P relief valve is not intended for constant duty, such as relief of pressure due to repeated normal system expansion. Refer to expansion tank manufacturer’s instructions for proper sizing.

Failure to comply could result in severe personal injury, death or substantial property damage.
Direct Connect System Piping - Single Boiler System

80/110/150 Boilers only

System water piping methods

Direct connection piping to boiler

It is recommended, but not required, to use primary/secondary piping to the boiler. Using primary/secondary piping will provide the most accurate desired system heating temperature.

Installations using direct connection piping layout should:

1. Read the NOTICES and guidelines beginning on page 46 to determine if the system is eligible for this piping strategy.
2. If eligible, reference suggested piping layouts on pages 47 and 48.
3. Use primary/secondary piping if system ineligible.

Primary/secondary piping to boiler

Using primary/secondary piping will provide the most accurate desired system heating temperature. Reference suggested piping layouts on pages 50-55.

Some installations can be piped in numerous other ways that will work equally as well as the suggestions here.

Verify the application will work:

Direct connect will only work with the ECO Tec 80/110/150 models.

The minimum temperature rise across the heat exchanger is 20°F during high fire operation. The factory installed circulator will provide between a 20° and 35°F temperature rise across the heat exchanger depending on boiler model (System head loss must be less than what is listed in Table 6, page 47). If the temperature drop across the heat exchanger is lower than 20°F during high fire, the flow rate will need to be reduced until 20° is achieved.

Systems zoning with circulators must use primary/secondary piping layout using guidelines starting on page 50.

Verify that the internal circulator will provide enough head to the system, see Table 6, page 47.

If the internal circulator will not provide enough head for the system, then direct connect piping can not be used. The system will have to be set up for primary/secondary piping (see page 50).

Check system flow rate

1. To determine whether direct connection will provide suitable flow for the intended application
2. The minimum temperature rise across the heat exchanger is 20°F during high fire operation. Using flow rates higher than the maximum is NOT RECOMMENDED. The factory installed circulator will provide the temperature rise given in Table 2, page 47 during high fire operation if the system head matches the corresponding table value.
3. Design zoning to ensure minimum flow rate is maintained under any call for heat condition that could see full input rate (High Fire).

Use a primary/secondary piping layout if the total flow through the heat exchanger will be higher than the maximum.

Any system zoned with zone valves must include a by-pass pressure regulator. Failure to comply may reduce pump life.

Boiler circulators

The boiler circulator is factory-installed in the boiler. DO NOT remove or relocate the boiler circulator. The boiler circulator is selected to ensure adequate flow through the boiler.

Failure to comply could result in unreliable performance and nuisance shut downs from insufficient flow.

If replacing included circulator with a replacement Taco model, replace only with Taco Model 0015e3 circulator. Set to Max.

Expansion tank location

Figure 56 and Figure 58 show typical installation of the system expansion tank. It is highly recommended that you locate the air separator and expansion tank as shown in the suggested piping drawings on page 47 and page 48.

Ensure that the expansion tank size will handle boiler and system water volume and temperature. See tank manufacturer’s instructions and ratings for details. Additional tanks may be added to the system if needed to handle the expansion. These tanks may be installed by connecting to tees in the system piping.

Undersized expansion tanks cause system water to be lost from the relief valve and makeup water to be added through the fill valve. Eventual boiler failure can result due to excessive make-up water addition. Always locate the cold-water fill connection at the expansion tank. Never locate this elsewhere.

Diaphragm- or bladder-type tank:

Refer to Figure 56 for suggested piping when using a diaphragm- or bladder-type expansion tank.

Install an automatic air vent on top of the air separator, per separator manufacturer’s instructions.

Diaphragm- or bladder-type expansion tank—Calculated cold fill pressure should equal tank air charge pressure. Always check pressure and charge tank with tank removed from system to be sure reading is accurate. Boiler relief valve is set for 30 PSIG. Operating pressure of system, after temperature expansion above cold fill pressure, should not exceed 24 PSIG to avoid weeping of relief valve.
Direct Connect System Piping - Single Boiler System

80/110/150 Boilers only

Closed-type expansion tank:

⚠️ CAUTION ⚠️
DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic air vent or if an automatic air vent is incorporated into the system piping.

Figure 56 shows suggested piping when using a closed-type expansion tank, in which the air is directly in contact with tank water.

Connect piping (½” or ¾”) from the air separator outlet to the tank fitting. Slope any horizontal piping a minimum of 1 inch per 5 feet of horizontal pipe.

Always use a tank fitting such as the B&G Tank-trol or Taco Taco-trol (shown). The fitting reduces gravity flow of water in the piping to the tank, avoids air bubbling through the tank water, and provides the proper fill height in the tank.

⚠️ CAUTION ⚠️
Correct all leaks in the system or tank piping. Leaks allow air to escape from the system and will cause water-logging of the tank. This will result in water loss through the boiler relief valve due to over-pressurization.

NEVER use an automatic air vent in a system equipped with a closed-type expansion tank. The air removed from the system will cause water-logging of the expansion tank.

NOTICE
Closed-type expansion tank—Follow tank manufacturer’s instructions for filling the tank. Typical tank sizing provides for approximately 12 PSIG when the tank is filled to the normal level and system water is cold. Note that boiler relief valve is set for 30 PSIG. Operation pressure of system, after temperature expansion above cold fill pressure, should not exceed 24 PSIG to avoid weeping of relieve valve.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Boiler Pump Head available to system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>ECO Tec</strong></td>
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<tr>
<td></td>
<td><strong>80-H</strong></td>
</tr>
<tr>
<td>20°</td>
<td></td>
</tr>
<tr>
<td>Ft. w.c.</td>
<td>6.6</td>
</tr>
<tr>
<td>GPM</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Figure 57  Boiler Pump Head available to system
Install relief valve

1. Install relief valve in a 3/4” street elbow along with a 3/4” tee onto the top water pipe – Air elimination/relief valve (Figure 8, page 13).

**WARNING:** Connect the relief valve ONLY on the top boiler pipe, NOT the boiler out. Connect the relief valve only as shown in this manual. Ensure relief valve is located above heat exchanger.

2. Pipe the relief valve only as shown, in the location shown.
3. Connect discharge piping to safe disposal location, following guidelines in the WARNING below.

---

Figure 58 Piping to closed-type expansion tank

- **1** Closed-type expansion tank
- **2** Make-up water supply
- **3** Air separator
- **4** Tank fitting
- **5** Press. & Temp. gauge

---

**To avoid water damage or scalding due to relief valve operation, as per local or state codes:**

- Install relief valve ONLY with the spindle vertical, as shown in illustrations in this manual.
- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the valve discharge. Locate away from the top of the boiler.
- Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6” above the floor drain where any discharge will be clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375 °F or greater.
- Do not pipe the discharge to any place where freezing could occur.
- No shutoff valve shall be installed between the relief valve and boiler, or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the valve after filling and pressurizing system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.
- Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of severe personal injury, death or substantial property damage.
Direct Connect System Piping - Single Boiler System (continued)

80/110/150 Boilers only

ZONE VALVE zoning – direct connection
(Shown with optional DHW piping)
See Figure 59.

1. This configuration is for zone valve systems that qualify to use direct connection piping based on the criteria on page 46 only. If system does not qualify, pipe using primary/secondary piping. See pages 51-55 for piping suggestions and guidelines.

2. Systems zoned with zone valves MUST use a by-pass pressure regulator (Taco 3196 or equivalent – Item 21) unless using modulating type of circulator that has protection against dead heading.

Expansion Tank required
1. Provide a system expansion tank following the guidelines on page 46 or page 48.
2. DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic vent.

Domestic Hot Water (DHW) tank, if used
1. DHW direct connection—Pipe from the near-boiler piping to the DHW tank’s boiler connections as shown.
2. DHW as zone— A DHW tank can be connected as a zone if a DHW tank is NOT already connected to the boiler. See notices on page 149 to ensure compliance with the 2007 Energy Act. See Control section in this manual, page 84 to change TARGET MODULATION SENSOR to System Supply when system sensors are installed.
3. DHW Priority operation— Using Priority 1 for DHW (default) will turn off lower priorities during DHW calls. The MAX ON TIME setting can be adjusted to limit how long this occurs. Use Priority 2 or 3 for DHW if DHW priority is not desired.

NOTICE Overriding the Outdoor Reset function by setting control to DHW mode when system is intended for space heating may violate Section 303 of the 2007 Energy Act. See page 149 for compliance information and exemptions.

Controlling the circulators (Direct Connect only)
1. In a direct connect set-up, by default the internal circulator will turn on for any configured heating call or DHW call.
2. If an Indirect tank is used, as in Figure 59, a secondary circulator will have to be configured to turn on when the indirect tank input is active.

NOTICE Connect zone valve end switches to Priority 2 input.

CAUTION Use isolation relays if connecting 3-wire zone valve end switches to the input.

---

LEGEND for Figure 59.

| Figure 59 ECO Tec 80/110/150 Zone valve zoning direct connection (internal boiler circulator provides flow for system) |

Part number 550-100-260/0520
Primary/Secondary System Piping - Single Boiler System

Expansion tank location

Figure 60 and Figure 61 show typical installation of the system expansion tank. It is highly recommended that you locate the air separator and expansion tank as shown in the suggested piping drawings on pages 53-55.

Ensure that the expansion tank size will handle boiler and system water volume and temperature. See tank manufacturer’s instructions and ratings for details. Additional tanks may be added to the system if needed to handle the expansion. These tanks may be installed by connecting to tees in the system piping.

⚠️ CAUTION Undersized expansion tanks cause system water to be lost from the relief valve and makeup water to be added through the fill valve. Eventual boiler failure can result due to excessive make-up water addition. Always locate the cold-water fill connection at the expansion tank. Never locate this elsewhere.

Diaphragm- or bladder-type tank:

Refer to Figure 60 for suggested piping when using a diaphragm- or bladder-type expansion tank.

⚠️ NOTICE Diaphragm- or bladder-type expansion tank—Calculated cold fill pressure should equal tank air charge pressure. Always check pressure and charge tank with tank removed from system to be sure reading is accurate. Boiler relief valve is set for 30 PSIG. Operating pressure of system, after temperature expansion above cold fill pressure, should not exceed 24 PSIG to avoid weeping of relief valve.

Install an automatic air vent on top of the air separator, per separator manufacturer’s instructions.

Closed-type expansion tank

⚠️ CAUTION DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic air vent or if an automatic air vent is incorporated into the system piping.

Figure 61, page 51 shows suggested piping when using a closed-type expansion tank, in which the air is directly in contact with tank water.

Connect piping (½" or ¾") from the air separator outlet to the tank fitting. Slope any horizontal piping a minimum of 1 inch per 5 feet of horizontal pipe. Always use a tank fitting such as the B&G Tank-trol or Taco Taco-trol. The fitting reduces gravity flow of water in the piping to the tank, avoids air bubbling through the tank water, and provides the proper fill height in the tank. Continued on next page.
Primary/Secondary System Piping - Single Boiler System (continued)

**CAUTION**
Correct all leaks in the system or tank piping. Leaks allow air to escape from the system and will cause water-logging of the tank. This will result in water loss through the boiler relief valve due to over-pressurization. **NEVER** use an automatic air vent in a system equipped with a closed-type expansion tank. The air removed from the system will cause water-logging of the expansion tank.

**NOTICE**
Closed-type expansion tank—Follow tank manufacturer’s instructions for filling the tank. Typical tank sizing provides for approximately 12 PSIG when the tank is filled to the normal level and system water is cold. Note that boiler relief valve is set for 30 PSIG. Operation pressure of system, after temperature expansion above cold fill pressure, should not exceed 24 PSIG to avoid weeping of relieve valve.

**Install relief valve**

1. Install relief valve in a 3/4” street elbow along with a 3/4” tee onto the top water pipe – Air elimination/relief valve (Figure 8, page 13).

**WARNING**
Connect the relief valve **ONLY** on the **top** boiler pipe, **NOT** the boiler out. Connect the relief valve only as shown in this manual. Ensure relief valve is located above heat exchanger.

2. Pipe the relief valve only as shown, in the location shown.
3. Connect discharge piping to safe disposal location, following guidelines in the **WARNING** below.

**WARNING**
To avoid water damage or scalding due to relief valve operation, as per local or state codes:

- Install relief valve **ONLY** with the spindle vertical, as shown in illustrations in this manual.
- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the valve discharge. Locate away from the top of the boiler.
- Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6” above the floor drain where any discharge will be clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375°F or greater.
- Do not pipe the discharge to any place where freezing could occur.
- No shutoff valve shall be installed between the relief valve and boiler, or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the valve after filling and pressurizing system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.
- Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of severe personal injury, death or substantial property damage.
Primary/Secondary System Piping - Single Boiler System (continued)

System water piping methods

Near boiler piping
Connect boiler to system only as shown in Figure 60, page 50 and Figure 61, page 51. The primary/secondary piping shown ensures the boiler loop will have sufficient flow.

Boiler circulator
The boiler circulator is factory-installed in the boiler as shown in this manual. The boiler circulator is selected to ensure adequate flow through the boiler loop.

**WARNING:** DO NOT relocate or use the boiler circulator in any way other than the ones shown in this manual.

Failure to comply could result in unreliable performance and nuisance shut downs from insufficient flow.

System circulators and zone circulators
Install a system circulator or zone circulators as shown in the piping diagrams in the Primary/Secondary System Piping section in this manual. These circulators must be supplied by the installer.

System or zone circulators flow rates
Size circulators based on the flow rate required to achieve the temperature change you needed. You can closely estimate temperature rise (or drop) through a circuit by using the following formula, where \( TD \) is temperature rise (or drop), \( FLOW \) is flow rate (in gpm), and \( BTUH \) is the heat load for the circuit:

\[
FLOW = \frac{BTUH}{TD \times 500}
\]

**Examples:**
1. Consider a system loop for a system with total heating load equal to 210,000 Btuh. The desired temperature drop through the system piping is 20°F. Then the required flow rate is:

\[
FLOW = \frac{199,000}{20 \times 500} = 20 \text{ gpm}
\]

**Simplified:**
For 20° temperature drop, \( FLOW = \text{MBH} / 10 \).

System or zone circulator head requirement
1. The circulator must be capable of delivering the required flow against the head loss that will occur in the piping.
2. Determine the pipe size needed and the resultant head loss using accepted engineering methods.

Figure 62 Easy Up Manifold and DHW Service Valves options

1. The ECO Tec Easy Up Manifold comes as a separate kit. See Miscellaneous service parts and kits section at the end of this manual for ordering information.
2. See separate instructions for the ECO Tec Easy Up Manifold Weil-McLain website for suggested guidelines to determine how to use and setup.

1. The ECO Tec DHW Service Valves comes as a separate kit, as well. See Miscellaneous service parts and kits section at the end of this manual for ordering information.
2. See separate instructions for the ECO Tec DHW Service Valves Weil-McLain website for suggested guidelines to determine how to use and setup.
Primary/Secondary System Piping - Single Boiler System (continued)

ZONE VALVE zoning – primary/secondary
(Shown with optional DHW piping)  See Figure 63.
1. This configuration is for zone valve systems using a boiler loop connected as a secondary circuit off of a primary system loop. Systems whose flow characteristics do not comply with those listed in Direct Connect System Piping must pipe the boiler loop as a secondary circuit as shown.
2. Systems zoned with zone valves MUST use a by-pass pressure regulator (Taco 3196 or equivalent – Item 21) unless using modulating type of circulator that has protection against dead heading.
3. Install a system circulator (supplied by installer) capable of delivering the proper flow and head as shown.

Expansion Tank required
1. Provide a system expansion tank following the guidelines on page 50 or 51.
2. DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic vent.

Domestic Hot Water (DHW) tank, if used
1. DHW direct connection—Pipe from the near-boiler piping to the DHW tank’s boiler connections as shown.
2. DHW as zone—A DHW tank can be connected as a zone if a DHW tank is NOT already connected to the boiler. See notices on page 149 to ensure compliance with the 2007 Energy Act. See Control section in this manual, page 84 to change TARGET MODULATION SENSOR to System Supply when system sensors are installed.
3. DHW Priority operation—Using Priority 1 for DHW (default) will turn off lower priorities during DHW calls. The MAX ON TIME setting can be adjusted to limit how long this occurs. Use Priority 2 or 3 for DHW if DHW priority is not desired. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.

Overriding the Outdoor Reset function by setting control to DHW mode when system is intended for space heating may violate Section 303 of the 2007 Energy Act. See page 149 for compliance information and exemptions.

Controlling the circulators
1. The Control, for Heat only models, can control up to five circulators (boiler circulator and four others.) For Combi models, the control can control up to three circulators (boiler circulator and two others.) Refer to Field wiring, beginning on page 58, for instructions on wiring to circulators.
2. The factory default settings are not configured. Each input correlates to its respective circulator output. For DHW Priority applications, wire aquastat to Input 1 and assign to Priority 1.
3. The boiler and zone valves can also be operated by an external zone valve controller or an equivalent wiring strategy. Connect zone valve end switches to Priority 2 input. Connect system circulator to Circ. 2 output. Use isolation relays if connecting 3-wire zone valve end switches to the input.

LEGEND for Figure 63.

Legend:

1. ECO Tec boiler
2. Indirect Water Heater, if used
3. Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see page 13 for information
4. Relief valve piping to drain — see page 51
5. DHW circulator
6. Isolation valves
7. System circulator
8. Expansion tank, diaphragm type, if used
9. Air separator
10. Spring check valves
11. Purge/drain valves (one drain valve shipped loose with boiler)
12. Auto air vent
13. Zone valves
14. Primary/secondary connection (sees no more than 12 inches apart)
15. Expansion tank, closed type, if used (some chiller systems may use a diaphragm-type expansion tank)
16. Water chiller
17. Check valve
18. Y-strainer
19. Balancing valve
20. Make-up water supply – Use applicable codes to determine if backflow preventers, pressure reducing valves, and fill valves may be required
21. By-pass pressure regulator, REQUIRED for zone valve systems unless other provision is made
22. High limit temperature control (If used)
23. DHW tank boiler water supply connection, when used
24. Zone circulator
25. DHW tank boiler water return connection, when used
26. Pressure/temperature gauge, supplied with boiler, field piped
27. Heating circuits
28. Additional heating circuits, if any

Note: This is a common legend for all piping diagrams. Not all items listed appear in every figure.
Primary/Secondary System piping (continued)

**Circulator zoning – primary/secondary (Shown with optional DHW piping)**

See Figure 64.

1. This configuration is for circulator-zoned systems using a boiler loop connected as a secondary circuit off of a primary system loop. Systems zoned with circulators must pipe the boiler loop as a secondary circuit as shown.

2. Install a separate circulator (supplied by installer) for each zone capable of delivering the proper flow and head as shown.

**Expansion Tank required**

1. Provide a system expansion tank following the guidelines on page 50 or 51.

2. **DO NOT** use a closed-type tank if connecting to a water heater that is equipped with an automatic vent.

**Domestic Hot Water (DHW) tank, if used**

1. DHW direct connection—Pipe from the near-boiler piping to the DHW tank’s boiler connections as shown.

2. DHW as zone—A DHW tank can be connected as a zone if a DHW tank is **NOT** already connected to the boiler. See notices on page 149 to ensure compliance with the 2007 Energy Act. See Control section in this manual, page 84 to change TARGET MODULATION SENSOR to System Supply when system sensors are installed.

3. DHW Priority operation—Using Priority 1 for DHW (default) will turn off lower priorities during DHW calls. The MAX ON TIME setting can be adjusted to limit how long this occurs. Use Priority 2 or 3 for DHW if DHW priority is not desired. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.

**NOTICE**

Overriding the Outdoor Reset function by setting control to DHW mode when system is intended for space heating may violate Section 303 of the 2007 Energy Act. See page 149 for compliance information and exemptions.

**Controlling the circulators**

1. The Control, for Heat only models, can control up to five circulators (boiler circulator and four others.) For Combi models, the control can control up to three circulators (boiler circulator and two others.) Refer to Field wiring, beginning on page 58, for instructions on wiring to circulators.

2. The factory default settings are not configured. Each input correlates to its respective circulator output. For DHW applications, wire aquastat to Input 1 and assign to Priority 1. See Field wiring instructions, beginning on page 58, for details. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.

3. For more than 4-zones (Heat only models) or 2-zones (Combi only models), use an external zone controller.

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**LEGEND for Figure 64 and Figure 65.**

**Note:** This is a common legend for all piping diagrams. Not all items listed appear in every figure.

| 1 | ECO Tec boiler |
| 2 | Indirect Water Heater, if used |
| 3 | Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see page 13 for information |
| 4 | Relief valve piping to drain — see page 51 |
| 5 | DHW circulator |
| 6 | Isolation valves |
| 7 | System circulator |
| 8 | Expansion tank, diaphragm type, if used |
| 9 | Air separator |
| 10 | Spring check valves |
| 11 | Purge/drain valves (one drain valve shipped loose with boiler) |
| 12 | Auto air vent |
| 13 | Zone valves |
| 14 | Primary/secondary connection (tees no more than 12 inches apart) |
| 15 | Expansion tank, closed type, if used (some chiller systems may use a diaphragm-type expansion tank) |
| 16 | Water chiller |
| 17 | Check valve |
| 18 | Y-strainer |
| 19 | Balancing valve |
| 20 | Make-up water supply – Use applicable codes to determine if backflow preventers, pressure reducing valves, and fill valves may be required |
| 21 | By-pass pressure regulator, REQUIRED for zone valve systems unless other provision is made |
| 22 | High limit temperature control (If used) |
| 23 | DHW tank boiler water supply connection, when used |
| 24 | Zone circulator |
| 25 | DHW tank boiler water return connection, when used |
| 26 | Pressure/temperature gauge, supplied with boiler, field piped |
| 27 | Heating circuits |
| 28 | Additional heating circuits, if any |
Primary/Secondary System piping (continued)

Circulator zoning – Multiple temperature zones with primary/secondary
(Shown with optional DHW piping)

See Figure 65.
1. This configuration is for circulator-zoned systems with high- and low-temperature heating zones using a boiler loop connected as a secondary circuit off of a primary system loop. Systems zoned with circulators must pipe the boiler loop as a secondary circuit as shown.
2. Install a separate circulator (supplied by installer) for each zone capable of delivering the proper flow and head as shown.

Expansion Tank required
1. Provide a system expansion tank following the guidelines on page 50 or 51.
2. DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic vent.

System setup and settings
1. Hi-temp emitters may be baseboards, radiators, fan coils, or heat exchangers.
2. Add a mixing device (Figure 65, Item 30) to help ensure supply water temperature will not exceed the maximum allowable for the radiant system.
3. Heating zone supply water temperature settings should be selected for the hi-temp zones. The mixing device regulates supply temperature to the lower-temp zones.

Domestic Hot Water (DHW) tank, if used
1. DHW direct connection—Pipe from the near-boiler piping to the DHW tank’s boiler connections as shown.
2. DHW as zone—A DHW tank can be connected as a zone if a DHW tank is NOT already connected to the boiler. See notices on page 149 to ensure compliance with the 2007 Energy Act. See Control section in this manual, page 84 to change TARGET MODULATION SENSOR to System Supply when system sensors are installed.
3. DHW Priority operation—Using Priority 1 for DHW (default) will turn off lower priorities during DHW calls. The MAX ON TIME setting can be adjusted to limit how long this occurs. Use Priority 2 or 3 for DHW if DHW priority is not desired. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.
4. Overriding the Outdoor Reset function by setting control to DHW mode when system is intended for space heating may violate Section 303 of the 2007 Energy Act. See page 149 for compliance information and exemptions.

Controlling the circulators
1. The Control, for Heat only models, can control up to five circulators (boiler circulator and four others.) For Combi models, the control can control up to three circulators (boiler circulator and two others.) Refer to Field wiring, beginning on page 58, for instructions on wiring to circulators.
2. The factory default settings are not configured. Each input correlates to its respective circulator output. For DHW Priority applications, wire aquastat to Input 1 and assign to Priority 1. See Field wiring instructions, beginning on page 58, for details. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.
3. For more than 4-zones (Heat only models) or 2-zones (Combi only models), use an external zone controller. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems.
Install condensate drain line & trap assembly

Prepare condensate drain line assembly

1. Remove the condensate trap kit from the bag assembly.
2. Remove the flexible drain nut (Item 2) and tube gasket ring (Item 3) from the trap kit bag assembly.
3. Slide nut (Item 2) onto end of flexible tube (Item 1).
4. Push the flexible tube gasket ring (Item 3) onto the end of the flexible tube (Item 1) as shown in Figure 66. The tube should extend through the gasket about ¼ inch.
5. Insert the flexible tube and gasket into the drain fitting. When in position, the offset edge of the gasket ring will rest on the shoulder of the drain fitting as shown in Figure 66, detail 4.
6. Secure the flexible tube in place by screwing on the nut, Item 2. Finger tighten securely.

Install the condensate trap assembly

1. Remove pedestal front access panel (if installed as a floor standing boiler), see Figure 67.
2. Slide hose clamp onto condensate outlet tube and hold in place.
3. Slide the trap assembly into the boiler condensate outlet tube. Tighten the hose clamp to secure the condensate trap in place.
4. If floor standing boiler, route hose through slot in side of boiler pedestal.

Condensate drain system

1. Install condensate drain by connecting tubing or PVC pipe to the flexible drain line. Run the drain tubing or piping to a floor drain or condensate pump. The flexible drain line will fit in a ¾” PVC coupling. Run minimum ½” PVC for the piping to drain or condensate pump.

   NOTICE Use materials approved by the authority having jurisdiction. In the absence of other authority, PVC and CPVC pipe must comply with ASTM D1785, F441 or D2665. Cement and primer must comply with ASTM D2564 or F493. For Canada, use CSA or ULC certified PVC or CPVC pipe, fittings and cement.

2. Select a condensate pump (if used) that is approved for use with condensing boilers and furnaces. The pump should have an overflow switch to prevent property damage from condensate spillage. The pump should have a minimum capacity of 2 GPH for the ECO Tec 80, 3 GPH for the ECO Tec 110, 4 GPH for the ECO Tec 150 or 5 GPH for ECO Tec 199.

3. When sizing condensate pumps, make sure to include the total load of all appliances connected to it.

   CAUTION The condensate line must remain unobstructed, allowing free flow of condensate. If condensate is allowed to freeze in the line or if the line is obstructed in any other manor, condensate can exit from the boiler tee, resulting in potential water damage to property.

   NOTICE Condensate from the boiler will be slightly acidic (typically with a pH from 3.2 to 4.5). Install a neutralizing filter when draining into metal pipe and if required by local codes. See Replacement parts section at the end of this manual for the Weil-McLain kit.
Gas piping

Boilers are shipped ready to operate on natural gas ONLY. You must install the propane mixer (venturi) and orifice if the boiler will be connected to propane. See page 14. Failure to comply could result in severe personal injury, death or substantial property damage.

Use two wrenches when tightening gas piping at boiler, using one wrench to prevent the boiler gas line connection from turning. Failure to support the boiler gas connection pipe to prevent it from turning could damage gas line components.

Connecting gas supply piping

1. Remove jacket door and refer to Figure 68 to pipe gas to boiler.
   a. Place a pipe wrench on the gas line inside the jacket when tightening the gas line assembly to the boiler gas connection (Item 1).
   b. Install steel pipe fittings and factory-supplied manual gas shut off valve as shown in Figure 68. All pipe fittings and gas shut-off valve are supplied by the installer.
   c. In Canada — The manual gas shut off valve (Item 2) must be identified by the installer.
2. Use pipe dope compatible with propane gases. Apply sparingly only to male threads of pipe joints so that pipe dope does not block gas flow.
3. Connect gas supply piping to the ½" NPT manual gas shut off valve (Item 2).
4. Support gas piping with hangers, not by boiler or its accessories.
5. Purge all air from gas supply piping.
   a. During any pressure testing at less than 14" (355 mm) w.c., close the gas shutoff valve and disconnect system gas piping. At higher test pressures, disconnect boiler and gas valve from gas supply piping.

Gas pipe sizing

See page 19 for gas line sizing information.

Check gas pressure at inlet to boiler

1. See Figure 93, page 102 for location of the gas inlet pressure test port.
2. For natural gas or propane, the pressure required at gas valve inlet pressure port (verify minimum gas pressure when all gas appliances are in operation):
   a. Maximum: 14" (355 mm) w.c. with no flow (lockup) or with boiler on.
   b. Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire): 3½" (89 mm) w.c.
   c. Nominal propane gas pressure: 11.0" (279 mm) w.c.
   d. Nominal natural gas pressure: 7.0" (178 mm) w.c.
3. Install 100% lockup gas pressure regulator in supply line if inlet pressure can exceed 14" (355 mm) w.c. at any time. Adjust lockup regulator for 14" (355 mm) w.c. maximum.
**Field wiring**

**WARNING** ELECTRICAL SHOCK HAZARD — For your safety, 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.

**NOTICE** Wiring must be NEC Class 1. If original wiring as supplied with boiler must be replaced, use only type 105 °C wire or equivalent. Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition, and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

**NOTICE** The installation must comply with: National Electrical Code and any other national, state, provincial or local codes or regulations. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

**Boiler wiring**

**Connecting terminals**

All low voltage field wiring is made directly to the corresponding terminal blocks on the circuit board. Low voltage, 24VAC, terminals are on the right side and right bottom of the circuit board. Line voltage, pump, and /or AUX, 120VAC, terminal strips are on the bottom of boiler inside the High voltage junction box.

**Wiring overview**

See details on the following pages for the wiring connections outlined below:

**Required wiring connections**

- 120VAC power to boiler; 120VAC power out to boiler circulator and outdoor temperature sensor (unless exempt as described in this manual).
- Low water cut-off

**Connections as needed by systems**

- Thermostat, end switch or other inputs for call for heat.
- System zone circulators, valves, relays, etc. • System circulator, when required.
- System supply and return temperature sensors (strongly recommended for primary/secondary piping systems).

**Optional wiring connections**

- External limits; proof-of-closure interlocks (combustion air damper, flow switch, etc.); 0–10VDC for target or modulation control; remote alarm; additional heat demand contact; and communication cables for building management system interface (MODBUS -sold separately).

**Wire entrances** (see next page)

Wire entrance knockouts are provided on the top right, the bottom middle and the bottom right of the boiler cabinet:

1. Line voltage— five (5) knockouts on the bottom middle of the cabinet (Line In, Output 1, 2, 3, 4). Outputs 1&4 not used for combi models

2. Low voltage— three (3) knockouts on the bottom right side of the cabinet and 1 knockout on the top right. (Use one of these knockouts for BMS communication wiring).

**WARNING** Installer MUST use a strain relief through jacket knockouts. Failure to do so can cause severe personal injury, death or substantial property damage.

**WARNING** Installer MUST SEAL all electrical entrances using a sealed strain relief or a strain relief sealed with duct seal putty or silicone. Sealing the entrances prevents the boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other gas appliances. Failure to seal entrances could result in severe personal injury, death or substantial property damage.

**Wire routing in the cabinet** (see next page)

**Line voltage**: (120VAC in, circulator outputs)

1. Line voltage should be wired from the bottom middle electrical entrances going into the High voltage junction box.
2. Strip end of wire no more than 1/4” to avoid exposing uninsulated wire.
3. It is recommended to install an On/Off service switch in a junction box mounted near the boiler. Installation must meet all National and local electrical codes.

**Low voltage**:

1. Mount low voltage wire grommet(s) to desired low voltage knockout(s).
2. Thermostat, aquastat, limit devices, system sensors, 0-10VDC input and outdoor temperature sensor wire pairs should be routed through the grommet(s)/knockout(s).
3. Wires should be connected directly into the corresponding terminal block.
Field wiring (continued)

4. Low water cutoff harness should be routed from location shown in Figure 51, page 41 to control module connection shown in Section G, page 63. Provide strain relief and a seal at cabinet entry if mounted external of the cabinet.

5. Bundle all wires together with provided wire ties. Loop wire tie with bundled wires through wire tie mount and secure mount to control bracket in bottom right mounting hole.

6. After wires and connectors are attached to the control terminal blocks, make sure wires are properly sealed in the cabinet electrical entrances.
Field wiring (see wiring diagram, Figure 70, page 66) (continued)

**NOTICE** Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW (if needed) and Input 3 for Space Heating applications.

### A. 120VAC Power Supply – REQUIRED

#### Terminal Strip T1

1. Provide and install a properly-sized, fused disconnect or service switch as required by applicable codes. (15-amp for most cases.)
   a. Use table at right to determine total load.
2. Connect properly sized 120VAC power wiring to **ECO Tec** boiler line voltage terminal block T1 as shown at right.
3. If possible, provide a surge suppressor in the supply power line. This will reduce the possibilities of control damage due to line surges.
4. Must wire ground to this terminal to provide boiler grounding. Failure to properly ground the boiler can lead to abnormal operation and potential hazards.

<table>
<thead>
<tr>
<th>Determine total load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler &amp; boiler pump</td>
</tr>
<tr>
<td>(combined load)</td>
</tr>
<tr>
<td>2.5 amps</td>
</tr>
<tr>
<td>Output 1 . . . . . .</td>
</tr>
<tr>
<td>(2.2 amps max)</td>
</tr>
<tr>
<td>Output 2 . . . . . .</td>
</tr>
<tr>
<td>(2.2 amps max)</td>
</tr>
<tr>
<td>Output 3 . . . . . .</td>
</tr>
<tr>
<td>(2.2 amps max)</td>
</tr>
<tr>
<td>Output 4 . . . . . .</td>
</tr>
<tr>
<td>(2.2 amps max)</td>
</tr>
<tr>
<td>TOTAL . . . . . .</td>
</tr>
</tbody>
</table>

See Figure 70, page 66 for details

### B. 120VAC Outputs 1, 2, 3 & 4 – As needed for systems

#### Terminal Strip T2 & T3

**Note:** Input/Output 1 & 4 are unassigned/ not available in Combi models.

1. Output 1: (Heat Only) T2: 4, 5, & 6
2. Output 2: T2: 7, 8, & 9
3. Output 3: T3: 10, 11, & 12
5. Maximum load: 2.2 amps (use relay if circulator load is higher). See WARNING below.
6. These four outputs (Output 1, Output 2, Output 3, and Output 4) can provide 120VAC to the following listed below:
   - A zone circulator.
   - A system circulator.
   - A DHW circulator (used to circulate through an indirect tank).
   - An auxiliary Item that must be energized during an input call, such as an air damper.
7. When using inputs/outputs for heat/Indirect DHW demands, each input (Input 1, Input 2, Input 3, and Input 4) controls its respective 120VAC output (Output 1, Output 2, Output 3, and Output 4). Outputs are energized only when BOTH conditions below are met:
   a. The corresponding input indicates a call for heat/ Indirect DHW (i.e. contact closure).
   b. The PRIORITY assigned to the Input/Output pair is ACTIVE (i.e. the zone may be calling but the pump won’t activate unless the boiler is currently running on that system/priority).

**NOTICE** The 3-way valve will operate for Combi models, activating Output 1 for Combi DHW calls, and activating Output 4 for any Space Heating calls.

8. When using the inputs/outputs for the AUX PUMP/OUTPUT function, the output is controlled by selectable conditions set up in the control.
   a. Use the AUX PUMP/OUTPUT function for devices such as system pumps, combustion air dampers, and other auxiliary equipment to activate when the selected condition is met.
   b. See page 91 and page 93 for more information on the setup and selection of operating conditions.

**WARNING** Output circuits are 120VAC. If an output is to operate a low voltage circuit or must be an isolated contact, use an isolation relay.

---

For **Priority Indirect DHW Application:**

The DHW aquastat can be connected to any one of the four (4) input/output pairs for Heat Only models and Inputs 2 or 3 for Combi models. The selected input should be assigned to PRIORITY 1 during the WIZARD setup or manually in the System Settings menu for Heat Only models or Priority 2 for Combi models.

---

**CIRCULATOR POWER** — The maximum allowable current for each circulator is 2.2 amps at 120VAC.

For circulators with higher amp ratings, install a circulator relay or starter. Connect only the 120VAC coil to the circulator terminals.
**Field wiring** (see wiring diagram, Figure 70, page 66) (continued)

**NOTICE** Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW (if needed) and Input 3 for Space Heating applications.

<table>
<thead>
<tr>
<th>Connector J17 (Input 1, 2, &amp;3) &amp; Connector J16 (Input 4, 0-10VDC Input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Input 1 – Connector J17 – 1, 2 &amp; 3 (common)</td>
</tr>
<tr>
<td>2. Input 2 – Connector J17 – 4, 5 &amp; 6 (common)</td>
</tr>
<tr>
<td>3. Input 3 – Connector J17 – 7, 8 &amp; 9 (common)</td>
</tr>
<tr>
<td>4. Input 4 – Connector J16 – 1, 2 &amp; 3 (common)</td>
</tr>
<tr>
<td>5. These four (4) inputs on each boiler can indicate a call for heat to the control by means of a dry contact closure (thermostat, aquastat, or switch). (See right and Figure 70, page 66).</td>
</tr>
<tr>
<td>6. The control provides inputs for up to four demands and up to three systems (priorities).</td>
</tr>
<tr>
<td>7. <strong>For Priority Indirect DHW Application:</strong> The DHW aquastat can be connected to any one of the four (4) input/output pairs for Heating Only models and Inputs 2 or 3 for Combi models. The selected input should be assigned to PRIORITY 1 during the WIZARD setup or manually in the System Settings menu for Heating Only models or Priority 2 for Combi models.</td>
</tr>
<tr>
<td>8. The default control setting uses each input (INPUT 1, INPUT 2, INPUT 3 and INPUT 4) to control its respective 120V AC output (OUTPUT 1, OUTPUT 2, OUTPUT 3 and OUTPUT 4). For Combi models, input 1 and 4 and output 1 and 4 are reserved for Combi calls for heat and 3-way valve operation.</td>
</tr>
</tbody>
</table>

**NOTICE** Use of 0–10VDC input for modulation disables Input 2 T/T input from creating calls for heat. See page 65 for instructions.

An input can be assigned to an AUX PUMP/OUTPUT function to operate a system pump or interlock with a combustion air damper. Inputs assigned for this function cannot be used for heat demand operation. See page 91 and page 93 for more information on the setup and selection of operating conditions.

**WARNING** **Thermostats — DO NOT** supply 24-volt power to the thermostat circuits (Input 1, Input 2, Input 3 and Input 4 in Figure 70, page 66) or attempt to supply 24 volts for any other application. For thermostats that require a continuous 24-volt power source, connect the common wire (“C”) (see Figure 70, page 66). Do NOT exceed total amp draw per thermostat.

**Zone valves** — If using 3-wire zone valves, use relays to provide dry contacts to the Control thermostat connections. The zone valve end switches of 3-wire valves carry 24VAC from the valve.

**Thermostat anticipator setting** — 0.1 amps.
**Field wiring** (see wiring diagram, Figure 70, page 66) (continued)

**NOTICE** Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW (if needed) and Input 3 for Space Heating applications.

---

**D. System supply and return temperature sensors – Recommended when using primary secondary piping design.** Connector J19

1. It is recommended to use two (2) strap-on temperature sensors (separate kit option). Attach one to the system supply piping and the other to the system return piping. For piping larger than 5 inch diameter or nonmetallic piping, using immersion sensors will provide faster response.
2. Locate the supply sensor at least six pipe diameters, but no further than 3 feet, downstream from the boiler connection to the main to ensure adequate mixing.
3. Return sensor – wire between J19 #1 and #2.
5. Thermostat wire can be used to connect these sensors.
6. The Control compares the system return temperature with the system supply temperature.

**NOTICE** It is recommended for all primary/secondary heating systems shown in this manual that the System Supply and Return sensors to be installed for proper control function. System may not properly provide desired temperature if sensors are not installed according to these instructions.

---

**E. Outdoor temperature sensor – REQUIRED unless exempted**

Connector J19

1. The control provides programmable options if using an outdoor temperature sensor. This sensor is supplied with the boiler.
2. **The outdoor sensor must be installed unless specifically exempted in the Energy Act statement on page 149.**
3. Mount the outdoor sensor on an exterior wall, shielded from direct sunlight or flow of heat or cooling from other sources.
4. The wire outlet on the sensor must be oriented DOWN to prevent water entry.
5. Connect the sensor leads to the terminal shown at right and in the wiring diagrams (see Figure 70, page 66). Thermostat wire can be used to connect the sensor.

---

**F. External limits – OPTIONAL**

**To cause MANUAL reset:** Connector J20 #1 & #2

The control will require manual reset after circuit is interrupted.

1. Remove factory-installed jumper and connect isolated contacts of external limits across J20 pins 1 and 2 to cause the control to enter manual reset lockout if the limit circuit opens. The limit must close and the control must be manually reset using the procedure given in this manual. See drawing at right and wiring diagram Figure 70, page 66.

**NOTICE** The control will lockout when a limit in its manual reset circuit opens (J20 pins 1 & 2). The control activates its alarm terminals and shuts the boiler down. An operator (user or technician) must manually reset the control to restart the boiler.
Field wiring  (see wiring diagram, Figure 70, page 66) (continued)

**NOTICE**  Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW (if needed) and Input 3 for Space Heating applications.

<table>
<thead>
<tr>
<th>To cause AUTOMATIC reset: Connector J20 #3 &amp; #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove factory-installed jumper and connect isolated contacts of external limits across J20 pins 3 and 4 to cause the control to shut down the boiler on limit opening, then automatically restart 150 seconds after the limit closes.</td>
</tr>
<tr>
<td>2. See drawing at right and wiring diagram (Figure 70, page 66).</td>
</tr>
</tbody>
</table>

**G. Low water cutoff (LWCO) – Required (Installer Supplied)**

**Connector J21**

1. Install a low water cut-off (required) (see Figure 51, page 41).
2. Wiring Weil-McLain LWCO Kit:
   a. When possible, use the Weil-McLain Low water cut-off kit listed in the back of this manual. It includes a probe-type low water cut-off and provides a simple harness connection for the wiring.
   b. Connect as shown at bottom center in the control wiring diagram (Figure 70, page 66).
3. Wiring another LWCO — must have isolated contact:
   a. Other low water cut-offs can be used with the ECO Tec only if the device uses an isolated contact for the LWCO function.
   b. Connect as shown at bottom right.

**H. Alarm contacts – OPTIONAL**

**Connector J18 #4 & #5**

1. The control’s alarm dry contact (J18, terminals 4 and 5) closes when the boiler enters manual lockout only.
2. Connect these terminals for remote alarm notification.
3. Contact electrical ratings: 24VAC or less; 0.5 amp or less.

**I. Additional heat demand contacts – OPTIONAL**

**Terminal Block J18 #6 & #7**

1. The circuit board can be set to activate another heat source using its additional heat demand dry contacts through terminal block J18 pins 6 & 7.
2. Connect these terminals to call for heat from the other heat source.
3. Contact electrical ratings: 24VAC or less; 0.5 amp or less.
4. Set the control to activate the heat demand contacts as needed.
5. For Additional Heat Demand, refer to setup in Control section for more information.
**J. Proof of closure (flow switch and/or CAD)**

**Jumper on Connector J18**

1. A flow switch or combustion air damper (CAD) interlock can be configured by removing the jumper on connector J18 and wiring components as shown at right and in the wiring diagram (Figure 70, page 66).

2. No control settings are required when using a flow switch.

3. Recommended configuration of the control for a CAD interlock:
   a. Assign INPUT 3 as a AUX PUMP/OUTPUT function.
   b. For the AUX PUMP/OUTPUT operating mode, select local or System Damper for use with CAD Interlock. This ensures the damper will be activated any time the boiler is called on to fire.
   c. OUTPUT 3 will provide 120VAC to the damper motor. Use an isolation relay if damper motor requires another voltage or more than 2.2 amp if using 120VAC.

   *The devices used must provide electrically isolated contacts, because the J18 jumper circuit carries 5 VDC.*

**K. 0–10 VDC Remote TARGET input – OPTIONAL**

**Connector J16 #5 & #6**

1. See illustration at right and Figure 70, page 66 (wiring diagram) for details.

2. Remote target using 0–10VDC input requires a 0–10VDC input signal at J16-5/6 as shown at right.
   a. The input positive connection must be at J16 terminal 6 and the common connection at terminal 5.

3. This illustration also shows how to connect TT or end switch contacts at INPUT 1, INPUT 2, INPUT 3 and INPUT 4.
   a. If a Heat/Indirect DHW demand is required, connect the demand's dry contact to an unused input on the control and its pump/valve to the respective output. Then assign and setup a priority to the input using the Wizard or manually through the contractor menu.
   b. A dry contact heat demand must be applied to one of the inputs in order to initiate a call for heat.

4. The 0–10VDC signal is used to adjust the supply target temperature, using the TARGET ADJUST setting. Set TARGET ADJUST during the WIZARD or manually in the PRIORITY SETTINGS menu for the desired system/priority.
   a. Many options are available for configuring the control. The following is a suggested setup that uses factory default settings as much as possible.
   b. Use PRIORITY 1 for the Indirect DHW heating system when used. This priority’s default values are set for Indirect DHW, direct-piped to the boiler. Verify that settings are suitable for the application, change if needed. Use Priority 2 for Combi models.
   c. Use PRIORITY 2 for the heating systems. Use PRIORITY 3 for Combi models.
      - The factory default settings for PRIORITY 2 or 3 make either priority a good choice for space heating applications. Set PRIORITY 2/3 values to the following:
         - Set TARGET ADJUST value to 0–10V.
         - Set VOLTS FOR MAX TARGET at the voltage that will call for the highest target temperature. Set MAX TARGET TEMP at this temperature.
         - Set VOLTS FOR MIN TARGET at the voltage that will call for the lowest target temperature. Set MIN TARGET TEMP at this temperature.
         - For voltages between VOLTS FOR MAX and VOLTS FOR MIN, the target temperature will range proportionately between MAX TARGET TEMP and MIN TARGET TEMP.

   **NOTE:** The 0–10VDC signal replaces the Outdoor Temp sensor as the target temperature modifier (TARGET ADJUST setting). The control does not control target.

   See Figure 70, page 66 for details.
L. **0–10 VDC Remote MODULATION input – OPTIONAL**

**Connector J16 #5 & #6**

1. See illustration at right and Figure 70, page 66 for details.
2. This illustration also shows how to connect TT or end switch contacts at INPUT 3 and INPUT 4 for other uses.
3. Note that using 0–10VDC input replaces INPUT 2 for generating a heat demand. Do **NOT** wire any input to INPUT 2 as shown at right.
4. Remote modulation requires a 0–10VDC input signal at J16-5/6 as shown at right.
   a. The 0–10VDC input positive connection must be at terminal 6 and common connection at terminal 5.
5. **Control setup:**
   a. Many options are available for configuring the control. The following is a suggested setup that uses factory default settings as much as possible.
   b. If Indirect DHW is required, use PRIORITY 1 to minimize setup steps.
      - Connect the DHW aquastat to INPUT 3, or INPUT 4 and assign the input used to PRIORITY 2.
      - Verify that control settings are suitable for the application, change if necessary.
   c. Use PRIORITY 3 for the system to be remote modulated.
      - The factory default settings for this priority are best suited for space heating.
      - Assign INPUT 2 to the priority chosen. Accept all defaults for INPUT 2 — no changes should be necessary during the WIZARD.
      - After the WIZARD has been completed, go to the SYSTEM SETTINGS – INPUT USAGE menu for INPUT 2. Change SOURCE to 0–10V (default setting is TT1). See page 92 for System Settings menu information.
6. **Operation:**
   a. The boiler comes on at 0.9VDC and turns off at 0.8VDC. 1 VDC = 10% input. 10 VDC = 100% input. These voltage settings are not adjustable.
   b. OUTPUT 2 (120VAC) is activated and deactivated as the heat demand is turned on and off. This output is a good choice to operate the system pump.

**NOTE:** The control can be configured to use either 0–10VDC for target operation (see previous section) or modulation, **but not both.**
Wiring diagram — schematic

Figure 70  Schematic wiring diagram (see Figure 71, page 68 for legend and notes)
TS NOTE

- DO NOT supply 24-volt power to the thermostat circuits. If using 3-wire zone valves, use relays to provide dry contacts to the Control Module thermostat connections.
- For power stealing thermostats: Maximum current for R/W contacts is 87mA. If higher current is needed use C terminal with thermostat.

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>Symbol</th>
<th>Wire Color</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>BK</td>
<td>Red</td>
<td>R</td>
</tr>
<tr>
<td>Blue</td>
<td>BL</td>
<td>Yellow</td>
<td>Y</td>
</tr>
<tr>
<td>White</td>
<td>W</td>
<td>Green</td>
<td>G</td>
</tr>
</tbody>
</table>

Additional heat demand contacts
Alarm contacts
Closure switch
SVDC Ground
Input 1, (See TS Note).
Input 2, (See TS Note).
Input 3, (See TS Note).
Input 4, (See TS Note).

N/C
Wiring diagram — ladder

Figure 71. Ladder wiring diagram (see Figure 70, page 66 for schematic wiring diagram).
Zoning with the ECO Tec Control

**NOTICE** Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW and Input 3 for Spacing Heating applications.

### A. Zoning with CIRCULATORs, suggested applications

**Four space heating zones (no Indirect DHW)** (Heating Only models shown)

1. Review wiring information on page 60 (120VAC outputs) and page 61 (24VAC inputs).
2. The configuration at right uses the four input/output pairs to receive thermostat inputs on J17-1/2, J17-4/5, J17-7/8 and J16-1/2; and circulator outputs as shown.
3. Choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu in the System Settings menu.
4. Use the factory default settings for the system type chosen, or change if needed.

**Three space heating zones plus Indirect DHW piped directly to boiler** (Heating Only models shown)

1. Review wiring information on page 60 (120VAC outputs) and page 61 (24VAC inputs).
2. The configuration at right uses INPUT 3 and 4 for space heating thermostats. INPUT 1 uses the input from a DHW aquastat.
3. System Settings 2, 3 and 4 to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu in the System Settings menu.
4. Assign INPUT 1 to PRIORITY 1, or use INPUT 2 PRIORITY 2 for Combi models.
5. Use the factory default settings for DHW and for the heating system type chosen, or change if needed.
Zoning with the ECO Tec Control (continued)

**NOTICE** Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW and Input 3 for Spacing Heating applications.

### B. Zoning with ZONE VALVES, suggested applications

**Two space heating zones (no Indirect DHW) (Heating Only models shown)**

1. Review wiring information on page 60 (120VAC outputs) and page 61 (24VAC inputs).
2. The configuration at right uses INPUT 2, 3, and 4 for space heating thermostats. INPUT 1 is reserved here for configuring the operation of the system circulator.
3. System Settings 2, 3 and 4 to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu in the System Settings menu.
4. Use the factory default settings for the heating system type chosen, or change if needed.
5. Assign INPUT 1 (Input 2 for Combi models) to AUX PUMP/OUTPUT. Then select INPUTS PRIORITY SETTING when prompted for when to activate the output. This will cause the system pump to run when either of the zones calls for heat. Confirm that Priority 2 RUN AUX PUMP/OUT is set to YES.
6. INPUT 1, J17-1/2, (Input 2, J17-4/5 for Combi models) cannot be used for a wired connection because it is being used in the control setup to run the system circulator.

**WARNING** The system must be equipped with a by-pass pressure regulating valve. Flow can occur with zone valves closed.
ECO Tec control operation

**ECO Tec control overview**
- Control inputs and outputs allow operation of multiple heating circuits (space heating and DHW, for example).
- Up to three priority levels can be set, providing automatic switch-over on demand.
- This manual provides quick set-up information for boiler installations.

**ECO Tec control operation**
- The control responds to signals from the room thermostats, DHW aquastats (if used), boiler sensors (Boiler out, Boiler In, flue temperature), outdoor temperature and system sensors, if used.
- The control automatically adjusts blower speed (and gas flow rate) to match boiler output to space heating and/or DHW heating demand.
- The default control settings provides up to four (4) space heating zones. The control can be easily set up for operation with a DHW zone, with or without domestic priority.

**ECO Tec control WIZARD**
- The Wizard leads through a step-by-step setup procedure designed for the application chosen.
- Context-sensitive help is available to explain the purpose of key setup items.

**ECO Tec control setup**
1. Set control parameters using the WIZARD option provided on initial start-up or manually enter parameters using control menus (see Figure 80, page 87 and following pages for information.)
2. See Express setup instructions beginning on page 78 for basic systems and minimum settings required.

---

**WARNING**
**Boiler Model, Altitude and Fuel Type are critical settings.**
Failure to set correctly could result in severe personal injury, death or substantial property damage.

**Temperature settings** — You must ensure that the control is set for the proper water temperatures for the system. Excessive water temperature can cause significant property damage in some applications.

**Multi-temperature systems** — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits (DHW, finned tube baseboard, etc.), it is recommended to protect low-temperature circuits with limit controls that are wired to an control external limit circuit. Failure to provide regulation can result in substantial property damage.

---

**Control features**
- Color touch-screen display for ease of operation monitoring and troubleshooting.
- Three programmable priority assignments for up to four heat inputs.
- Preset operating parameters for typical heating systems, including target temperatures, reset curves and circulator assignments.
- Integral outdoor reset option, with reset curves matched to the system type selected.
- ModBus communications for external communication and monitoring.
- 0-10VDC input modulation or remote target input.
- Five (5) pump outputs, including 1 internal boiler circulator output.
- Additional heat demand operation to call a second heat source to help supply the energy required for heating.
- Advanced PI response to anticipate system needs.
- Flue temperature modifier to target temperature.
- Modulation based on flue sensor, Boiler In/Boiler out, and DHW sensors.

---

**Figure 72** Control sequence of operation

<table>
<thead>
<tr>
<th>Display status text</th>
<th>Control action (also see Figure 76, page 76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER UP</td>
<td>• Check the boiler model listed on the power-up screen. If it is not correct, turn off the boiler. See page 88 for instructions to change setting.</td>
</tr>
<tr>
<td></td>
<td>• When power is turned on, the screen lists sensors that are detected. If any sensor is not listed, make sure it is connected correctly. Turn off power and restart.</td>
</tr>
<tr>
<td>Standby</td>
<td>• Standby - no calls for heat.</td>
</tr>
<tr>
<td></td>
<td>• Toggles through no calls, 1 dot, 2 dots, then 3 dots while in standby (wrench symbol will show instead if maintenance is needed).</td>
</tr>
<tr>
<td>Blower ON</td>
<td>• Call for heat detected.</td>
</tr>
<tr>
<td></td>
<td>• Display on with BLUE banner (space heating) or PURPLE banner (DHW).</td>
</tr>
<tr>
<td></td>
<td>• Start min/max timers if more than one system is calling - highest priority starts first.</td>
</tr>
<tr>
<td></td>
<td>• Start circulators for this priority setup based upon settings.</td>
</tr>
<tr>
<td></td>
<td>• Calculate target temp — If sensor temp is below target temp, begin firing sequence.</td>
</tr>
<tr>
<td></td>
<td>• Blower to ignition speed for prepurge.</td>
</tr>
<tr>
<td>Ignition</td>
<td>• After prepurge times out, begin ignition cycle.</td>
</tr>
<tr>
<td></td>
<td>• Activate gas valve and ignition spark.</td>
</tr>
<tr>
<td></td>
<td>• Continue ignition spark for ignition period.</td>
</tr>
<tr>
<td></td>
<td>• Turn off spark and use electrode to check for flame signal.</td>
</tr>
<tr>
<td>Space Heating</td>
<td>• Flame detected.</td>
</tr>
<tr>
<td></td>
<td>• Release boiler to modulation.</td>
</tr>
<tr>
<td></td>
<td>• NOTE: If flame is not detected, the gas valve is turned off, blower turns on (postpurge), and control starts cycle again. After 5 failures, the control waits 60 minutes, then tries again.</td>
</tr>
<tr>
<td></td>
<td>• If priority timer times out, switch to next priority and start priority timer.</td>
</tr>
<tr>
<td></td>
<td>• If demand satisfied, go to postpurge.</td>
</tr>
<tr>
<td>DHW Heating</td>
<td>• Flame detected.</td>
</tr>
<tr>
<td></td>
<td>• Release boiler to modulation.</td>
</tr>
<tr>
<td></td>
<td>• NOTE: If flame is not detected, the gas valve is turned off, blower turns on (postpurge), and control starts cycle again. After 5 failures, the control waits 60 minutes, then tries again.</td>
</tr>
<tr>
<td></td>
<td>• If priority timer times out, switch to next priority and start priority timer.</td>
</tr>
<tr>
<td></td>
<td>• If demand satisfied, go to postpurge.</td>
</tr>
<tr>
<td>Blower OFF</td>
<td>• Demand satisfied (temperature reaches target temperature or limit setting).</td>
</tr>
<tr>
<td></td>
<td>• Gas valve off.</td>
</tr>
<tr>
<td></td>
<td>• Blower to ignition speed for postpurge.</td>
</tr>
<tr>
<td></td>
<td>• Return to standby after purge.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>• Display banner turns BLUE, toggling between graphic screen and maintenance screen (occurs if maintenance schedule timer times out).</td>
</tr>
<tr>
<td></td>
<td>• Will show during standby only.</td>
</tr>
<tr>
<td></td>
<td>• Boiler operates as normal.</td>
</tr>
<tr>
<td>Error/fault</td>
<td>• Display banner turns RED due to error or limit event.</td>
</tr>
<tr>
<td>WWSD</td>
<td>• Warm weather shut down - the boiler will not be allowed to fire on space heating if the outdoor temperature is greater than the WWSD setting.</td>
</tr>
<tr>
<td></td>
<td>• DHW operation is not affected by WWSD.</td>
</tr>
</tbody>
</table>
ECO Tec control operation (continued)

- Dual temperature sensors on boiler outlet, DHW outlet and flue, providing redundant protection.
- Boiler is shipped with an outdoor sensor.
- Blower speed modulation to control boiler firing rate.
- Alarm relay on error/fault for use with an audible safety.
- Optional PREHEAT mode – Automatically maintains boiler water temperature to reduce boiler reaction time on Combi domestic hot water (DHW) draws.
- Select the mode of PREHEAT, between Off, Economy and High Performance.
- ECO BOOST – Reacts to homeowner use to recharge boiler water temperature once, if needed to reduce boiler reaction time on subsequent Combi domestic hot water (DHW) draws.
- Select whether or not to use the ECO BOOST feature. If conditions are met, the burner will continue to fire after Combi flow ends to recover temperature within the heat exchanger.
- Blower calibration – allows fine tuning of blower control to reach purge speeds faster, reducing time to heat delivery.

Sequence of operation

Figure 72, page 72 is a summary of the operating sequence for the control.
- The statuses shown appear in the display as the control cycles the boiler. See Figure 76, page 76 for screen shots.
- The display banner will be red if a problem has been detected.

ECO Tec control Priorities & Input/Outputs

- For heating installations with multiple systems, the control uses PRIORITIES to determine the order of operation of the systems. The control’s MAX and MIN time settings determine the maximum and minimum times a system will be operated before being turned off to allow another system to operate. A typical example is DHW priority — heat demand from the DHW system is given preference over space heating, if set to use Priority 1.
- The MAX ON TIME setting controls the maximum time a priority will be allowed to run before switching to a lower priority’s call for heat. The MIN ON TIME setting controls the minimum time a priority will be operated before switching to a higher priority’s call for heat, or the next lower priority.
- Each PRIORITY has its own set of operating parameters. The control prompts the user to select the system type (finned tube baseboard, DHW, etc.) and is factory programmed with parameters suited to each of these system types. The user can also choose CUSTOM to create a system type.
- The 120VAC power output to the boiler circulator is provided by a terminal block located on the boiler’s control board. For each of the priorities, the control can be setup to run the boiler pump or to leave it off.
- Each boiler has four input/output pairs (INPUT/OUTPUT 1, 2, 3 and 4). Control setup prompts the user to assign each of these I/O pairs to a PRIORITY. The control then knows which system (priority) to operate when the input receives a call for heat. On a call for heat to an input, the control closes the corresponding output (120VAC) and begins controlling the boilers according to the setup for the assigned priority.
- When multiple inputs are set up on the same priority, they will run at the same time if the priority and inputs are active.
- Temperature units – Select between using °F or °C.
- Daylight Saving Time – Select whether your boiler will obey Daylight Savings Time for your region.

Setting Up the Boiler

| Step 1 | • DETERMINE input/output needs –
| | • What are the inputs? – Thermostats, remote contacts, end switches, etc.
| | • What does each control’s output need to do? – operate a pump, activate an air louver, etc.
| Step 2 | • Install the boiler following all instructions in the ECO Tec Boiler Manual before proceeding further.
| | • Follow instructions in the Boiler Manual to start up and power the boiler.
| Step 3 | • Connect wiring to the control inputs and outputs to accomplish the purposes set in Step 1.
| Step 4 | • Use the WIZARD (below) or enter control parameters manually (skip Wizard).

ECO Tec control WIZARD

- The Wizard is available on initial setup of the boiler. It leads through a step-by-step setup procedure designed for the application chosen.
- Context-sensitive help is available to explain the purpose of key setup Items.

WIZARD Sequence

| Boiler Settings | • Altitude – WARNING – must be set correctly for proper operation.
| | • WWSD – set outdoor temperature above which space heating will be deactivated.
| | • Fuel (natural gas or propane) – WARNING – must be set correctly for proper operation – control will pause until this value is selected.
| | • Set date and time – important for control diagnostic logging.
| Inputs/ Outputs | • Select the usage of inputs 1, 2, 3 and 4.
| | • Determine usage of outputs 1, 2, 3 and 4 (outputs correspond to inputs).
| Set Priorities | • Assign priorities 1, 2 and 3 to the inputs.
| System Settings | • Set system settings or leave at their defaults.
| System Types | • Specify what system type is connected to each of the four outputs; each system type causes the control to preset operating temperatures.
| Output Activation | • (When applicable) Select when to activate AUX PUMP/OUTPUT – by input, always on, external switch, etc.
| Priority Switching | • Set maximum and minimum timings for priorities.
| Information | • Set installer name and contact information.
| | • Enter install date, maintenance date, etc.
| | • Set automatic maintenance notification timing.
ECO Tec control operation

The control responds to signals from:
- DHW Flow demand.
- Room thermostats.
- DHW aquastats (if used).
- Temperature sensors Boiler Out, Boiler In, flue temperature and when used, outdoor temperature. For optimal performance, it is recommended to install System Supply and Return sensors.
- The control automatically adjusts blower speed (and gas flow rate) to match boiler output to space heating and/or DHW heating demand.
- The control provides four inputs and four outputs (for circulators or auxiliary devices) plus a fifth boiler circulator output.
- Outdoor reset must be used in all applications that are not exempt as described on page 149.
- The outdoor temperature is used for supply temperature reset operation and for the Warm Weather Shut Down (WWSD) option.
- System presets:
  The ECO Tec control provides presets by system type for complete list, see Figure 79, page 85.

DHW Target
Set DHW target to the required Combi DHW water temperature for the application according to design mixing valve.

OUTDOOR TEMP FOR MIN TARGET
1. OUTDOOR TEMP FOR MIN TARGET means the outdoor temperature at which the target temperature reaches its minimum (Min Target Temp).
2. In the examples of Figure 73, this occurs at 70 °F (the factory default).

OUTDOOR TEMP FOR MAX TARGET
1. OUTDOOR TEMP FOR MAX TARGET means the outdoor temperature at which the target temperature reaches its maximum value (Max Target Temp).
2. In the examples of Figure 73, this occurs at 0°F outdoor (the factory default setting).
3. OUTDOOR TEMP FOR MAX TARGET should equal the Outdoor Temp (outdoor design temperature) for the installation's location.

Outdoor reset operation
4. Set desired temperatures for space heating zones.
5. For an explanation of the target temperatures and associated outdoor temperatures, see Figure 73.
6. The temperature settings discussed below are accessed in the priority menu for the applicable system. For detailed explanations of the priority menus, see Figure 82, page 89.

MAX TARGET TEMP
Set Max Target Temp to the required supply water temperature for the system at design maximum heat loss (typically 180°F for finned tube baseboard on new installations).

MIN TARGET TEMP
1. Min Target Temp should equal the desired minimum supply water temperature for the system.
2. This could be set as low as 60°F, which would supply “zero heat” when outdoor temperature is 70°F, because supply water temperature would equal room temperature. See examples in Figure 73.

Remote target operation (0–10VDC input)
1. This function allows a remote analog input to regulate the supply temperature for control operation/modulation. This can be done for any priority.
2. The settings discussed below are accessed in the priority menu for the applicable system. For detailed explanations of the priority menus, see Figure 82, page 89.
3. See Figure 74 for an explanation of target temperature vs voltage when using remote target operation.
4. In the priority menu for the applicable system, select 0-10V for the TARGET ADJUST setting.
5. In the same priority menu, select the VOLTS FOR MIN TARGET and VOLTS FOR MAX TARGET values. VOLTS FOR MIN TARGET sets the voltage value for the desired minimum supply temperature. VOLTS FOR MAX TARGET sets the voltage value for the desired maximum supply temperature.

Remote modulation operation (0–10VDC input)
1. To use 0-10VDC for remote modulation, go to Contractor Menu -> System Settings -> select the appropriate priority. Select Input 1 from System Setting menu, then change Input 1’s source to 0-10V. The priority that is assigned to Input 1 cannot be used by any other Input.
2. The boiler comes on at 0.9VDC and turns off at 0.6VDC. 1 VDC = 10% input. 10VDC = 100% input. These voltage settings are adjustable.
Screen branching options

1. Occurs when a control is powered up after being fully configured.
2. Occurs when a factory-installed control is powered for the first time (applies for new boilers).
3. Occurs when a new control is first powered or when a control is reset to factory defaults; will not be shown on new boilers (because control has been factory tested).

Screens shown above are typical only. Actual screens depend on control settings chosen.
Control settings menus

Figure 76  ECO Tec control display screens and typical navigation

Keyboard: Appears when editing name of inputs/outputs and contractor information.

Navigation controls

Swipe: Slide finger left or right on the screen to navigate forward and backward on applicable screens.
Press: Touch icons on screen to perform specified action.
Scroll: Place finger on slide bar empty space and hold to scroll. Applicable screens can also be swiped up or down to scroll.
Double tap: Applicable on editable parameters. Allows user to enter edit mode by double tapping parameter.

Screens shown above are typical only. Actual screens depend on control settings chosen.
EXPRESS SETUP — Example A

Multi-zone SPACE HEATING (Circulators with circulator relays) | DHW (Direct-piped)

Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage. Incorrect setup or piping can result in severe personal injury, death or substantial property damage. Use primary/secondary piping or equivalent unless system meets requirements on page 46. Verify that the correct system type is selected on the control and that operating temperature settings are suitable for the system. System and structural damage can occur if temperatures are too high.

Purpose
- Space heating with multiple zones.
- Zoning with circulators using circulator relays.
- DHW piped directly to the boiler.
- DHW priority — space heating is disabled during call for heat from water heater.

Control setting notes
- See the table at right for required and optional settings.
- The sequence in the table follows the WIZARD.
- If not using the WIZARD, follow instructions elsewhere in this manual to enter the settings manually.

Circulators and piping

Provide an external relay and external power to any circulator if its load rating exceeds 2.2 amps FLA, 3.6 amps locked rotor, or 16.4 amps in rush.

- Piping must be primary/secondary as shown.
- DHW circulator must be selected to handle the pressure drop through the water heater and piping. DHW circulator supplied by installer.
- For some large indirect water heaters, the required flow rate may require piping the water heater differently.
- The control settings in table at right provide DHW priority — space heating will be discontinued during a call for DHW.
- Zone circulators and relays supplied by installer. For alternate zone wiring using a zone controller, see page 70.

BOILER
- Boiler circulator is installed internally within the boiler.
- Follow all instructions in this manual for piping boiler and system.

Note 1: If DHW is not used, set the USE of INPUT/OUTPUT 1 to NONE. Keep all other wiring as shown at right and follow all settings given above for PRIORITY 2.

Note 2: For Combi models, INPUT/OUTPUT 1 and 4 are NOT used and Priority 1 is assigned to Combi DHW. Use INPUT/OUTPUT 2 and 3 and Priority 2 and 3 for this application.
EXPRESS SETUP — Example A (continued)

Multi-zone SPACE HEATING (Circulators with circulator relays) | DHW (Direct-piped)

PIPING

LEGEND

1. ECO Tec boiler.
2. Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings.
3. Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see Figure 8, page 13 for information.
4. Relief valve piping to drain.
5. DHW circulator.
6. Isolation valves.
7. Expansion tank.
8. Air separator.
9. Flow/check or spring check valves.
11. Return temperature sensor.
12. Supply temperature sensor.
13. Make-up water supply.
14. Unions as needed for service.
15. Return temperature sensor.
17. Zone circulators.
18. Boiler drain valve, supplied with boiler, field piped.
19. Pressure/temperature gauge, supplied with boiler, field piped.
20. Outdoor sensor.
21. 120V AC power to boiler — see page 60.
22. Control module.
23. = Items supplied with boiler — all other items supplied by installer.

LEGEND

1. ECO Tec boiler.
2. Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings.
3. Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see Figure 8, page 13 for information.
4. Relief valve piping to drain.
5. DHW circulator.
6. Isolation valves.
7. Expansion tank.
8. Air separator.
9. Flow/check or spring check valves.
11. Return temperature sensor.
12. Supply temperature sensor.
13. Make-up water supply.
14. Unions as needed for service.
15. Return temperature sensor.
17. Zone circulators.
18. Boiler drain valve, supplied with boiler, field piped.
19. Pressure/temperature gauge, supplied with boiler, field piped.
20. Outdoor sensor.
21. 120V AC power to boiler — see page 60.
22. Control module.
23. = Items supplied with boiler — all other items supplied by installer.
**EXPRESS SETUP — Example B**

**2- or 3- Zone SPACE HEATING (Circulators without circulator relays) | DHW (Direct-piped)**

---

**Control settings**

| BLACK OBLIQUE - VALUE MUST BE SET OR VERIFIED |
| D — DEFAULT ACCEPTABLE; CHANGE ONLY IF DESIRED |

**Boiler settings**

| **Boiler Model** | Verify model number is correct |
| **WwSd Temp** | Default (70 °F) or as required |
| **High Altitude** | Set to YES if above 5,500 feet |

**Input/output 1**

| **What is the use of input/output 1?** | Heat/Dhw demand |
| **What Priority is input #1?** | Select Priority 1 |
| **What System Type is Input/output 1?** | DhW (D) |
| **Target Modulation Sensor** | Boiler Out (D) |
| **Target adjust** | None (D) |
| **Max Target Temp** | D (or change if desired) |
| **Run Boiler Pump?** | Yes (D) |
| **Run Aux pump/output?** | D (not applicable) |

**Input/output 2**

| **What is the use of input/output 2?** | Heat/Dhw demand |
| **What Priority is input #2?** | Priority 2 |
| **What System Type is Input/output 2?** | Select correct system type |
| **Target Modulation Sensor** | Boiler In (D) |
| **Target adjust** | Odt (D) (Outdoor temp sensor must be installed) |
| **Max Target Temp** | D (or change if desired) |
| **Min Target Temp** | D (or change if desired) |
| **Outdoor Temp for Min Target** | D (or change if desired) |
| **Outdoor Temp for Max Target** | D (or change if desired) |
| **Target Boost Time** | D (or change if desired) |
| **Run Boiler Pump?** | Yes (D) |
| **Run Aux Pump/output?** | D (not applicable) |

**Input/output 3**

If Priority 2 is assigned, no further steps are required. If Priority 3 is assigned, repeat the steps from Input/output 2, above.

**Priority switch times:**

| **P1 Max on Time** | D (or change if desired) |
| **P2 Max on Time** | D (or change if desired) |
| **P2 Min on Time** | D (or change if desired) |
| **P3 Min on Time** | D (not applicable) |

**Input/output 4**

If Priority 2 is assigned, no further steps are required. If Priority 3 is assigned, repeat the steps from Input/output 2, above.

**Finish the wizard**

Enter time, date and maintenance information as prompted.

---

**Purpose**

- Space heating with multiple zones.
- Zoning with circulators using control outputs to operate zone circulators (3 zones if space heating only; or 2 space heating zones plus DhW).
- DhW piped directly to the boiler.
- DhW priority — space heating is disabled during call for heat from water heater.

**Control setting notes**

- See the table at right for required and optional settings.
- The sequence in the table follows the WIZARD.
- If not using the WIZARD, follow instructions elsewhere in this manual to enter the settings manually.

---

**Circulators and piping**

**Warning** Provide an external relay and external power to any circulator if its load rating exceeds 2.2 amps FLA, 3.6 amps locked rotor, or 16.4 amps in rush.

- Piping must be primary/secondary as shown.
- DhW circulator must be selected to handle the pressure drop through the water heater and piping. DhW circulator supplied by installer.
- For some large indirect water heaters, the required flow rate may require piping the water heater differently.
- The control settings in table at right provide DhW priority — space heating will be discontinued during a call for DhW.
- Zone circulators supplied by installer. For alternate zone wiring using a zone controller, see page 71.

**Boiler**

- Boiler circulator is installed internally within the boiler.
- Follow all instructions in this manual for piping boiler and system.

---

**Note 1:** If DhW is not used, provide a fourth space heating zone by setting up Input/output 1 exactly the same as Input/output 2. Assign Input/output 1 to Priority 2. Wire the fourth zone thermostat to J17 – 1&2 and its circulator to T2 – 4, 5, 6.
EXPRESS SETUP — EXAMPLE B (continued)
2- or 3- Zone SPACE HEATING (Circulators without circulator relays) | DHW (Direct-piped)

PIPING

LEGEND

1 ECO Tec boiler.
2 Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings.
3 Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see Figure 8, page 13 for information.
4 Relief valve piping to drain.
5 DHW circulator.
6 Isolation valves.
7 Expansion tank.
8 Air separator.
9 Flow/check or spring check valves.
10 Purge/drain valves.
11 = Items supplied with boiler — all other Items supplied by installer.

FIELD WIRING
**EXPRESS SETUP — Example C**

Multi-zone **SPACE HEATING** (Zone valves) | **DHW** (Direct-piped)

---

**Boiler Model, Altitude and Fuel Type are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage. Incorrect setup or piping can result in severe personal injury, death or substantial property damage. Use primary/secondary piping or equivalent unless system meets requirements on page 46. Verify that the correct system type is selected on the control and that operating temperature settings are suitable for the system. System and structural damage can occur if temperatures are too high.

**Purpose**
- Space heating with multiple zones.
- Zoning with zone valves. **DO NOT** use 3-wire zone valves — the voltage on the valve end switch will damage the control. Use only 4-wire zone valves with isolated end switches.
- **DHW** piped directly to the boiler.
- **DHW** priority — space heating is disabled during call for heat from water heater.

**Control setting notes**
- See the table at right for required and optional settings.
- The sequence in the table follows the WIZARD.
- If not using the WIZARD, follow instructions elsewhere in this manual to enter the settings manually.
- The system circulator is wired to OUTPUT 2. It will be activated on any call for heat from a zone valve end switch.

**Circulators and piping**

**WARNING** Provide an external relay and external power to any circulator if its load rating exceeds 2.2 amps FLA, 3.6 amps locked rotor, or 16.4 amps in rush.
- Piping must be primary/secondary as shown.
- **DHW** circulator must be selected to handle the pressure drop through the water heater and piping. **DHW** circulator supplied by installer.
- For some large indirect water heaters, the required flow rate may require piping the water heater differently.
- The control settings in table at right provide **DHW** priority — space heating will be discontinued during a call for **DHW**.
- Zone valves and system circulator supplied by installer. For alternate zone wiring using a zone controller, see page 71.
- A by-pass pressure regulator is recommended when used in a zone valve system as shown in this express setup.

**Boiler**
- **Boiler** circulator is installed internally within the boiler.
- Follow all instructions in this manual for piping boiler and system.

**Note 1:** If **DHW** is **not used**, set the USE of INPUT/OUTPUT 1 to NONE. Keep all other wiring as shown at right and follow all settings given above for **PRIORITY 2**.

**Note 2:** For Combi models, INPUT/OUTPUT 1 and 4 are **NOT** used and Priority 1 is assigned to Combi **DHW**. Use INPUT/OUTPUT 2 and 3 and Priority 2 and 3 for this application.

---

**Control settings**

<table>
<thead>
<tr>
<th>BLACK OBLIQUE - VALUE MUST BE SET OR VERIFIED</th>
<th>D — DEFAULT ACCEPTABLE; CHANGE ONLY IF DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(IN ORDER OF WIZARD SEQUENCES)</strong></td>
<td></td>
</tr>
</tbody>
</table>

**BOILER SETTINGS**

| BOILER MODEL | Verify model number is correct |
| WWSD TEMP | Default (70 °F) or as required |
| HIGH ALTITUDE | Set to YES if above 5,500 feet |

**INPUT/OUTPUT 1 (Assign to PRIORITY 1)**

WHAT IS THE USE OF INPUT/OUTPUT 1? **HEAT/DHW DEMAND**
WHAT PRIORITY IS INPUT #1? **Select PRIORITY 1**
WHAT SYSTEMTYPE IS INPUT/OUTPUT 1? **DHW (D)**
TARGET MODULATION SENSOR **BOILER OUT (D)**
TARGET ADJUST **NONE (D)**
MAX TARGET TEMP **D (or change if desired)**
RUN BOILER PUMP? **Yes (D)**
RUN AUX PUMP/OUTPUT? **D (not applicable)**

**INPUT/OUTPUT 2 (Assign to PRIORITY 2)**

WHAT IS THE USE OF INPUT/OUTPUT 2? **HEAT/DHW DEMAND**
WHAT PRIORITY IS INPUT #2? **PRIORITY 2**
WHAT SYSTEMTYPE IS INPUT/OUTPUT 2? **Select correct system type**
TARGET MODULATION SENSOR **Boiler In (D)**
TARGET ADJUST **ODT (D)** (Outdoor Temp sensor must be installed)
MAX TARGET TEMP **D (or change if desired)**
MIN TARGET TEMP **D (or change if desired)**
OUTDOOR TEMP FOR MIN TARGET **D (or change if desired)**
OUTDOOR TEMP FOR MAX TARGET **D (or change if desired)**
TARGET BOOST TIME **D (or change if desired)**
RUN BOILER PUMP? **YES (D)**
RUN AUX PUMP/OUTPUT? **D (not applicable)**

**INPUT/OUTPUT 3 (Not used)**

WHAT IS THE USE OF INPUT/OUTPUT 3? **NONE**

**PRIORITY SWITCH TIMES:**

P1 MAX ON TIME **D (or change if desired)**
P2 MAX ON TIME **D (or change if desired)**
P2 MIN ON TIME **D (or change if desired)**
P3 MIN ON TIME **D (not applicable)**

**INPUT/OUTPUT 4 (Not used)**

WHAT IS THE USE OF INPUT/OUTPUT 4? **NONE**

**PRIORITY SWITCH TIMES:**

P1 MAX ON TIME **D (or change if desired)**
P2 MAX ON TIME **D (or change if desired)**
P2 MIN ON TIME **D (or change if desired)**
P3 MIN ON TIME **D (not applicable)**

**Finish the WIZARD**

ENTER TIME, DATE AND MAINTENANCE INFORMATION AS PROMPTED
EXPRESS SETUP — EXAMPLE C (continued)

Multi-zone SPACE HEATING (Zone valves) | DHW (Direct-piped)

PIPING

LEGEND

1  ■ ECO Tec boiler.
2  Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings.
3  ■ Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see Figure 8, page 13 for information.
4  Relief valve piping to drain.
5  DHW circulator.
6  Isolation valves.
7  System circulator.
8  Expansion tank.
9  Air separator.
10  Flow/check or spring check valves.
11  Purge/drain valves.
12  ■ Boiler circulator, supplied with boiler, field piped.
13  Zone valves.
14  Unions as needed for service.
15  Return temperature sensor.
16  Supply temperature sensor.
20  Make-up water supply.
21  By-pass pressure regulator, REQUIRED for zone valve systems.
23  DHW Temperature and Pressure relief valve
25  ■ Boiler drain valve, supplied with boiler, field piped.
30  ■ Pressure/temperature gauge, supplied with boiler, field piped.
31  Outdoor sensor.
32  Low water cut-off.
33  120VAC power to boiler — see page 60.
35  Control module.

= Items supplied with boiler — all other Items supplied by installer.

FIELD WIRING

13  Additional zones
14  4-Wires Zone Valve End Switches
15  RETURN
16  SUPPLY
17  OUTDOOR
18  Additional zones
19  RETURN
20  SUPPLY
21  OUTDOOR
22  Additional zones
23  RETURN
24  SUPPLY
25  OUTDOOR

Part number 550-100-260/0520
## Available control settings and system presets

### Figure 77  ECO Tec Control / Priority settings

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>Range/ options</th>
<th>Default setting</th>
<th>COMBI default</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ASSIGNED INPUTS</td>
<td>1, 2, 3, 4, 0-10V, FLOW</td>
<td>-</td>
<td>FLOW</td>
<td>-</td>
</tr>
<tr>
<td>• SYSTEM TYPE</td>
<td>See System Type Presets</td>
<td>OFF</td>
<td>1=COMBI DHW</td>
<td>-</td>
</tr>
<tr>
<td>• TARGET MODULATION SENSOR</td>
<td>SYSTEM SUPPLY, BOILER OUT, DHW OUT</td>
<td>SYSTEM SUPPLY if detected, Boiler Out if not</td>
<td>DHW OUT</td>
<td>-</td>
</tr>
<tr>
<td>• TARGET ADJUST</td>
<td>Outdoor Temp, 0-10V, none</td>
<td>Outdoor Temp (If attached)</td>
<td>None</td>
<td>-</td>
</tr>
<tr>
<td>• MAX TARGET TEMP</td>
<td>See System Type Presets</td>
<td>See System Type Presets</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• HOT WATER TEMP (COMBI ONLY)</td>
<td>See System Type Presets</td>
<td>N/A</td>
<td>120</td>
<td>°F</td>
</tr>
<tr>
<td>• MIN TARGET TEMP</td>
<td>See System Type Presets</td>
<td>See System Type Presets</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• COMBI ENABLED (COMBI ONLY)</td>
<td>ON, OFF</td>
<td>N/A</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>• OUTDOOR TEMP FOR MIN TARGET</td>
<td>50 - 100</td>
<td>70</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• OUTDOOR TEMP FOR MAX TARGET</td>
<td>-20 to 49</td>
<td>0</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• VOLTAGE FOR MAX TARGET (TARGET ADJUST)</td>
<td>5.0 - 10.0</td>
<td>10.0</td>
<td>N/A</td>
<td>V</td>
</tr>
<tr>
<td>• VOLTAGE FOR MIN TARGET (TARGET ADJUST)</td>
<td>0.0 - 4.9</td>
<td>0.0</td>
<td>N/A</td>
<td>V</td>
</tr>
<tr>
<td>• TARGET BOOST TIME</td>
<td>OFF, 1 - 240</td>
<td>OFF</td>
<td>N/A</td>
<td>M</td>
</tr>
<tr>
<td>• SYSTEM SUPPLY OFF DIFF</td>
<td>5 - 15</td>
<td>10</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• DHW OFF DIFF</td>
<td>1 - 20</td>
<td>N/A</td>
<td>10</td>
<td>°F</td>
</tr>
<tr>
<td>• SYSTEM SUPPLY ON DIFF</td>
<td>5 - 30</td>
<td>10</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>• DHW ON DIFF</td>
<td>1 - 20</td>
<td>N/A</td>
<td>1</td>
<td>°F</td>
</tr>
<tr>
<td>• MAX BOILER TEMP</td>
<td>See System Type Presets</td>
<td>See System Type Presets</td>
<td>See System Type Presets</td>
<td>°F</td>
</tr>
<tr>
<td>• BOILER OUT OFF DIFF</td>
<td>2 - 15</td>
<td>5</td>
<td>5</td>
<td>°F</td>
</tr>
<tr>
<td>• BOILER OUT ON DIFF</td>
<td>2 - 30</td>
<td>5</td>
<td>5</td>
<td>°F</td>
</tr>
<tr>
<td>• COLD START ERROR</td>
<td>0 - 150</td>
<td>50</td>
<td>50</td>
<td>°F</td>
</tr>
<tr>
<td>• MAX ON TIME</td>
<td>OFF, 1 - 240</td>
<td>30</td>
<td>30</td>
<td>M</td>
</tr>
<tr>
<td>• MIN ON TIME</td>
<td>OFF, 1 - 240</td>
<td>15</td>
<td>N/A</td>
<td>M</td>
</tr>
<tr>
<td>• PREHEAT MODE (COMBI ONLY)</td>
<td>Off, Economy, High Performance</td>
<td>Economy</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>• PREHEAT TEMP (COMBI ONLY)</td>
<td>70 - 180</td>
<td>N/A</td>
<td>120 (Econ), 140 (H. Perf)</td>
<td>°F</td>
</tr>
<tr>
<td>• PREHEAT CIRC DIFF (COMBI ONLY)</td>
<td>1 - 30</td>
<td>N/A</td>
<td>30 (Econ), 10 (H. Perf)</td>
<td>°F</td>
</tr>
<tr>
<td>• PREHEAT ON DIFF (COMBI ONLY)</td>
<td>1 - 30</td>
<td>N/A</td>
<td>10 (Econ), 5 (H. Perf)</td>
<td>°F</td>
</tr>
<tr>
<td>• PREHEAT OFF DIFF (COMBI ONLY)</td>
<td>1 - 30</td>
<td>N/A</td>
<td>10</td>
<td>°F</td>
</tr>
<tr>
<td>• ECO BOOST (COMBI ONLY)</td>
<td>OFF, ON</td>
<td>N/A</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>• ECO BOOST SETPOINT (COMBI ONLY)</td>
<td>70 - 180</td>
<td>N/A</td>
<td>130</td>
<td>°F</td>
</tr>
<tr>
<td>• ECO BOOST ON DIFF (COMBI ONLY)</td>
<td>1 - 30</td>
<td>N/A</td>
<td>10</td>
<td>°F</td>
</tr>
</tbody>
</table>
Available control settings and system presets

**Figure 78** ECO Tec Control / Priority settings (continued)

<table>
<thead>
<tr>
<th>PRIORITY SETTINGS</th>
<th>RANGE/OPTIONS</th>
<th>DEFAULT SETTING</th>
<th>COMBI DEFAULT</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO BOOST OFF DIFF (COMBI ONLY)</td>
<td>1 - 30</td>
<td>N/A</td>
<td>10</td>
<td>°F</td>
</tr>
<tr>
<td>RUN BOILER PUMP</td>
<td>YES, NO</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>RUN AUX/PUMP OUT</td>
<td>YES, NO</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>PRE PUMP</td>
<td>OFF, 1 - 240</td>
<td>OFF</td>
<td>OFF</td>
<td>S</td>
</tr>
<tr>
<td>POST PUMP</td>
<td>10</td>
<td>30</td>
<td>OFF</td>
<td>S</td>
</tr>
<tr>
<td>MAXIMUM RATE</td>
<td>11 - 100</td>
<td>100</td>
<td>100</td>
<td>%</td>
</tr>
<tr>
<td>MINIMUM RATE</td>
<td>10 - 99</td>
<td>10</td>
<td>10</td>
<td>%</td>
</tr>
<tr>
<td>ADDITIONAL HEAT DEMAND ACT CONTACT</td>
<td>OFF, 1ST, 2ND, Outdoor Temperature</td>
<td>OFF</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>RESPONSE TIME</td>
<td>OFF, 1 - 240</td>
<td>OFF</td>
<td>OFF</td>
<td>M</td>
</tr>
<tr>
<td>TEMP DEPENDENT</td>
<td>YES, NO</td>
<td>NO</td>
<td>N/A</td>
<td>-</td>
</tr>
<tr>
<td>OUTDOOR TEMP SETPOINT</td>
<td>0 - 50</td>
<td>15</td>
<td>N/A</td>
<td>°F</td>
</tr>
<tr>
<td>ACT CONTACT BELOW SETPOINT</td>
<td>1st, 2nd</td>
<td>1st</td>
<td>N/A</td>
<td>-</td>
</tr>
</tbody>
</table>

**Figure 79** System Type Presets (each option shown with factory settings)

<table>
<thead>
<tr>
<th>System Type</th>
<th>8-Character Abbreviation</th>
<th>3-Character Abbreviation</th>
<th>Max Target Temp °F</th>
<th>DHW Target °F</th>
<th>OD Reset Min °F</th>
<th>OD Reset Max °F</th>
<th>Min Target Temp °F</th>
<th>OD Reset Max °F</th>
<th>Run Boiler Pump</th>
<th>Run AUX PUMP/OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan-coil</td>
<td>FAN-COIL</td>
<td>FCL</td>
<td>180</td>
<td>N/A</td>
<td>0</td>
<td>140</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Finned Tube Baseboard</td>
<td>FIN BASE</td>
<td>FTB</td>
<td>180</td>
<td>N/A</td>
<td>0</td>
<td>130</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Cast Iron Baseboard</td>
<td>IRONBASE</td>
<td>CIB</td>
<td>180</td>
<td>N/A</td>
<td>0</td>
<td>120</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Cast Iron Radiators</td>
<td>RADIATOR</td>
<td>CIR</td>
<td>180</td>
<td>N/A</td>
<td>0</td>
<td>120</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Radiant - slab on grade</td>
<td>RAD SLAB</td>
<td>RSG</td>
<td>120</td>
<td>N/A</td>
<td>0</td>
<td>80</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Radiant - thin slab</td>
<td>RAD SLAB</td>
<td>RTS</td>
<td>140</td>
<td>N/A</td>
<td>0</td>
<td>80</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Radiant - below floor (staple up)</td>
<td>RADFLOOR</td>
<td>RSU</td>
<td>160</td>
<td>N/A</td>
<td>0</td>
<td>90</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Radiant - above floor (sleeper system)</td>
<td>RADFLOOR</td>
<td>RAF</td>
<td>140</td>
<td>N/A</td>
<td>0</td>
<td>90</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Domestic Hot Water</td>
<td>DOMESTIC</td>
<td>DHW</td>
<td>180</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Combi DHW</td>
<td>COMBI</td>
<td>DHW</td>
<td>N/A</td>
<td>120</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Custom (user defined)</td>
<td>XXXXXXXX (user input)</td>
<td>first three of user input</td>
<td>180</td>
<td>N/A</td>
<td>0</td>
<td>70</td>
<td>70</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>
Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

### HOMEOWNER NAVIGATION menus

**WARNING**

- Banner info
- Status image
- Fault name and reset button
- Time/Date
- Navigation buttons – 2 dots and Home
- Current temperature
- Target Temperature (when a priority is active)

**HOMEOWNER SCREEN**

- Status: Shows the current sequence of operation status with the active priority.
- Input Status: Shows the current status of each call for heat.
- 0-10v: Shows the current 0-10v input value from external device.
- 1-4: Shows inputs 1 through 4, what they are assigned to, their custom names and their status. Input 4 will not show for Combi models.
- Pumps/Aux: Shows which aux/pump outputs are currently active.
- Additional Heat Demand: Shows whether AHD is off or on. Only appears if a priority is selected to use AHD.
- DHW Flow: Shows the current flow rate of the Combi DHW in GPM. Only visible for Combi models.
- DHW Temp: Shows the current temperature of the Combi DHW sensor. Only visible for Combi models.
- Outdoor Temp: Shows the current outdoor temperature sensor value. Only visible if selected to use.
- Supply/Return: Shows the current System Supply and System Return temperature. Only visible if selected to use.
- Boiler Out/In: Shows the current Boiler Out and Boiler In temperatures.
- Target Temp: Shows the current Target Temperature of the active priority.
- Mod Rate: Shows the modulation rate of the boiler’s blower motor.

**DATE/TIME BUTTON**

- Allows user to edit the current date and time.

**BACKLIGHT**

- Allows user to edit how bright the screen is during normal operation and when dormant.

**CLEAN**

- Locks the screen so nothing can be pressed for 10 seconds while the user cleans the screen.

**SOFTWARE**

- Displays the current software revisions of the control and display.

**HOT WATER**

- Allows the user to edit the Hot Water Temp of the Combi demand, as well as enable or disable PREHEAT mode or ECO BOOST.

**MAINTENANCE INFO**

- Allows the user to view contractor and maintenance information, as well as reset the maintenance reminder when present.

**SETTINGS**

- Allows the user to edit temperature units, screen timeout, daylight savings time and sound effect of presses.

screens shown above are typical only. actual screens depend on control settings chosen.
**CONTRACTOR menus**

**Boiler Model, Altitude and Fuel Type are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

---

**Figure 80** ECO Tec control menu access — accessing contractor menus

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>PURPOSE</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BOILER SETTINGS</strong></td>
<td>• Set/change boiler model, control type, high altitude setting, Outdoor Temp sensor requirement, manual reset high limit and WWSD temperature settings, outdoor sensor temp adjustment, circulator exercising, freeze protection setup, and restore to factory default option, fuel type and blower calibration.</td>
<td>See page 88</td>
</tr>
<tr>
<td><strong>SYSTEM SETTINGS</strong></td>
<td>• These settings assign Priority 1, 2 or 3 to each of the four inputs to the control and see an overview of assigned priorities.</td>
<td>See page 91</td>
</tr>
<tr>
<td><strong>DIAGNOSTICS</strong></td>
<td>• Use to review current and historical information including previous lockouts.</td>
<td>See page 94</td>
</tr>
<tr>
<td><strong>SERVICE INFO</strong></td>
<td>• Used to set contractor contact information, boiler information and maintenance dates.</td>
<td>See page 96</td>
</tr>
<tr>
<td><strong>MODBUS SETTINGS</strong></td>
<td>• Used to adjust Modbus related settings such as Baud Rate, Parity and Stop Bits, Modbus Address and turning Modbus on/off.</td>
<td></td>
</tr>
</tbody>
</table>

Screens shown above are typical only. Actual screens depend on control settings chosen.
**BOILER SETTINGS menu**

**WARNING** Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

**Figure 81** ECO Tec BOILER SETTINGS options

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| BOILER MODEL | • **WARNING** MUST be set to correct model.  
• Check the boiler model against the model listed on the boiler’s rating plate. Change the selection to the correct model if not. Also verify the model number on the ECO Tec control display at power-up. Failure to correct would result in severe personal injury, death or substantial property damage. |
| ALTITUDE | • Must be set correctly if altitude is greater than 2,000 feet. Settings in 500-foot increments |
| FUEL TYPE | • **WARNING** MUST be correct — Select between Propane and Natural gas is used. Follow screen instructions to change if necessary. |
| OUTDOOR TEMP SENSOR EXEMPT | • Select YES only if boiler is exempt from the requirement for outdoor reset operation stipulated in Section 303 of the 2007 Energy Act. See information provided elsewhere in this manual. |
| MANUAL RESET HIGH TEMP LIMIT | • If boiler outlet water temperature exceeds this temperature, the ECO Tec control will shut down the boiler and enter lockout. Changing this setting is NOT recommended. |
| WWSD TEMP | • WWSD stands for warm weather shut down. It means the boiler will not be allowed to fire if the outdoor temperature is greater than the WWSD setting. When the boiler is kept off because the outdoor temperature is above WWSD, the graphic display will show WWSD, and the boiler will remain in standby until the outdoor temperature drops below WWSD temperature. WWSD does not apply to DHW systems. The outdoor sensor must be installed to use this function. |
| ADJUST OUTDOOR | • Use this setting to calibrate the outdoor sensor when needed to compensate for variations in lead length or other factors that could affect total resistance in sensor circuit. |
| CIRCULATOR EXERCISING | • For each circulator, select whether you want the control to automatically start the circulator and run for 10 seconds for each 72-hour period of inactivity. |
| FREEZE PROTECT CIRCS | • This function automatically fires the boiler at low fire and starts the circulators chosen if the heat exchanger sensors detect a temperature less than 45 °F. Burner is turned on if temperature drops below 40 °F. Circulators and burner turn off when the temperature rises above 48 °F. |
| BLOWER CALIBRATION | • Use this function to re-calibrate the blower motor for optimal blower performance. **NOTE:** All calls for heat must be off and boiler must be in "Standby" to use this function. |
| RESET FACTORY DEFAULTS | • This screen has two options. RESTART WIZARD keeps all contractor information, time and date, run times and errors, and boiler model and allows the user to restart the wizard from the beginning. RESET FACTORY DEFAULTS clears all information from the control including model number and returns the control to a factory received state. |

Screens shown above are typical only. Actual screens depend on control settings chosen.
### Priority Setting screens

**WARNING**  
Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

**Figure 82  ECO Tec PRIORITY options**

![BOILER SETTINGS](#)

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SYSTEM TYPE</strong></td>
<td>· Select the system type for this PRIORITY, based on the heating terminal units in the system (see Figure 79, page 85). Use the CUSTOM selection to set the control for a different system type. The factory preset values for Max Target Temp, MIN TARGET TEMP, Outdoor Temp for Min Target and OUTDOOR TEMP FOR MAX TARGET are chosen based on the normal best setting for the terminal units.</td>
</tr>
</tbody>
</table>
| **TARGET MODULATION SENSOR** | · Choose SYSTEM SUPPLY or BOILER OUT to determine which will be the primary temperature sensor. The control will modulate boiler input to reach the TARGET temperature. (Default is SYSTEM SUPPLY only if sensor is attached.) If system sensors are not used, boiler defaults to using boiler outlet sensor in place of system sensor.  
  NOTE: Not adjustable on Combi DHW priority. |
| **TARGET ADJUST** | · Select how target temperature is calculated by control: NONE (no reset, fixed target temperature), 0-10V (target temperature based on analog input from remote source), Outdoor Temp (outdoor reset operation; default setting when an outdoor temperature sensor is attached).  
  NOTE: Not adjustable on Combi DHW priority. |
| **MAX TARGET TEMP** | · Set Max Target Temp to the required supply water temperature for the system at design maximum heat loss (typically 180 °F for finned tube baseboard on new installations.)  
  NOTE: Not adjustable on Combi DHW priority. |
| **MIN TARGET TEMP** | · MIN TARGET TEMP should equal the desired minimum supply water temperature for the system.  
  · This line is not shown on priorities configured as DHW system type or Heating system type, if outdoor temperature sensor not used.  
  NOTE: Not adjustable on Combi DHW priority. |
| **OUTDOOR TEMP FOR MIN TARGET** | · OUTDOOR TEMP FOR MIN TARGET is the outdoor temperature at which the target temperature reaches its minimum (MIN TARGET TEMP).  
  · This line is not shown on priorities configured as DHW system type or Heating system type, if outdoor temperature sensor not used.  
  NOTE: Not adjustable on Combi DHW priority. |
| **OUTDOOR TEMP FOR MAX TARGET** | · OUTDOOR TEMP FOR MAX TARGET means the outdoor temperature at which the target temperature reaches its maximum value (MAX TARGET TEMP).  
  · OUTDOOR TEMP FOR MAX TARGET should equal the Outdoor Temp (outdoor design temperature) for the installation’s location.  
  · This line is not shown on priorities configured as DHW system type or Heating system type, if outdoor temperature sensor not used.  
  NOTE: Not adjustable on Combi DHW priority. |
| **VOLTAGE FOR MAX TARGET** | · Only appears if Target Adjust or Source for Input 2 is set to 0-10V. For Target Adjust, this sets the voltage at which Max Target Temp temperature is requested. For Source on Input 2, this sets the voltage that corresponds to Max Rate. |

Screens shown above are typical only. Actual screens depend on control settings chosen.
Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

Figure 83  ECO Tec  PRIORITY options

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage for Min Target</td>
<td>• Only appears if Target Adjust or Source for Input 2 is set to 0-10V. For Target Adjust, this sets the voltage at which Min Target Temp temperature is requested. For Source on Input 2, this sets the voltage that corresponds to Min Rate.</td>
</tr>
<tr>
<td>Cold Start Error</td>
<td>• At ignition, the difference between the Target temperature and the current temperature is compared to this value to decide the starting modulation rate once released to modulation. If the difference is less than or equal to this value the modulation rate will start at Min Rate. If it is greater than this value, the control will calculate a higher modulation starting rate.</td>
</tr>
<tr>
<td>Hot Water Temp</td>
<td>• Set target temperature to the required Combi water temperature for the application according to design with mixing valve.</td>
</tr>
<tr>
<td>Combi Enabled</td>
<td>• Select whether to enable or disable Combi functionality. • Disabling Combi functions will ignore DHW flow calls for heat and only allow Central Heat on inputs 2 &amp; 3 to service calls for heat.</td>
</tr>
<tr>
<td>DHW On Diff</td>
<td>• The DHW Outlet temperature must fall below the Hot Water Temp minus this value in order to proceed to ignition.</td>
</tr>
<tr>
<td>DHW Off Diff</td>
<td>• If the DHW Outlet temperature exceeds the Hot Water Temp plus this value, the burner will shut off.</td>
</tr>
<tr>
<td>PREHEAT Mode</td>
<td>• Select the mode of PREHEAT, between Off, Economy and High Performance.</td>
</tr>
<tr>
<td>PREHEAT Temp</td>
<td>• Select the target temperature of the PREHEAT functionality. The boiler will drive to this temperature until PREHEAT Off Diff is achieved, or is interrupted by a call for heat. • PreHeat will end if Boiler Out and Boiler In exceed this temperature.</td>
</tr>
<tr>
<td>PREHEAT Circ Diff</td>
<td>• When in Standby, if the Boiler Out temperature falls below the PREHEAT Temp minus the PREHEAT Circ Diff, the boiler will activate the boiler circulator.</td>
</tr>
<tr>
<td>PREHEAT On Diff</td>
<td>• Temperature differential that is checked when Preheat starts due to temp falling below Circ Diff. Checks water temp to determine whether to stop Preheat or continue to turning on burner.</td>
</tr>
<tr>
<td>PREHEAT Off Diff</td>
<td>• While modulating on PREHEAT mode, if the Boiler Out temperature exceeds the PREHEAT Temp plus this value, the burner will shut off and PREHEAT mode will exit.</td>
</tr>
<tr>
<td>ECO BOOST</td>
<td>• Select whether or not to use the ECO BOOST feature. If conditions are met, the burner will continue to fire after Combi flow ends to recover temperature within the heat exchanger. • ECO Boost will end if Boiler Out and Boiler In exceed this temperature.</td>
</tr>
<tr>
<td>ECO BOOST Setpoint</td>
<td>• This setpoint is the temperature that will be driven to by the ECO BOOST.</td>
</tr>
<tr>
<td>ECO BOOST On Diff</td>
<td>• If a Combi DHW call for heat ends, the Boiler Out temperature is compared to the ECO BOOST Setpoint minus ECO BOOST On Diff. If below this value, the burner will continue to fire.</td>
</tr>
<tr>
<td>ECO BOOST Off Diff</td>
<td>• If firing due to ECO BOOST and the Boiler Out temperature exceeds the ECO BOOST Setpoint plus this value, the burner will shut off and ECO BOOST will end.</td>
</tr>
</tbody>
</table>
System Settings

**WARNING** Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

---

### Figure 84 ECO Tec Priorities and Inputs

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| INPUTS    | • Press on any of the Input squares to navigate to the Input assignment screen. Assign priorities to inputs and the source of Input 2.  
|           | • Custom name will appear above Input/output # when a name is entered. |
| PRIORITIES| • Press on any of the Priorities buttons to navigate to that priority settings.  
|           | • Each box displays from left to right: the priority number, system type, Max Target Temp on top of Min Target Temp (when used), and populates BLR Pump and/or SYS PUMP when selected to run these during that priority. The color of the box corresponds to the color of the Input/output #. |

---

Screens shown above are typical only. Actual screens depend on control settings chosen.
Configure Inputs and Outputs

Boiler Model, Altitude and Fuel Type are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

![Contractor Menu](image1)

<table>
<thead>
<tr>
<th>MENU Item</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME</td>
<td>• Give a name to the input/output you are assigning to help clarify the use of this priority for future reference.</td>
</tr>
<tr>
<td>USAGE</td>
<td>• Assign whether the input is used for a Heat Demand, Aux/pump output, or not used.</td>
</tr>
<tr>
<td>PRIORITIES</td>
<td>• Assign which priority this input is linked to.</td>
</tr>
</tbody>
</table>

![Input 2 Usage](image2)

Screens shown above are typical only. Actual screens depend on control settings chosen.
**AUX Pump/Output**

**Boiler Model, Altitude and Fuel Type are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the WM Logo for 7 seconds from the home screen.
2. See the following pages for explanations of control setting options.

---

**Figure 86 AUX PUMP/OUTPUT operation**

<table>
<thead>
<tr>
<th>Option</th>
<th>Activation conditions</th>
<th>Suggested uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALWAYS ON</td>
<td>• Output is always energized whenever the control is powered.</td>
<td>• Hot loop for seasonal boilers that are manually shut down at end of season and started up at start of heating season.</td>
</tr>
<tr>
<td>EXTERNAL SWITCH</td>
<td>• The output is energized on closure of an external switch wired to this input and is de-energized when the external switch opens.</td>
<td>• Hot loop for boilers whose CH is manually shut down at end of season and started up at start of heating season, but remain available for local calls (DHW, etc.).</td>
</tr>
<tr>
<td>OUTDOOR BELOW WWSD</td>
<td>• This output is energized only when outdoor temperature is below the WWSD setting (see BOILER SETTINGs menu).&lt;br&gt;• This setting is non-selectable if WWSD is set to OFF or Outdoor Temp is not connected at initial boiler power. If Outdoor Below WWSD is already chosen and WWSD is later set to OFF, Outdoor Below WWSD will behave as Always On.</td>
<td>• Hot loop for boilers whose CH is automatically shut down based on outdoor temperature (inferred heat loss), but remain on for local calls (DHW, etc.).</td>
</tr>
<tr>
<td>ANY INPUT</td>
<td>• The assigned output is energized if there is an input closure on this boiler.</td>
<td>• Energize a system pump relay if pump must run during all heating calls.</td>
</tr>
<tr>
<td></td>
<td>• The assigned output will de-energize once there are; no input on this boiler, post-purge has finished and post-pump time has expired.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If the closed input is configured for a heat demand, its output will de-energize after post-purge and post-pump.</td>
<td></td>
</tr>
<tr>
<td>INPUT PRIORITY SETTINGS</td>
<td>• The assigned output is energized:</td>
<td>• Energize a system pump relay if pump must run only on some heat calls (such as systems with locally-connected DHW heating).</td>
</tr>
<tr>
<td></td>
<td>• If there is an input closure on this boiler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• . . . and . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• RUN AUX PUMP/OUTPUT is set to YES for the priority assigned to the closed input.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The assigned output will de-energize once there are no input closures on any of the network boilers, post-purge has finished, and post-pump time has expired.</td>
<td></td>
</tr>
<tr>
<td>SYSTEM DAMPER</td>
<td>• The assigned output is energized when the boiler receives a call for heat and starts to pre-purge.</td>
<td>• Use for interlocking with combustion air damper, flow switch, etc.</td>
</tr>
<tr>
<td></td>
<td>• The assigned output is de-energized once the burner is off and post-purge is complete.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Activates if either this boiler or Additional Heat Demand is activated.</td>
<td></td>
</tr>
<tr>
<td>LOCAL DAMPER</td>
<td>• The assigned output is de-energized once the burner is off and post-purge is complete.</td>
<td>• Use for interlocking with combustion air damper, flow switch, etc.</td>
</tr>
<tr>
<td></td>
<td>• Only activates if this boiler is attempting to fire.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 87 SYSTEM/LOCAL DAMPER operation — start, run and stop, based on boiler status**

<table>
<thead>
<tr>
<th>Option</th>
<th>Standby</th>
<th>TT Closed</th>
<th>Pre-Pump</th>
<th>Pre-Purge</th>
<th>Burner Running</th>
<th>Post-Purge</th>
<th>Post-Pump</th>
<th>Standby</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANY INPUT OR INPUT PRIORITY SETTINGS</td>
<td>off</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>off</td>
<td>• See Figure 86 for explanation of differences between the ANY TT INPUT options.</td>
</tr>
<tr>
<td>SYSTEM/LOCAL DAMPER</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>off</td>
<td></td>
</tr>
</tbody>
</table>
# DIAGNOSTIC menu

## Menu/Item

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble</td>
</tr>
<tr>
<td>Boiler Out1</td>
<td>Temperature of the first sensing element of the boiler's heat exchanger outlet sensor</td>
</tr>
<tr>
<td>Boiler Out2</td>
<td>Temperature of the second sensing element of the boiler's heat exchanger outlet sensor</td>
</tr>
<tr>
<td>DHW Out1</td>
<td>Temperature of the first sensing element of the boiler's Combi DHW outlet sensor</td>
</tr>
<tr>
<td>DHW Out2</td>
<td>Temperature of the second sensing element of the boiler's Combi DHW outlet sensor</td>
</tr>
<tr>
<td>Boiler In</td>
<td>Temperature of the boiler's heat exchanger inlet sensor</td>
</tr>
<tr>
<td>System Supply</td>
<td>Temperature of the system water after the boiler loop</td>
</tr>
<tr>
<td>System Return</td>
<td>Temperature of the system water returning to the boiler loop</td>
</tr>
<tr>
<td>Flue1</td>
<td>Temperature of the first sensing element of the boiler's flue gas sensor</td>
</tr>
<tr>
<td>Flue2</td>
<td>Temperature of the second sensing element of the boiler's flue gas sensor</td>
</tr>
<tr>
<td>Outdoor</td>
<td>Temperature of the remote outdoor air temperature sensor</td>
</tr>
<tr>
<td>Target Temp</td>
<td>Current target temperature of the active priority.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble</td>
</tr>
<tr>
<td>Input 1</td>
<td>Call for heat status on Input 1</td>
</tr>
<tr>
<td>Input 2</td>
<td>Call for heat status on Input 2 (Input 2 can be TT1 or 0-10VDC input)</td>
</tr>
<tr>
<td>Input 3</td>
<td>Call for heat status on Input 3</td>
</tr>
<tr>
<td>Input 4</td>
<td>Call for heat status on Input 4</td>
</tr>
<tr>
<td>0–10V</td>
<td>Voltage input for target adjust or modulation</td>
</tr>
<tr>
<td>Manual Limit</td>
<td>External manual limit on low voltage terminal strip</td>
</tr>
<tr>
<td>Auto Limit</td>
<td>External auto limit on low voltage terminal strip</td>
</tr>
<tr>
<td>Low Wtr CutOff</td>
<td>Low water cutoff device (inside boiler jacket)</td>
</tr>
<tr>
<td>Air P-Switch</td>
<td>Limit device (inside boiler jacket) that will shut off the boiler if flue pressure becomes too high</td>
</tr>
<tr>
<td>Closure Switch</td>
<td>J18 jumper circuit closed or open (flow switch, CAD, etc.)</td>
</tr>
<tr>
<td>Blower Speed</td>
<td>Feedback from blower</td>
</tr>
<tr>
<td>Flame Signal</td>
<td>Number indicating the presence and quality of the flame used to shut down or boost the boiler</td>
</tr>
<tr>
<td>DHW Flow</td>
<td>Approximate gallons per minute water flow passing through the Combi brazed plate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble</td>
</tr>
<tr>
<td>Gas Valve</td>
<td>Control's gas valve circuit status</td>
</tr>
<tr>
<td>Circulator 1</td>
<td>Control's circulator 1 relay status</td>
</tr>
<tr>
<td>Circulator 2</td>
<td>Control's circulator 2 relay status</td>
</tr>
<tr>
<td>Circulator 3</td>
<td>Control's circulator 3 relay status</td>
</tr>
<tr>
<td>Circulator 4</td>
<td>Control's circulator 4 relay status</td>
</tr>
<tr>
<td>Boiler Circ</td>
<td>Boiler's circulator</td>
</tr>
<tr>
<td>Blower Signal</td>
<td>Control's signal controlling the blower speed</td>
</tr>
<tr>
<td>Additional Heat Demand</td>
<td>Additional heat demand contact status</td>
</tr>
<tr>
<td>Alarm</td>
<td>Alarm contact status</td>
</tr>
</tbody>
</table>
### DIAGNOSTICS menu (continued)

#### Menu/Item | Comment
--- | ---
**Run Times** | 
Burner Time | Displays cumulative time the burner has been active (can be increased by user)
Input 1 Time / DHW Time | Displays cumulative time that Input 1 has been closed (Changes to DHW Time for Combi models).
Input 2 Time | Displays cumulative time that Input 2 has been closed (Or 0-10V ≥ 1 volt)
Input 3 Time | Displays cumulative time that Input 3 has been closed
Input 4 Time / PREHEAT Time | Displays cumulative time that Input 4 has been closed, changes to PREHEAT Time for Combi models, if configured for PREHEAT.
Ignition Count: | Displays total number of successful ignitions
Last 5 Proof of Ignition: | Displays last 5 Proof of Ignition flame valves read by the control
Last 5 Stabilization: | Displays last 5 Stabilization flame valves read by the control
Last Factory Reset: | Shows the time/date stamp of the last factory reset performed
Last Power Cycle: | Shows the time/date stamp of the last known power cycle

**FAULT HISTORY** | 
Ignition Retries | Displays cumulative ignition attempts. It is recommended that his be reset during yearly maintenance by selecting this line and pressing the Reset button
Manual Reset Cnt | Displays number of manual reset lockouts since last cleared
Auto Reset Cnt | Displays number of auto reset lockouts since last cleared
Lockout History 1 - 6 | Choose this to view the second most recent error recorded
Fault Type | Displays the type of fault that occurred
Time | Displays time that lockout occurred
Date | Displays date that lockout occurred
Status | Displays what the status of the boiler was at the time of the error
Temperatures | Choose this to view the Boiler Temperatures at the time of the error
Inputs | Choose this to view the status of the Boiler Inputs at the time of the error
Outputs | Choose this to view the status of the Boiler Outputs at the time of the error

**Manual Test Mode** | 
Status | Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble
Inputs | Displays which inputs are presently calling for heat
Target Temp | Calculated target temperature based on outdoor temp or the max target if no ODR
Modulation | Displays what sensor the boiler is using to modulate from. May also indicate reason for boiler rate self-limiting.
Boiler Out | Temperature of the outlet sensor on the boiler heat exchanger
Boiler In | Temperature of the inlet sensor on the boiler heat exchanger
System Supply | Temperature of the system water after the boiler loop
System Return | Temperature of the system water returning to the boiler loop
Flue | Temperature of flue gases
Outdoor | Temperature of outdoor air
Blower Signal | Control’s signal controlling the blower speed
Blower Speed | Blower’s feedback to the control
Flame Signal | Number indicating the presence and quality of the flame used to shut down or boost the boiler
DHW Out/Flow | Temperature of the boiler’s DHW outlet sensor and approximate flow in gallons per minute passing through the Combi brazed plate
Force Rate | Used to manually force a rate during a call for heat. Choose auto for normal operation

**TO RESET ALL HISTORY COUNTERS TO ZERO:** | To reset all history counters to zero: Enter the FAULT HISTORY menu. Then press the reset button. This will cause ALL history to be deleted. To maintain history, set counters individually.

**Manual Reset** | Reset selected condition
SERVICE menus

Figure 90  SERVICE menus — navigation

<table>
<thead>
<tr>
<th>Service Info</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Contractor name to appear in maintenance reminders and during lockouts</td>
</tr>
<tr>
<td>Phone</td>
<td>Contractor phone number</td>
</tr>
<tr>
<td>Model</td>
<td>Displays the boiler model selected in the boiler setup</td>
</tr>
<tr>
<td>CP Number</td>
<td>Enter the CP# of the boiler</td>
</tr>
<tr>
<td>Installed</td>
<td>Enter the date the boiler was installed</td>
</tr>
<tr>
<td>Last Maintenance Performed</td>
<td>Date automatically entered when Reset Reminder is chosen by contractor</td>
</tr>
<tr>
<td>Next Maintenance Due</td>
<td>Date automatically calculated when Reset Reminder is selected by contractor</td>
</tr>
<tr>
<td>Interval Settings</td>
<td>Contractor selects maintenance reminder frequency based on service history</td>
</tr>
<tr>
<td>Reset Reminder</td>
<td>Contractor selects this to update Last maintenance Date and Next Date. Homeowner uses this to ignore the reminder and update only the Next Date.</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>Displays date of last calibration performed.</td>
</tr>
</tbody>
</table>

SERVICE INFO

Use this section to enter contractor’s information, Consumer Protection (CP) number, install date and to enter an automatic notice for maintenance (default is 12 months). Because this shows on the display, it is an automatic means of notifying the homeowner of need for scheduled maintenance by the technician. Select RESET REMINDER to reset for the next maintenance date.
Clean system to remove sediment
1. The system must be thoroughly flushed (without boiler connected) to remove sediment. The high-efficiency heat exchanger can be damaged by buildup or corrosion due to sediment.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and piping is free of sediment.

Do not use petroleum-based cleaning or sealing compounds in boiler system. Damage to elastomer seals and gaskets in system could occur, resulting in substantial property damage.

Before filling the boiler and system with water, verify the following. **DO NOT fill with softened water.** Boiler corrosion can occur. Failure to comply could result in boiler failure or unreliable operation.

Water chemistry

Water pH between 7.0 and 8.5
1. Maintain boiler water pH between 7.0 and 8.5. Check with litmus paper or have chemically analyzed by water treatment company.
2. If pH differs from above, consult local water treatment company for treatment needed.

Hardness less than 7 grains
1. Consult local water treatment companies for unusually hard water areas (above 7 grains hardness).

Chloride concentration must be LESS THAN 200 ppm
1. Filling with chlorinated fresh water should be acceptable since drinking water chloride levels are typically less than 5 ppm.
2. Do not use the boiler to directly heat swimming pool or spa water.
3. Do not fill boiler or operate with water containing chloride in excess of 200 ppm.

Verify that the water chemistry meets the limitations and requirements of all other equipment in the system.

Antifreeze and Correct Dosage Amount
Use only antifreeze listed by Weil-McLain as suitable for use with **ECO Tec** Gas Boilers. See Figure 125, page 137 for information to obtain antifreeze through a Weil-McLain distributor.

1. Determine the freezing temperature needed (to protect against lowest likely temperature the system water will encounter).
2. Find the antifreeze concentration by volume needed for this temperature from the antifreeze manufacturer’s data on the antifreeze container.
3. Add up the volume (gallons) of all system piping and components, including the expansion tank and boiler.
   a. Boiler water content is listed in Figure 138, page 149.
   b. Remember to include expansion tank water content.
4. Multiply this volume by the (percent) antifreeze needed to find the number of gallons of antifreeze to add.

Fill and test water system
1. Fill system only after ensuring the water meets the requirements of this manual.
2. Close manual and automatic air vents and boiler drain valve.
3. Fill to correct system pressure. Correct pressure will vary with each application.
   a. Typical cold water fill pressure for a residential system is 12 psi.
   b. Pressure will rise when boiler is turned on and system water temperature increases. Operating pressure must never exceed 24 PSIG.
4. For combi models only, purge domestic water up to cold water inlet by flushing water out the drain valve (Figure 54, page 44, Item #3). Once flushing is complete, allow water to flow through boiler’s internal domestic water circuit by opening a faucet. Ensure proper flow rate is obtained. If the flow rate through several faucets seem reduced, remove and clean internal combi filters located in the Domestic Water’s Return Manifold; see page 134 under section Cleaning & Maintenance for Domestic Water Inlet Manifold.
5. At initial fill and during boiler startup and testing, check system thoroughly for any leaks. Repair all leaks before proceeding further.

Eliminate all system leaks. Continual fresh make-up water will reduce boiler life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating heat exchanger, and causing heat exchanger failure.

Purge air from water system
1. Connect a hose to the purge valve (see purge/drain valves, Item 11, in piping diagrams beginning on page 44). Route hose to an area where water can drain and be seen.
2. Close the boiler or system isolation valve between the purge valve and fill connection to the system.
3. Close zone isolation valves.
4. Open quick-fill valve on cold water make-up line.
5. Open purge valve.
Part 5: Startup – fill the system

Freeze protection (if used)

**WARNING** Follow these guidelines to prevent possibility of severe personal injury, death or substantial property damage:

Use only the products listed by Weil-McLain for use with this boiler. See page 137 for information.

Thoroughly flush any system that has used glycol before installing the new boiler.

Review the material safety data sheets (MSDS) are available online. The MSDS contains information on potential hazards and first aid procedures for exposure or ingestion.

Check antifreeze inhibitor level at least annually. Glycol concentration and inhibitor levels may change over time. Add antifreeze to increase concentration if necessary. Add inhibitor as needed to bring to acceptable level, using inhibitor test kit to verify.

In addition to antifreeze and inhibitor, use and maintain minimum level of Sentinel X100 inhibitor as directed on this page.

If using freeze protection fluid with automatic fill, install a water meter to monitor water make-up. Freeze protection fluid may leak before the water begins to leak, causing concentration to drop, reducing the freeze protection level.

**DO NOT exceed 50% antifreeze by volume.** Antifreeze moves more sluggishly than water and can interfere with heat transfer. At antifreeze concentrations higher than 50%, sludge can develop in the boiler, potentially causing damage to the heat exchanger.

Clean the system before filling. Always drain and flush the system thoroughly before filling with antifreeze. Sludge, iron oxide deposits and other sediment in the system inhibit flow and can cause rapid breakdown of inhibitors.

Use only antifreeze recommended by Weil-McLain.

**NOTICE** Weil-McLain provides information for application of the antifreeze products listed in this document only for use in Weil-McLain boilers. Do not apply these products or instructions for other applications. Local codes may require a backflow preventer or actual disconnection from city water supply.

1. The system may have residual substances that could affect water chemistry.
2. After the system has been filled and leak tested, verify water pH and chloride concentrations are acceptable.
3. Test the pH of a sample of system water at least annually. The pH of the water mixture must be between 7.0 and 8.5. (Or use the Sentinel inhibitor test kit to check concentration.)
4. If pH is outside this range (or inhibitor test kit indicates low level), the inhibitor level may not be sufficient to prevent corrosion.
5. Verify and test antifreeze concentration, if used.

6. One zone at a time, open the isolation valves. Allow water to run through the zone, pushing out the air. Run until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged. Follow the same procedure to purge air from the boiler and its internal piping.
7. Close the quick-fill water valve and purge valve and remove the hose. Open all isolation valves. Watch that system pressure rises to correct cold-fill pressure.
8. After the system has operated for a while, eliminate any residual air by using the manual air vents located throughout the system.
9. If purge valves are not installed in system, open manual air vents in system one at a time, beginning with lowest floor. Close vent when water squirts out. Repeat with remaining vents.
10. Open automatic air vent (diaphragm-type or bladder-type expansion tank systems only) one turn.
11. Starting on the lowest floor, open air vents one at a time until water squirts out.
12. Repeat with remaining vents.
13. Refill to correct pressure.

**WARNING** **X100 inhibitor is required**

1. It is required that the ECO Tec boiler have Sentinel X100 added to the system to prevent damage to the boilers’ heat exchanger. See Replacement Parts section at the end of this manual for ordering information.
2. After filling the system as directed in these instructions, use a caulking gun to inject the X100 inhibitor concentrate into the system, or fill with the X100 in its liquid form, following the instructions on the tube or container.
3. After adding the inhibitor to the system, allow time for the water to circulate and mix. Then check the inhibitor level. Add additional inhibitor if necessary.
4. See separate instructions or Weil-McLain website for suggested guidelines to determine how much inhibitor to use.

Check/verify water chemistry

1. Test antifreeze concentration at least annually. If concentration is low, add antifreeze or drain system and refill with correct mixture.
2. Follow instructions on antifreeze container to determine the amount of antifreeze needed. **DO NOT** exceed 50% by volume concentration of antifreeze.
3. Follow the instructions on the Sentinel test kit to sample the system water and verify inhibitor concentration.
4. Check inhibitor level after adjustments are made. Check concentration annually.
Check for gas leaks

Before starting the boiler, and during initial operation, use a leak detector or smell near the floor and around the boiler for gas odorant or any unusual odor. Remove boiler jacket door and smell the interior of the boiler jacket. **Do not proceed with startup if there is any indication of a gas leak. Repair any leak at once.**

**DO NOT** adjust or attempt to measure gas valve outlet pressure. The gas valve is factory-set for the correct outlet pressure. This setting is suitable for natural gas and propane, requiring no field adjustment. Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death or substantial property damage.

**Propane boilers only** — Your propane supplier mixes an odorant with the propane to make its presence detectable. In some instances, the odorant can fade, and the gas may no longer have an odor. Before startup (and periodically thereafter), have the propane supplier verify the correct odorant level in the gas.

---

Inspect/fill condensate system

**Inspect/check condensate lines and fittings**
Inspect the condensate drain line, condensate PVC fittings and condensate trap. (See page 56 for component locations.)

**Fill condensate trap with water**
1. Remove test port cap on vent adapter (see Figure 91).
2. Pour one cup full of clean water into test port.
3. Ensure condensate trap filled with water.
4. Reinstall test port cap on vent adapter.

---

**Figure 91** Remove test port cap on vent adapter

---

Check thermostat circuits

1. Disconnect wires connected to the **Input 1, Input 2, Input 3 and Input 4** thermostat terminals (see Field wiring, beginning on page 58 for low voltage terminal locations and application information). Mark the wires before removing to avoid wiring errors when reconnecting them.

2. Close each thermostat, zone valve and/or relay in the external circuit one at a time and check the voltmeter reading at each wire to ground to ensure no voltage is being fed back into the boiler’s control module.

3. There should NEVER be a voltage reading when external device is closed.

4. If a voltage reading is measured on the incoming wires, check and correct the external wiring.

**WARNING** **DO NOT** connect the thermostat terminals to 3-wire zone valves. This could cause control damage.

5. Once the external thermostat circuit wiring is checked and corrected if necessary, reconnect the external thermostat circuit wires.

---

**WARNING** The condensate trap must be filled with water during all times of boiler operation to avoid flue gas emission from the condensate drain line. Failure to fill the trap could result in severe personal injury or death.
Final checks before starting boiler

- Read the instructions to adjust and set up the control.
- Verify that the boiler model is set correctly in the control, and that it displays correctly.
- Verify that the boiler and system are full of water and all system components are correctly set for operation.
- Verify that condensate trap is filled with water.
- Verify electrical connections are correct, securely attached, and sealed at cabinet openings.
- Inspect vent piping and air piping for signs of deterioration from corrosion, physical damage or sagging. Verify air piping and vent piping are intact and correctly installed per this manual.

To start the boiler

1. Apply power to the boiler via the field installed service switch.
2. Follow the Operating Instructions, Figure 92, page 101.
3. If this is the first time powering the boiler, please refer to the Control section of this manual starting on page 72. The control will prompt installer to go through our Wizard menu setup. Please complete the Wizard setup and ensure all connected sensors are detected and the correct boiler model is identified. If not, determine the cause and correct before proceeding.

If boiler does not start correctly

1. Check for loose connections, blown fuse or service switch off.
2. Are external limit controls (if used) open? Is boiler water temperature above 200°F?
3. Are the closure switch contacts open?
4. Are thermostats set below room temperature?
5. Is gas turned on at meter and boiler?
6. Is incoming gas pressure less than the minimum values given on page 19?
7. Are control settings correct for the application?
8. Is the warm weather shutdown activated?
9. If none of the above corrects the problem, refer to Troubleshooting, beginning on page 114.

Check system and boiler

- Check water piping
  1. Check system piping and DHW piping (Combi models only) for leaks. If found, shut down boiler and repair immediately. (See WARNING on pages 97 and 98 regarding failure to repair leaks.)
  2. Vent any remaining air from system using manual vents. Air in the system will interfere with circulation and cause heat distribution problems and noise.

- Check vent piping and air piping
  1. Check for gas-tight seal at every connection and seam of air piping and vent piping.

WARNING Venting system must be sealed gas-tight to prevent flue gas spillage and carbon monoxide emissions which will result in severe personal injury or death.

Check gas piping

Check around the boiler and inside the boiler jacket for gas odor following the procedure of page 57 of this manual.

WARNING If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with bubble test and repair immediately. Do not start boiler again until corrected. Failure to comply could result in severe personal injury, death or substantial property damage.

Propane boilers — verify conversion

Verify boiler has been converted for propane. See page 14 for ECO Tec 80, 110, 150 or 199.

WARNING DO NOT attempt to measure gas valve outlet pressure

DO NOT adjust or attempt to measure gas valve outlet pressure. The gas valve is factory-set for the correct outlet pressure. This setting is suitable for natural gas and propane, requiring no field adjustment.

Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death or substantial property damage.

Boilers are shipped ready to operate on natural gas ONLY. Failure to comply could result in severe personal injury, death or substantial property damage.

Check flame & combustion with instruments

1. Initiate a call for heat on one of the thermostat inputs.
2. Access the control installer menus by pressing and holding the WM logo on the top left for 5 seconds while in the middle "Homeowner" screen.
3. Make sure the Max firing rate is set to the maximum given in Figures 98 and 99, pages 110 and 111. If not, adjust as necessary. Then navigate to DIAGNOSTICS — Manual test mode (see Figure 89, page 95) and force the firing rate to HIGH (high fire).
4. Look at the flame through the flame inspection window. The high fire flame should be blue and should be stable. The burner surface should be covered with orange dots.
5. Insert combustion analyzer probe — Remove the test port cap from the vent flue adapter and insert a combustion test probe.
6. Test for CO₂ (or O₂) and for CO. The CO₂ values must comply with Figure 94, page 103. If results are acceptable, proceed to step 7. If NOT, follow the instructions under the "Gas Valve Adjustment" section on page 102 or page 103 to set the throttle screw and offset regulating screw position. See WARNING on page 102 upper left.

CONTINUED AFTER NEXT PAGE
FOR YOUR SAFETY — READ BEFORE OPERATING

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

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. Before OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

C. Use only your hand to toggle the switch and/or turn the manual gas valve. If the switch or valve will not move by hand, don’t try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

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

WHAT TO DO IF YOU SMELL GAS

• Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.

• If you cannot reach your gas supplier, call the fire department.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

2. Set room thermostat(s) to lowest setting.

3. Turn OFF all electrical power to the appliance.

4. Toggle the switch located on Boiler’s internal automatic gas valve to the “off” position.

5. Locate boiler manual gas valve (in the gas piping connected to the boiler).

6. Turn boiler manual gas valve handle counterclockwise to OPEN gas supply.

7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor.

8. If you smell gas, STOP! Turn the boiler manual gas valve to OFF. Then follow WHAT TO DO IF YOU SMELL GAS, above. If you don’t smell gas, go to step 9, below.

9. Turn ON all electrical power to the appliance including the switch located on Boiler’s internal automatic gas valve.

10. Set thermostat(s) to desired setting.

11. The boiler display will show symbols and/or text describing the status of the boiler as it proceeds through its operating sequence. "Standby" status means the burner is off.

12. If the appliance will not operate when there is a call for heat and piping is not hot, follow the instructions "To Turn Off Gas To Appliance" below and call your service technician or gas supplier.

TO TURN OFF GAS TO THE APPLIANCE

1. Set room thermostats to lowest setting.

2. Turn OFF all electrical power to the appliance including the switch located on Boiler’s internal automatic gas valve.

3. Turn boiler manual gas valve knob clockwise to close gas supply.
If combustion at either high or low fire is outside the range given in Figure 95, page 105, follow the procedure given on this page or page 105 for adjusting the gas valve. If adjustment does not correct the problem, then shut down the boiler and contact your local Weil-McLain representative. The gas valve adjustment must be done only by a qualified technician, using calibrated test instruments. Failure to comply could result in severe personal injury, death or substantial property damage.

7. Measure natural gas input:
   a. Operate boiler 10 minutes. Turn off other appliances.
   b. At natural gas meter, measure time (in seconds) required to use one cubic foot of gas.
   c. Calculate gas input:
      \[ \frac{3600 \times 1000}{\text{number of seconds from step b}} = \text{Btuh} \]
   d. Btuh calculated should approximate input rating on boiler rating label.
8. Use the control display to navigate to Manual test mode (see Figure 89, page 95) and force the firing rate to LOW (low fire).
9. Look at the flame through the flame inspection window. The low fire flame should be stable and evenly distributed over burner surface with a uniform orange color.
10. Repeat the combustion test as instructed in the previous steps.
11. Use the control display to navigate to Manual test mode (see Figure 89, page 95) and force the firing rate to AUTO (normal operation).
12. Reinstall the vent flue cap and ensure its sealed.

You must reinstall the vent flue cap to prevent flue gas spillage into the boiler enclosure. Failure to comply could result in severe personal injury, death or substantial property damage.

7. Measure natural gas input:
   a. Operate boiler 10 minutes. Turn off other appliances.
   b. At natural gas meter, measure time (in seconds) required to use one cubic foot of gas.
   c. Calculate gas input:
      \[ \frac{3600 \times 1000}{\text{number of seconds from step b}} = \text{Btuh} \]
   d. Btuh calculated should approximate input rating on boiler rating label.
8. Use the control display to navigate to Manual test mode (see Figure 89, page 95) and force the firing rate to LOW (low fire).
9. Look at the flame through the flame inspection window. The low fire flame should be stable and evenly distributed over burner surface with a uniform orange color.
10. Repeat the combustion test as instructed in the previous steps.
11. Use the control display to navigate to Manual test mode (see Figure 89, page 95) and force the firing rate to AUTO (normal operation).
12. Reinstall the vent flue cap and ensure its sealed.

You must reinstall the vent flue cap to prevent flue gas spillage into the boiler enclosure. Failure to comply could result in severe personal injury, death or substantial property damage.

### Gas Valve Adjustment

**WARNING** DO NOT attempt to adjust the throttle or offset screw unless done by a qualified technician, and with the use of calibrated combustion test instruments. Adjust the throttle or offset screw only as needed to meet the combustion values given in Figure 94, page 103. Must confirm correct low fire RPM before making any adjustments to Offset regulating screw.

1. Throttle screw adjustment is only necessary if specified elsewhere in this manual or if combustion tests indicate the need, as explained under “Check flame & combustion with instruments,” page 100.
2. Boiler behavior that might indicate a need to check combustion values at high fire (as per page 100) to verify boiler is in adjustment include: difficulty igniting, poor flame stability at low fire, combustion noise or high carbon monoxide values.
3. Combustion readings must be taken at both high fire and low fire. DO NOT attempt an adjustment of the throttle screw at low fire.
   - See Figure 93 for location of the throttle screw.

**Figure 93** Throttle and Offset Regulating screw (ONLY for use by a qualified technician, using calibrated combustion test instruments)

**Throttle adjustment screw**
- Turn counter-clockwise to increase CO₂
- Turn clockwise to decrease CO₂

**Offset Regulating screw**
- Turn clockwise to increase CO₂
- Turn counter-clockwise to decrease CO₂

NOTE: Must remove cover.

### High Fire

Make sure that the MAX RATE and MIN RATE for the PRIORITY that you are planning on testing on are set to 100% and 10% respectively. Then navigate to the MANUAL TEST MODE menu from the DIAGNOSTICS menu (Figure 89, page 95). After forcing the boiler to HIGH FIRE insure the BLOWER SPEED has achieved the RPM listed on Figures 98 or 99 (Pages 110 or 111). Take CO₂ and CO readings and adjust gas valve accordingly to Figures 93 and 94 allowing adequate time for the combustion analyzer to stabilize.
Startup — final checks (continued)

Figure 94  Acceptable combustion values — measured values must be within the ranges given below

<table>
<thead>
<tr>
<th>Boiler model</th>
<th>Fuel</th>
<th>High fire</th>
<th>Low fire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% CO2</td>
<td>CO ppm</td>
</tr>
<tr>
<td>80</td>
<td>NG</td>
<td>9.25 ± 0.5</td>
<td>&lt; 100</td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>10.50 ± 0.5</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>110</td>
<td>NG</td>
<td>9.25 ± 0.5</td>
<td>&lt; 100</td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>10.50 ± 0.5</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>150</td>
<td>NG</td>
<td>9.25 ± 0.5</td>
<td>&lt; 100</td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>10.50 ± 0.5</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>199</td>
<td>NG</td>
<td>9.25 ± 0.5</td>
<td>&lt; 100</td>
</tr>
<tr>
<td></td>
<td>LP</td>
<td>10.50 ± 0.5</td>
<td>&lt; 150</td>
</tr>
</tbody>
</table>

- Values above are with the boiler front door removed. Values will increase about 0.2% once the door is reinstalled.
- REINSTALL the boiler door after completing service.
- Values above are for altitudes up to 5,500 feet. For higher altitudes, CO2 may be slightly lower and CO slightly higher.
- The low fire CO2 must be lower than the high fire CO2 values.

Re-check the Maximum and Minimum CO2 and CO rate

1. Turn off the boiler and then turn it back on and put in Test Mode at maximum. Ensuring the CO2 setting level has remained unchanged and confirm that CO is within limits.
2. Reduce to minimum and re-check the minimum rate output ensuring the CO2 setting level has remained unchanged and confirm that CO is within limits.
3. In the event that the CO2 and CO cannot be obtained, please contact your Weil-McLain representative.
4. Should you require any assistance during the set up procedure contact your Weil-McLain representative if the problem cannot be addressed with the information provided in this manual.

- Check ignition system safety shutoff device
1. After the boiler has been installed, turn off the boiler.
2. Shut off the manual gas valve located on the gas line to stop flow of fuel to the boiler.
3. Turn on the boiler. It will start the ignition sequence, but will not light. After some time, the boiler will lockout, the display screen will have a red banner across the screen and will display “Ignition Fault 1”. It means that the boiler tried to ignite without success for five (5) times and went into Lockout mode. This means that the ignition system safety device worked properly.
5. Open the manual gas valve located on the gas line to resume fuel supply to the boiler.

- Check heat exchanger, vent seals, and condensate dish joint
1. Operate the boiler on HIGH fire.
2. Using an inspection mirror, move the mirror around all heat exchanger joints and vent pipe connections at the top of the boiler and at the connection to the condensate dish. Also inspect the joint between the condensate dish to heat exchanger.
3. A leak would appear as vapor on the surface of a mirror. Also look for signs of weepage or other indications that there might be leakage.
4. If there is any indication of a leak at any joint, immediately shut down the boiler.
   a. If possible, tighten the retaining screws or nuts (without over-tightening).
   b. If this does not correct the problem, disassemble the components where the leak appeared. Use the procedures given in the Maintenance section of this manual.
   c. When disassembling components, inspect gaskets to see if there is damage. Replace any damaged gasket.
   d. Contact your Weil-McLain representative if the problem cannot be addressed with the information provided in this manual.

Low Fire

1. Adjust the boiler to (LOW) (minimum output) and allow the boiler to stabilize. Confirm the rpm value during operation with the Figures 98 or 99, Pages 110 or 111.
2. Remove the 4mm Allen Head cap, see Figure 93, page 102, for Offset screw adjustment.
   a. If the CO2 is HIGH, turn the offset regulating screw 4mm Allen Head COUNTERCLOCKWISE to lower the input. Allow the boiler to stabilize and take another reading. Continue until the desired CO2 value is achieved.
   b. If the CO2 is LOW, turn the regulating screw CLOCKWISE to increase the input. Allow the boiler to stabilize and take another reading. Continue until the desired CO2 value is achieved.
   c. Confirm that the CO is within limits.
   d. Reinstall the 4mm Allen Head cap when adjustment is complete.
### Check Thermostatic Mixing Valve Operation (Combi Model Only)
- Ensure an ASSE 1070 Thermostatic Mixing Valve is installed on the domestic hot water outlet pipe from the combi boiler and is installed per the manufacturer’s instructions.
- Set Boiler Control (Figure 81, page 88) to be slightly higher than the desired temperature of the mixed hot water out of the mixing valve.
- Open a faucet to allow water to flow through the combi boiler and allow boiler to operate and modulate to the set temperature. More than one faucet may be required for steady modulation and outlet temperature.
- Once the combi boiler is delivering a steady temperature of domestic hot water, follow the manufacturer’s instructions to properly adjust and set the thermostatic mixing valve.
- Make sure to check the hot water temperature at all fixtures. Additional thermostatic mixing valves may be installed in the system near or at fixtures. The Combi boiler’s thermostatic mixing valve and/or other installed mixing valves may need adjusted accordingly.

### Check-out/startup verification

#### Adjust and test boiler controls
1. Follow instructions in this manual to set and verify operation of the boiler controls.
2. Follow low water cutoff manufacturers instructions (if used).

#### Have the following been done?
- Is the control set for the correct boiler model?
- Installation date and time entered into control?
- Boiler and heat distribution units filled with water?
- Water chemistry verified per page 97?
- Sentinel X100 corrosion inhibitor added and water tested to be within range?
- Automatic air vents, if used, opened one full turn?
- Air purged from system?
- Air purged from gas piping? Piping checked for leaks?
- Has the condensate trap been primed and secured to drain tube with hose clamp?
- Control set to correct gas type and altitude settings?
- Propane orifice and mixer/venturi installed for propane firing and propane conversion label affixed to jacket?

**WARNING:** Boilers are shipped ready to operate on natural gas ONLY. To operate on propane, you must follow the instructions in this manual to install the propane venturi and orifice. See page 14 for propane conversion. Failure to comply could result in severe personal injury, death or substantial property damage.

- Thermostat circuit wiring checked to ensure there are no stray voltages?
- Followed Operating Instructions, Figure 92, page 101?
- Burner flame and combustion verified per page 100?
- Control operation for space heating, DHW (Indirect tank) (if used), DHW (Combi model) verified per this manual?
- Additional field-installed controls tested as outlined by control manufacturers? (Boiler should be operating and should go off when controls are tested. Verify controls cause automatic reset lockout or manual reset lockout as desired.)
- Additional field-installed limit control(s) set to system temperature requirements? Balancing valves and controls adjusted to provide design temperature to system?
- Flow adjusted/balanced for each zone of multiple zones systems?
- Thermostat heat anticipator (if available) set properly?
- Boiler cycled with thermostats (and with DHW aquastat, if installed) — Raised to highest setting and verified boiler goes through normal startup cycle? Lowered to lowest setting and verified boiler goes off?
- **Combi models only:** Boiler cycled with hot water faucet. Verify boiler goes through normal start up cycle.
- Natural gas input measured? (page 102)
- Incoming gas pressure checked by connecting manometer to gas valve ahead of boiler? (Gas pressure must be at least the minimum values given on page 19, with boiler operating at high fire, and no more than 14 inches (355 mm) w.c. with boiler operating or boiler off.)
- Heat exchanger and vent seals checked with mirror to ensure no leakage?
- Observed several operating cycles for proper operation?
- Room thermostats set to desired room temperature (and DHW aquastat, if installed, to desired DHW storage temperature)?
- **Combi models only:** Check that the thermostatic mixing valve is installed and is set correctly according to procedure on page 43 and information in the paragraph at the top of this page, and that the control is adjusted properly according to procedure on page 90 for Control adjustment procedure.
- All instructions shipped with this boiler reviewed with owner or maintenance person?

#### Before leaving:
- Fill in Installation certificate, page 151.
- Return instructions to envelope and give to owner or place inside boiler housing.

**NOTICE** Fill out start-up data on the Installation and Service Certificate, page 151.
**Annual startup and general maintenance**

**WARNING** Follow the service and maintenance procedures given throughout this manual and in component literature shipped with the boiler. Failure to perform the service and maintenance could result in damage to the boiler or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.

**Figure 95** Service and maintenance schedules

<table>
<thead>
<tr>
<th>Service technician (see page numbers indicated for details)</th>
<th>Owner maintenance (see User's Information Manual)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANNUAL START-UP (See First-Year special inspection)</strong></td>
<td><strong>Daily</strong></td>
</tr>
<tr>
<td>• Address reported problems</td>
<td>• Check boiler area.</td>
</tr>
<tr>
<td>• Inspect boiler area</td>
<td>• Check air openings.</td>
</tr>
<tr>
<td>• Inspect boiler interior &amp; jacket door gaskets.</td>
<td>• Check pressure/temperature gauge.</td>
</tr>
<tr>
<td>• Clean condensate trap</td>
<td>• Verify boiler jacket door is securely in place.</td>
</tr>
<tr>
<td>• Check all piping for leaks</td>
<td><strong>Monthly</strong></td>
</tr>
<tr>
<td>• Check air openings</td>
<td>• Check vent piping.</td>
</tr>
<tr>
<td>• Flue vent system and air piping</td>
<td>• Check air piping.</td>
</tr>
<tr>
<td>• Check water system</td>
<td>• Check relief valve.</td>
</tr>
<tr>
<td>• Check expansion tank(s)</td>
<td>• Check condensate drain system.</td>
</tr>
<tr>
<td>• Inspect ignition electrode</td>
<td>• Check automatic air vents (if used).</td>
</tr>
<tr>
<td>• Check flame signal.</td>
<td>• Verify that domestic hot water is being supplied to fixtures at the correct temperature.</td>
</tr>
<tr>
<td>• Check control settings</td>
<td><strong>Every 6 months</strong></td>
</tr>
<tr>
<td>• Perform startup and checks</td>
<td>• Check boiler piping (gas and water)</td>
</tr>
<tr>
<td>• Check low water cutoff</td>
<td>• Operate relief valve.</td>
</tr>
<tr>
<td>• Check burner flame</td>
<td></td>
</tr>
<tr>
<td>• Check flue gas temperature</td>
<td></td>
</tr>
<tr>
<td>• Manual Test Mode for Boilers</td>
<td></td>
</tr>
<tr>
<td>• 3 Way Valve Test (Combi Model Only)</td>
<td></td>
</tr>
<tr>
<td>• Check Inlet gas pressure</td>
<td></td>
</tr>
<tr>
<td>• Check Internal circulation pump</td>
<td></td>
</tr>
<tr>
<td>• High Altitude</td>
<td></td>
</tr>
<tr>
<td>• Check boiler relief valve</td>
<td></td>
</tr>
<tr>
<td>• Review with owner</td>
<td></td>
</tr>
<tr>
<td>• Reinstall jacket door after servicing</td>
<td></td>
</tr>
<tr>
<td>• Check Inlet gas pressure</td>
<td></td>
</tr>
<tr>
<td>• Check DHW Temperatures</td>
<td></td>
</tr>
<tr>
<td><strong>Combi Models Only:</strong></td>
<td></td>
</tr>
<tr>
<td>• Check Combi 3-way valve, DHW function and brazed plate</td>
<td></td>
</tr>
<tr>
<td>• Clean DHW brazed plate</td>
<td></td>
</tr>
<tr>
<td>• Clean DHW external filter and internal Combi manifold filters</td>
<td></td>
</tr>
<tr>
<td>• Check DHW Temperatures</td>
<td></td>
</tr>
</tbody>
</table>
Annual startup

HANDLING CERAMIC FIBER MATERIALS

**REMOVING BURNER, COVER PLATE or COVER PLATE COMPONENTS**

**WARNING** The cover plate components, refractory insulation, and gaskets 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).”

- Avoid breathing dust and contact with skin and eyes.
  - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for cristobalite 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.
- Handle carefully to minimize dust that could be caused by abrasion.
- If replacement is necessary, remove the refractory 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.

FIRST-YEAR SPECIAL INSPECTION

**NOTICE** It is recommended that you obtain a Weil-McLain Boiler Maintenance kit before attempting the first-year inspection, to ensure all parts that may be needed are available. This kit includes a heat exchanger cover plate gasket, burner gasket, new ignition electrode, and ignitor gasket. See listing in Replacement parts section of this manual. These parts must be on hand when you perform the first-year inspection in the event they must be replaced.

**WARNING** Failure to replace the Items above when needed could result in severe personal injury, death or substantial property damage.

1. **No later than 12 months** after the boiler is installed, perform a first-year inspection of the boiler. This should include the following in addition to routine annual start-up procedures.
   a. Inspect the heat exchanger and clean if necessary (see page 127, for access and cleaning procedures).
   b. Inspect the cover plate insulation and gasket. Replace if not in good condition.
   c. Inspect the burner and inspect carefully. Clean the burner thoroughly using a vacuum cleaner and compressed air if needed.
   d. Make sure there is no blockage or accumulation of debris in the burner or the burner ports. Replace the burner if necessary.
   e. Check the burner for tightness. Remove the cover plate insulation and tighten the burner mounting screws if needed, following the instructions on page 128.
   f. Make sure to follow the inspection procedure given in “Check exchanger and vent seals,” page 103.
   g. Disconnect the condensate trap and drain lines. Inspect, then flush thoroughly. Reinstall and refill the trap per page 99.

2. Determine any follow-up maintenance and service needs based on the condition of the heat exchanger and condensate lines.
   a. If the heat exchanger shows substantial fouling, or if condensate lines show accumulation of sediment, schedule a follow-up service call to perform the first-year inspection again, sooner than the normal twelve months between.
   b. Heavy fouling of the exchanger or condensate lines indicates possible combustion air contamination. Inspect the air intake area carefully, and remove possible contaminants. See page 20, for products to avoid.

**WARNING** You must eliminate causes of corrosion and contamination to ensure reliable operation of the boiler and system.
Annual startup (continued)

Address reported problems

1. Inspect any problems reported by owner and correct before proceeding.

Inspect boiler area

1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
2. Verify that air intake area is free of any of the contaminants listed on page 20 of this manual. If any of these are present in the boiler intake air vicinity, they must be removed. If they cannot be removed, reinstall the air and vent lines per this manual.

Inspect boiler interior & jacket door gaskets

1. Remove jacket door and inspect interior of boiler.
2. Visually inspect the jacket door gaskets on front of cabinet. Make sure all are in good condition. Obtain replacements if any gasket is damaged.
3. Remove the venturi air inlet silencer and clean if necessary. Reinstall silencer.
4. Vacuum any sediment from the inside of the boiler and components. Remove any obstructions.

Clean condensate trap

1. For cleaning condensate trap, see Figure 96.
2. Remove pedestal front access panel to access the condensate trap, if floor standing.
3. Loosen the hose clamp connecting the condensate trap to the condensate drain tube. (See Figure 96). Pull the trap down to disengage the condensate drain tube.
4. Remove the clean out cap and remove the trap internal parts as shown.
5. Clean all trap components.
7. Make sure the trap ball moves freely when re-inserted.
8. Fill trap with fresh water by pouring into the top of the trap body. Continue filling slowly until water begins flowing out the condensate drain line. Make sure the trap line is unobstructed and flows freely or follow the procedure on page 99 under “Fill condensate trap with water.
9. Reattach the trap to the boiler condensate outlet. Push the trap up until fully engaged. Then retighten the hose clamp securing the trap to the tube. Check for secure connection.

Check all piping for leaks

1. Inspect all water and gas piping and verify to be leak free.
2. Look for signs of leaking lines in the system and in the boiler and correct any problems found.
3. Check gas line using procedure on page 57.
Annual startup (continued)

Check air openings
1. Verify that combustion and ventilation air openings to the boiler room and/or building are open and unobstructed.
2. Check operation and wiring of automatic combustion air dampers, if used.
3. Verify that boiler vent discharge and air intake are clean and free of obstructions.

Flue vent system and air piping
1. Visually inspect entire flue gas venting system and combustion air piping for blockage, deterioration or leakage. Repair any joints that show signs of leakage in accordance with vent manufacturer’s instructions. Verify that air inlet piping is connected and properly sealed.

**WARNING** Failure to inspect for the above conditions and have them repaired can result in severe personal injury or death.

Check water system
1. Verify all system components are correctly installed and operational.
2. Check the cold fill pressure for the system. Verify it is correct (usually around 12 PSIG).
3. Watch the system pressure as the boiler heats up (during testing) to ensure pressure doesn’t rise too high. Excessive pressure rise indicates expansion tank sizing or performance problem.
5. Check system water chemistry (pH, hardness and inhibitor level). See pages 97 and 98.

Check expansion tank(s)
1. Expansion tanks provide space for water to move in and out as the heating system water expands due to temperature increase or contracts as the water cools.
2. See page 46 or page 50 depending on system type for information.
3. Tank types
   - **Closed-type** — welded gas tight and located above boiler. Tank is partially filled with water, leaving an air cushion for expansion.
   - Make sure a closed-type tank is fitted with a tank fitting, such as the B & G Tank-trol or Taco Taco-trol. This fitting reduces gravity circulation of air-saturated tank water back to the system and prevents the air from bubbling up through the water as it returns from the system.
   - Do not use automatic air vents in systems with closed-type tanks. The air will escape from the system instead of returning to the tank.
   - Eventually, the tank will waterlog and no longer control pressurization. The boiler relief valve will weep frequently.
   - **Diaphragm- or bladder-type** — welded gas tight with a rubber membrane to separate the tank pressurizing air and the water. May be located at any point in the system, but preferably located on the suction side of the system circulator.
   - Systems with this type of expansion tank require at least one automatic air vent, preferably located on top of an air eliminator, as shown in examples in this manual.
4. If relief valve has tended to weep frequently, the expansion tank may be water logged or undersized.
   a. **Diaphragm- or bladder-type expansion tank** — first, check tank size to be sure it is large enough for the system. If size is too small, add additional tank (or tanks) as necessary to provide sufficient expansion. If tank size is large enough, remove tank from system and check charge pressure (usually 12 PSIG for residential applications). If tank won't hold pressure, membrane has been damaged. Replace tank.
   b. **Closed-type expansion tank** — tank is most likely waterlogged. Install a tank fitting if not already installed. Then check fill level per fitting manufacturer’s instructions. If fill level is correct, check tank size against manufacturer’s instructions. Replace with a larger tank if necessary.

Inspect ignition electrode
1. Remove the ignition electrode from the cover plate (see Item 13, page 130). Disconnect the ground wire and ignition cable connected to the electrode.
2. Discard the ignition electrode gasket.
3. Remove any white oxides accumulated on the ignition electrode using steel wool. If the ignition electrode cannot be cleaned satisfactorily, replace ignition electrode with a new one.
4. Ignition electrode rods should be parallel and spark gap should be 4.5mm.
5. Slide new gasket on to the ignition electrode. Reinstall ignition electrode, making sure gasket is in good condition and correctly positioned.

**WARNING** TORQUE LIMIT — Use a torque wrench when tightening the two ignition electrode retainer screws. DO NOT exceed 20 inch-pounds.

**WARNING** Check the seal of the ignition electrode, igniter gasket and cover plate. Failure to comply could cause a gas leak, resulting in severe personal injury or death.
Annual startup (continued)

Check ignition wiring
1. Check ignition cable electrical resistance. A good cable will have resistance between 950 and 1050 ohms. Replace if not acceptable.
2. Inspect boiler ground wire from heat exchanger access cover to ground terminal screw.
3. Verify all wiring is in good condition and securely attached.
4. Check ground continuity of wiring using continuity meter.
5. Replace ground wires if results are not satisfactory.

Check all boiler wiring
1. Inspect all boiler wiring, making sure wires are in good condition and securely attached.
2. Verify that all connectors are securely inserted.

Check control settings
1. Use the control display to navigate through all settings. Adjust settings if necessary.
2. Check settings of external limit controls (if any) and adjust if necessary. Adjust as needed to accommodate the system design.

Perform startup and checks
1. Start boiler and perform checks and tests specified in this manual, including combustion performance check starting on page 100.
2. Verify cold fill pressure is correct and that operating pressure does not go too high. Adjust water pressure and expansion tank charge pressure as necessary.
3. Complete the check-out procedure on page 104.

Check low water cutoff
Check the Low Water Cutoff for proper operation. Refer to manufacturer’s instructions for operation and service.

Check burner flame
The boiler contains ceramic fiber materials. Use care when handling these materials per instructions on page 106 of this manual. Failure to comply could result in severe personal injury.
1. Inspect flame through observation window using the procedure on page 100.
2. If flame is unsatisfactory at either high fire or low fire, check combustion values. If combustion is properly adjusted, turn off boiler and allow boiler to cool down. Then remove burner and clean it thoroughly using a vacuum cleaner or compressed air. Do not use compressed air to clean burner if performed inside a building.
3. To access the burner, remove the heat exchanger cover plate following the procedure beginning on page 128.
4. If replacing the burner, ensure the burner gasket is in good condition and correctly positioned. Follow all instructions on page 128 or 130 to reinstall all components.
5. Restart the boiler.
6. Inspect the flame at high and low fire. If flame is still not acceptable, check combustion values. If combustion is properly adjusted, obtain a replacement burner from Weil-McLain.

Check flame signal
1. Navigate to Diagnostics/Inputs on the control display (see Figure 80, page 87 for navigation instructions and Figure 88, page 94 for the complete Diagnostics menus).
2. The flame signal value (in micro amps) must be at least the boost value listed in Figure 97. If the flame signal drops below level, the control will attempt to correct by increasing the blower speed to increase flame signal. At ignition, the proof of flame signal must be 0.5 or greater. Typical running flame signal should be between 4 and 6. This value will vary depending on blower modulation, gas type, combustion settings, altitude & age of components.

![Figure 97 Running flame signal shutdown and boost values](image)

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<tr>
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3. A low flame signal may indicate a fouled ignition electrode or damaged ignition electrode insulation.
   a. See Inspect ignition electrode, page 108 to remove and inspect the ignition electrode.
   b. If required, clean the ignition electrode as instructed.
   c. If cleaning the ignition electrode does not improve, ground wiring is in good condition, and ground continuity is satisfactory, replace the ignition electrode.
4. If flame signal still remains low:
   a. Inspect the vent and air piping.
   b. Check combustion values.
   c. Then inspect the heat exchanger, following the procedures given in this manual for removal and reinstatement of the heat exchanger cover plate and other boiler components (see page 128).
   d. Clean the exchanger as described in this manual if necessary.

Check blower speeds
1. For all installations make sure the correct altitude is set in the boiler setup menu. The control automatically adjusts low fire, ignition and high fire rates to compensate for high altitude conditions.
2. Use the control display to navigate to DIAGNOSTICS/Manual test mode (see Figure 80, page 87 for navigation instructions and Figure 88, page 94 for the complete Diagnostics menus).
3. Set the firing rate to LOW (low fire).
4. Write down the blower RPM value, it should be within 50 of the value given in Figure 98, page 110 for Natural gas, Figure 99, page 111 for LP propane gas, unless low fire speed was increased based on priority need.
5. Set the firing rate to IGNITION (ignition rate).
6. Write down the blower RPM value. It should be within 50 RPM of the value listed in Figure 98, page 110 for Natural gas, Figure 99, page 111 for LP propane gas.
7. Set the firing rate to HIGH (high fire).
## Annual startup (continued)

**Figure 98**  Natural gas firing rates and corresponding blower speeds (low fire, ignition, and high fire) — for altitudes up to 2,000 feet (default settings) and high altitude (above 2,000 feet).

### Low Fire

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<th>Model</th>
<th>Fuel Type</th>
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**Note 1:**
- Low Fire: 10% up to 2,000 feet; 10% for altitudes above 2,000 feet.
- Ignition: 10% up to 2,000 feet; 10% for altitudes above 2,000 feet.
- High Fire: 10% up to 2,000 feet; 10% for altitudes above 2,000 feet.
### Annual Startup

Figure 99  Propane (LP) gas firing rates and corresponding blower speeds (low fire, ignition, and high fire) — for altitudes up to 2,000 feet (default settings) and high altitude (above 2,000 feet).

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</table>
Annual startup (continued)

Check blower speeds (continued)
8. Write down the blower RPM value. It should be within 50 RPM of the value given in Figure 98, page 110 for Natural gas, Figure 99, page 111 for LP propane gas.
9. If any of the values are outside the ranges listed in the previous steps, contact the factory for technical assistance.

**NOTICE** Minimum and maximum blower speeds can be adjusted within limits, but changing speeds will affect AFUE ratings.

Check flue gas temperature
1. Set the boiler to high fire. Then adjust the control display to view flue gas temperature and boiler return temperature.
2. The flue gas temperature should be no more than 50°F higher than the boiler return temperature. If temperature delta is higher, cleaning the Heat exchanger may be required. See the maintenance section starting on page 128.
3. If the flue temperature is higher than this, shut down the boiler, allow to cool, and follow the procedure starting on page 128 to clean the heat exchanger.

Manual Test Mode for Boilers
2. Generate a call for heat and wait until the burner is lit, if not yet in operation.
3. Press EDIT and select the desired FORCE RATE. Rate will be forced to setting for 30 minutes. Manual Test Mode resets at end of heating demand. If time out, boiler will revert to AUTO but will keep running if demand exist.

Check Inlet gas pressure
Check inlet gas pressure to limits on page 19 and at the gas inlet pressure test port shown in Figure 93, page 102.

Check Internal circulation pump
1. Check that the circulator light turns solid orange during boiler operation and that water flow exists.
2. Check for water leaks or signs of any water damage.

High Altitude
**Note 1 for Figure 98, page 110 for Natural gas and Figure 99, page 111 for LP propane gas —**
The boiler will automatically derate the BTU values listed in by 4% per 1,000 feet above sea level.

**NOTICE** In the USA Input rates are derated 4% for each 1000 ft. above sea level, beyond 2000 ft. in accordance with National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition, and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1.

**WARNING** For elevations above 11,000 feet, please contact Weil-McLain Technical Support for details.

**NOTICE** In Canada, Input rates are derated 10% for altitudes of 2000 ft. to 4500 ft. above sea level. Please use appropriate Fan Speed Settings for High Altitude provided in this manual.

In Canada for elevation beyond 4500 feet, please consult Provincial Authorities having jurisdiction and/or local codes.

3 Way Valve Test (Combi Model Only)
2. Ensure boiler is in "Standby" with no calls for heat active.
3. Press edit and select the desired position of the 3 way valve. This is a test feature to check if the 3 way valve is operational.
4. The 3 Way Valve Actuator may be removed by the procedure shown in Figure 122, page 135. Once removed, use the display to change the position of the actuator and visually check to see if the motor shaft is moving. It is normal to see the shaft slide back in forth when the actuator is in the recessed state, but there should be no play in the shaft when it is in the extended state. The recess position of the shaft is for the DHW mode. The extended position of the shaft is for the space heating mode. When the actuator is detached, use a blunt object to push on the 3 way valve shaft still assembled in the Sanitary Shutter. This shaft should require some force to compress against the valve spring. If the shaft cannot be moved, or stuck in the compressed state, follow the procedures listed on page 135 Cleaning & maintenance for Flow Manifold.
Annual startup (continued)

Check boiler relief valve

1. Inspect the relief valve and lift the lever to verify flow as in the following warnings, excerpted from a relief valve manufacturer’s warning label. Before operating any relief valve, ensure that it is piped with its discharge in a safe area to avoid severe scald potential.
2. Read page 48 or 51 before proceeding further.
3. Follow instructions below or perform procedures per relief valve manufacturer’s printed instructions.

WARNING Safety relief valves should be reinspected AT LEAST ONCE EVERY THREE YEARS, by a licensed plumbing contractor or authorized inspection agency, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions are not detectable unless the valve and its components are physically removed and inspected. This inspection must only be conducted by a plumbing contractor or authorized inspection agency — not by the owner. Failure to reinspect the boiler relief valve as directed could result in unsafe pressure buildup, which can result in severe personal injury, death or substantial property damage.

Following installation, the valve lever must be operated AT LEAST ONCE A YEAR to ensure that waterways are clear. Certain naturally occurring mineral deposits may adhere to the valve, rendering it inoperative. When manually operating the lever, water will discharge and precautions must be taken to avoid contact with hot water and to avoid water damage. Before operating lever, check to see that a discharge line is connected to this valve directing the flow of hot water from the valve to a proper place of disposal. Otherwise severe personal injury or property damage may result. If no water flows, valve is inoperative. Shut down boiler until a new relief valve has been installed.

4. After following the above warning directions, if the relief valve weeps or will not seat properly, replace the relief valve. Ensure that the reason for relief valve weeping is the valve and not over-pressurization of the system due to expansion tank waterlogging or under-sizing.

Review with owner

1. Review the User’s Information Manual with the owner.
2. Emphasize the need to perform the maintenance schedule specified in the User’s Information Manual (and in this manual as well).
3. Remind the owner of the need to call a licensed contractor should the boiler or system exhibit any unusual behavior.
4. Remind the owner to follow the proper shutdown procedure and to schedule an annual startup at the beginning of the next heating season.

Reinstall jacket door after servicing

WARNING

Reinstall boiler jacket door after start-up or servicing. The boiler jacket door must be securely fastened to the boiler to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances.

Inspect boiler jacket door gaskets on front of cabinet. Gaskets must be in good condition, with no tears or gaps. Replace if necessary.

Failure to keep the jacket door securely sealed and fastened could result in severe personal injury or death.

Combi Models Only:

Check Combi 3-way valve, DHW function and brazed plate

1. Cycle the 3-way valve by giving a boiler a call for heat and then turning on a DHW call by operating a faucet. Ensure that the valve and boiler operation changes from a space heating call to a domestic call and hot water is being delivered accordingly. It may be necessary to run “3 way valve test” listed on page 112.
2. Check for water leaks around 3-way valve, brazed plate, and brazed plate manifold fittings.

Clean DHW brazed plate

DHW/Combi brazed plate should be cleaned annually according to the instructions starting on page 131. Cleaning maybe required more frequently depending on water quality.

Clean DHW external filter and internal Combi manifold filters

1. Clean the filter on the domestic inlet water external to the boiler, installed in the near boiler piping. Follow the manufacturer’s recommended cleaning procedure.
2. Clean the Combi Manifold DHW flow switch filter and the bypass filter according to the instructions on page 135.

Check DHW temperatures

Follow the procedure on page 104 under “Check Thermostatic Mixing Valve Operation” to ensure proper temperatures at all domestic hot fixtures. If a recirculation loop is installed, check to ensure recirculation pump is working properly. Also check aquastat, timer, and/or occupancy sensor for proper operation, if used.
Troubleshooting

1. See Figure 100 for tools and kits recommended for troubleshooting ECO Tec boilers.
2. Check for 120V AC (minimum 102V AC to maximum 132V AC) to boiler.
3. Check the control’s last six (6) lockout histories. (Navigate to the DIAGNOSTICS menus.)
   a. See Figure 80, page 87 for HOMEOWNER NAVIGATION instructions and Figure 88, page 94 for the complete Diagnostics menus.
   b. In the DIAGNOSTICS menu, select FAULT HISTORY and press the right arrow.
   c. Record the fault counts, (Ignition Retries, Manual Reset Count, Auto Reset Count).
   d. Follow information at the bottom of the screen to navigate through your lockout histories.

**Figure 100 Tools and kits needed for troubleshooting**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>#2 Phillips screwdriver</td>
<td>Multiple uses</td>
</tr>
<tr>
<td>2.5 &amp; 4mm Allen wrench</td>
<td>To adjust gas valve settings</td>
</tr>
<tr>
<td>3mm Allen wrench</td>
<td>For removing ignition electrode screws</td>
</tr>
<tr>
<td>8mm wrench</td>
<td>To remove blower</td>
</tr>
<tr>
<td>10mm wrench</td>
<td>To remove heat exchanger cover plate</td>
</tr>
<tr>
<td>T20 long-handled Torx driver</td>
<td>To remove burner screws and mixer/venturi</td>
</tr>
<tr>
<td>Large crescent wrench</td>
<td>To remove gas valve</td>
</tr>
<tr>
<td>Multimeter</td>
<td>Measurements on sensors and electrical components</td>
</tr>
<tr>
<td>Manometer (Inclined or digital)</td>
<td>Measure the INLET gas pressure to the boiler</td>
</tr>
<tr>
<td>Combustion analyzer (Digital preferred)</td>
<td>Combustion testing and boiler adjustments</td>
</tr>
<tr>
<td>Contact thermometer</td>
<td>Checking surface temperatures of heat exchanger and pipes</td>
</tr>
<tr>
<td>Maintenance kit</td>
<td>ALWAYS have this kit on hand when performing maintenance in case replacement is required.</td>
</tr>
</tbody>
</table>

**Warning:** Failure to adhere to these guidelines can result in severe personal injury, death or substantial property damage.

**Electrical Shock Hazard**

Turn off all power to the boiler when servicing.

**Do Not Jumper Devices**

Never jumper (bypass) any device except for momentary testing.

**Reinstall Jacket Door**

The boiler jacket door must be securely fastened to the boiler to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances. Failure to keep the jacket door securely fastened could result in severe personal injury or death.

**Before Servicing or Making Connections —**

Always turn power off to the boiler to prevent electrical surges, which can damage boiler components.

**Label Wires Before Removing**

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

Before calling for troubleshooting assistance, fill in the “ECO Tec Gas Data Collection Sheet” (starting on page 152). Record the boiler size and Consumer Protection (CP) number (located on the right side exterior of the boiler jacket).

Check the following:

1. Make sure thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for 24VAC between thermostat wire nuts and ground.
2. Make sure all external limit controls are either installed (and closed) or temporarily jumpered for testing.
3. Make sure that connectors to the control are securely plugged in at module and originating control.
4. Gas pressures:
   - Maximum: 14” (355 mm) w.c. with no flow (gas valve lockup pressure).
   - Minimum: must be no less than the minimum values given on page 19 while operating on high fire.
Troubleshooting (continued)

Check control fuses

**WARNING** ALWAYS check control fuses before replacing the control or any major components (blower, etc.). If one of these fuses is blown, it can prevent the control or other components from operating.

1. Turn OFF power to boiler at external line switch. Then remove the control access door.
2. Locate fuses using Figure 102.
3. Remove and inspect the seven (7) fuses (Items 1, 2, and 3, Figure 102).
4. If necessary, replace one or more of the fuses:
   a. Low voltage circuit fuse (Item 1) is a 3-amp 24VAC fast-blow (Littelfuse 0287003).
   b. Line voltage circuit fuses (Item 2) are 2.5-amp 120VAC fast-blow (Littelfuse 032602.5).
   c. Line voltage circuit fuses (Item 3) are 4-amp 120VAC fast-blow (Littelfuse 314004).

**WARNING** Do not jumper either fuse or replace with any fuse except as specified. Failure to comply could result in severe personal injury, death or substantial property damage.

5. Reinstall the control access cover.

Checking temperature sensors

1. The boiler temperature sensors (Boiler In, Boiler Out, DHW Out, Flue, Outdoor, and System Supply/Return) are all resistance-type devices. Figure 101 shows the correct value for the sensor at various temperatures. For dual sensors, the temperature difference between the sensors must be no more than 10°F.

2. Use the resistance values at 32°F, 60°F, 70°F and 212°F to measure the sensor resistance at known temperatures (ice point, room temperature and sea level boiling point). For ice point and boiling point, insert the sensor in water at that temperature. Use an ohmmeter to read resistance value.

3. To check whether the control is correctly sensing temperature, you can use a resistance decade box. Connect the decade box temporarily in place of a sensor and read the corresponding temperature on the control display. The temperature should be close to the value corresponding to the input resistance.

---

**Figure 101 Sensor resistance values**

<table>
<thead>
<tr>
<th>Temp (°F)</th>
<th>Sensor ohms Min</th>
<th>Sensor ohms Max</th>
<th>Temp (°F)</th>
<th>Sensor ohms Min</th>
<th>Sensor ohms Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>34265</td>
<td>37871</td>
<td>90</td>
<td>8504</td>
<td>9399</td>
</tr>
<tr>
<td>40</td>
<td>27834</td>
<td>30764</td>
<td>100</td>
<td>6847</td>
<td>7568</td>
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<tr>
<td>50</td>
<td>21630</td>
<td>23907</td>
<td>110</td>
<td>5545</td>
<td>6129</td>
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<tr>
<td>60</td>
<td>16944</td>
<td>18727</td>
<td>120</td>
<td>4517</td>
<td>4992</td>
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<tr>
<td>70</td>
<td>13372</td>
<td>14780</td>
<td>130</td>
<td>3698</td>
<td>4088</td>
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<tr>
<td>80</td>
<td>10629</td>
<td>11747</td>
<td>140</td>
<td>3043</td>
<td>3364</td>
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</table>

**Figure 102 Control fuses**
Control fault indications

1. The control provides diagnostic information for both automatic reset conditions and manual reset conditions. See Figure 76, page 76 for information available on the control display and navigation instructions for all menus.

2. Figure 103 shows the screen behavior during a fault condition. The display illustration and text below in Figure 103 shows how to reset faults from the Home Owners screen.

3. Figure 105, page 117 lists conditions that will cause the control to display a constant red screen. The boiler will automatically restart if the condition self-corrects or the technician uses the control’s manual reset screens to reset.

Figure 103  Control display toggles when in lockout, with screen red banner
Troubleshooting (continued)

Figure 104  Troubleshooting suggestions — control Error Condition Log

RESTART WIZARD

The user must hold the button for a specified length of time. Upon completion, this will erase user specific parameter settings and take the user back through the wizard.

ONCE THIS IS CHOSEN, PREVIOUS SETTINGS CANNOT BE RECOVERED. ENSURE THIS ACTION IS TRULY DESIRED BEFORE CONTINUING.

RESET TO FACTORY DEFAULT

1. The user must hold the button for a specified length of time. Upon completion, this will reset the control settings back to factory installed settings.

ONCE THIS IS CHOSEN, PREVIOUS SETTINGS CANNOT BE RECOVERED. ENSURE THIS ACTION IS TRULY DESIRED BEFORE CONTINUING.

<table>
<thead>
<tr>
<th>Information</th>
<th>Description</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>Ignition Retries</td>
<td>Displays cumulative ignition attempts. It is recommended that this be reset during yearly maintenance.</td>
<td>Press and reset button to reset the count or select this parameter and press enter to reset.</td>
</tr>
<tr>
<td>Manual Reset Count</td>
<td>Records number of lockouts that required a manual reset since this count was last cleared.</td>
<td>Press the reset button to reset this count.</td>
</tr>
<tr>
<td>Auto Reset Count</td>
<td>Records number of lockouts that have automatically reset since this count was last cleared.</td>
<td>Press the reset button to reset this count.</td>
</tr>
<tr>
<td>Lockout History 1-6</td>
<td>Details of present or last recorded lockout, up to 6 previous lockouts.</td>
<td>Select and press the right arrow key for more details.</td>
</tr>
</tbody>
</table>

How to read the last 6 lockout histories:

1. Press “DIAGNOSTICS” button.
2. Select “FAULT HISTORY” and press the right arrow key.
3. Select “LOCKOUT HISTORY #” and press the right arrow key.
4. Review fault information displayed on screen.

How to clear all lockout histories:

1. While on the “FAULT HISTORY” screen, hold the reset button until cleared.
## Troubleshooting (continued)

### Figure 106 Troubleshooting suggestions — Fault displays, diagnostics and corrective actions

<table>
<thead>
<tr>
<th>Faults</th>
<th>Display</th>
<th>Condition</th>
<th>Diagnostics</th>
<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing shown on display screen and boiler will not respond to call for heat</td>
<td>Control is not receiving 24V power.</td>
<td>Check wiring for short circuit or incorrect wiring.</td>
<td>Correct wiring per wiring diagram including connection of transformer to the control.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check 3-amp low voltage fuse on control shown on page 115.</td>
<td>Replace fuse with proper part found in replacement part section of this manual. If fuse blows again recheck wiring per diagram.</td>
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<tr>
<td></td>
<td></td>
<td>Check transformer connection to the control per wiring diagram. Check for 24V output of transformer.</td>
<td>Replace transformer if it is receiving 120VAC, but not outputting 24VAC.</td>
<td></td>
</tr>
<tr>
<td>Nothing is shown in display screen and no other boiler components are operating</td>
<td>Control is not receiving 120V power.</td>
<td>Check service switch and/or circuit breaker to boiler is turned on.</td>
<td>Turn on service switch to power boiler.</td>
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<tr>
<td></td>
<td></td>
<td>Is there 120VAC at the service switch?</td>
<td>Troubleshoot and correct the power supply to the service switch.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Check for 120VAC at the line voltage terminal block located at J1 on the circuit board.</td>
<td>Correct wiring to circuit board using the wiring diagram in this manual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspect 4-amp fuse as shown on page 115. Replace if necessary.</td>
<td>Replace the fuse with proper part found in the replacement part section of this manual. If fuse blows again recheck wiring per diagram.</td>
<td></td>
</tr>
<tr>
<td>Nothing is shown on display screen, but boiler is operating</td>
<td>Occurs if the communication is lost from the control to the display.</td>
<td>Check for loose connections and proper pin alignment/engagement on the control’s plug J14 and the back of the display circuit board.</td>
<td>Check for continuity on the wire harness from the display to the communications board to circuit board. See repair parts section for proper replacement part.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cycle power off and on and check for operation.</td>
<td>Replace with new display module. See repair parts section for proper replacement part.</td>
<td></td>
</tr>
<tr>
<td>TEMP RISE TOO QUICKLY</td>
<td>Occurs if supply water temperature in heat exchanger rises faster than 10°F per second during the first two minutes the burner is on.</td>
<td>Automatically resets after 1 minute delay or using manual reset on display.</td>
<td>Verify water pipe is installed correctly per instructions in this manual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual reset is necessary after 5 automatic resets have occurred during the same Priority heat demand. Reset using manual reset screen on display.</td>
<td>Verify proper circulator and speed for boiler size and system requirements.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>See message displayed TEMPERATURE SENSOR and follow procedure for loose connections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication errors</td>
<td>Occurs if display or main control communications out for 30 seconds.</td>
<td>Automatically resets when communication is re-established.</td>
<td>Improper connections may display the incorrect model numbers. Check for a loose connection at the molex plug on the control and connection on the back of the display.</td>
<td></td>
</tr>
<tr>
<td>Control fault</td>
<td>Occurs when micro-controllers on main board have a RAM or ROM error.</td>
<td>Check for hardware damages.</td>
<td>RAM or ROM errors can be reset with the manual reset option. If problems persist, replace main board.</td>
<td></td>
</tr>
</tbody>
</table>
# Troubleshooting (continued)

Figure 107 Troubleshooting suggestions — Fault displays, diagnostics and corrective actions

## Faults

<table>
<thead>
<tr>
<th>Display</th>
<th>Condition</th>
<th>Diagnostics</th>
<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW WTR CUTOFF OPEN</td>
<td>Occurs if internal low water cutoff contacts open.</td>
<td>Manual reset of control if contacts are open.</td>
<td>Check for low water condition in system. Repair system as necessary refer to piping section of this manual. If low water condition does not exist, check Diagnostics — Inputs screen to view status of Low Water Cutoff. If shown as OPEN check wiring between LWCO and control. If wiring is alright, remove LWCO and Clean probe. If problem still exist, then replace the LWCO.</td>
</tr>
<tr>
<td>RETURN &gt; SUPPLY</td>
<td>Occurs if a return water temperature is greater than the corresponding supply temperature by 10º F or more and burner has been lit for more than 60 seconds.</td>
<td>Automatically resets when condition no longer exists.</td>
<td>Verify proper flow direction of the boiler circulator. Verify proper placement of system sensors. System sensors should be on system piping not on the boiler loop. Verify sensors are wired to correct terminal locations. System sensors may need to be located further away from the boiler loop connection to the system, if proximity to the boiler loop is causing sensors to be heated inaccurately.</td>
</tr>
<tr>
<td>Boiler Output sensor or Flue sensor</td>
<td>Occurs if dual temperature sensors values have spread by more that 10º F.</td>
<td>Automatically resets when sensors are within 10º F.</td>
<td>Follow procedure for above for SHORT and OPEN sensor conditions to properly diagnose sensor. If measured resistance values of sensors convert to temperatures separated by more than 10º F replace the sensor.</td>
</tr>
<tr>
<td>FLUE TEMP TOO HIGH</td>
<td>Occurs if flue temperature sensor exceeds 210º F (Warning) or 220º F (Lockout).</td>
<td>Automatic reset occurs if temperature drops below 210º F for 2½ minutes. Manual reset is required if the temperature rises above 220°F. Reset using manual reset screen on display.</td>
<td>Follow procedure above for SHORT and OPEN sensor conditions to properly diagnose sensor. In addition inspect heat exchanger combustion chamber and flue ways for abnormal wear or buildup. Inspect vent system for abnormal wear or damage. Contact Weil-McLain Technical Support.</td>
</tr>
</tbody>
</table>
# Troubleshooting

## Faults

<table>
<thead>
<tr>
<th>Display</th>
<th>Condition</th>
<th>Diagnostics</th>
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</tr>
</thead>
<tbody>
<tr>
<td>LIMIT OPEN</td>
<td>Occurs if manual or automatic reset limit opens.</td>
<td>Automatic external limit will reset 2½ minutes after external limit device closes.</td>
<td>Is there an external safety device connected? If yes, trouble shoot the external limit to determine and correct the cause that opened the limit. Also check for loose wiring connections.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual limit fault must be reset by choosing Manual Reset on the display.</td>
<td>Remove the Control cover and inspect the connector. Ensure a jumper is installed across the MAN LIMIT terminals if not using a manual reset external limit. Ensure a jumper is installed across the AUTO LIMIT terminals if not using a automatic reset external limit.</td>
</tr>
<tr>
<td>HIGH TEMP LIMIT</td>
<td>Boiler temperature sensor reached High Temp Limit setting.</td>
<td>Reset using manual reset screen on display.</td>
<td>Verify that high limit setting is at least 10° F above the maximum target temperature plus the off differential.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify all isolation valves are open and circulators are programmed into the control properly.</td>
<td>Verify water pipe is installed correctly per instructions in this manual.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The boiler circulator output and System Pump/Aux. output can be configured to turn on or off with each priority. Refer to the Control Setup section to configure these properly for the system.</td>
<td>Verify proper circulator sizing for boiler size and system requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>See message displayed TEMPERATURE SENSOR and follow procedure for loose connections.</td>
</tr>
<tr>
<td>FALSE FLAME</td>
<td>Occurs if flame is detected when there should be no flame.</td>
<td>Reset using manual reset screen on display.</td>
<td>Burner may be operating too hot due to incorrect combustion. Inspect flame and conduct combustion test. Force boiler into high fire. Check flue gases with combustion analyzer and correct using the maintenance and startup procedure in this manual.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Verify FLAME SIGNAL value quickly goes to zero on the DIAGNOSTICS - INPUTS screen when the gas valve closes.</td>
</tr>
<tr>
<td>GAS RELAY FAULT 1-4</td>
<td>The control has detected a problem with gas valve output circuit.</td>
<td>Control will do automatic retry; lockout if retry unsuccessful; retry 1 hour after lockout — restart if condition cleared, but lockout requiring manual reset if condition still present. Requires manual reset if control is in lockout.</td>
<td>If lockout reoccurs replace control.</td>
</tr>
</tbody>
</table>

Figure 108  Troubleshooting suggestions — Fault displays, diagnostics and corrective actions
**Troubleshooting (continued)**

**Figure 109 Troubleshooting suggestions — Fault displays, diagnostics and corrective actions**

<table>
<thead>
<tr>
<th>Faults</th>
<th>Display</th>
<th>Condition</th>
<th>Diagnostics</th>
<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGNITION 1 FAULT</td>
<td>Boiler went through 5 ignition attempts and never detected flame or flame sense value never reached minimum threshold for boiler model.</td>
<td>Automatically resets after 1 hour or can be reset by performing manual reset on boiler.</td>
<td>Check condensate trap for blockage allowing condensate to accumulate inside heat exchanger. Check ignition cable connection.</td>
<td>Fouled, worn, bent, or faulty igniter. Fouled ignition electrode can be cleaned for additional use with steel wool. Worn or badly fouled ignition electrode should be replaced with the proper repair part. Igniter rods should be parallel with a 4.5 mm (0.177 in) spark gap.</td>
</tr>
<tr>
<td>IGNITION 2 FAULT</td>
<td>Boiler went through 5 ignition attempts and did not meet running flame threshold for boiler model.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLAME LOSS FAULT</td>
<td>Boiler went through 5 ignition attempts and flame value dropped below proof of ignition during stabilization time of ignition.</td>
<td></td>
<td>Dirty burner and/or heat exchanger will cause high back pressure and poor ignition. Follow procedure in maintenance section of this manual to clean burner and heat exchanger. Visual inspection of flue ways may not be sufficient to diagnose condition.</td>
<td></td>
</tr>
<tr>
<td>AIR PRESSURE Switch Open</td>
<td>Occurs when Air Pressure connection is open.</td>
<td>Reset using Manual Reset screen on display.</td>
<td>Check boiler size selected in control against boiler rating label. Correct if necessary to select the proper boiler size.</td>
<td></td>
</tr>
<tr>
<td>Closure Switch fault</td>
<td>Proof of Closure connections on J18 a Pins 2 and 3 are open.</td>
<td>Soft lockout for 4 minutes then unlocks and checks for up to 4 minutes. If still open, soft lockout for 4 minutes. Repeats once more then a manual lockout.</td>
<td>None - Check jumper on correct pins and secure connection. Flow switch attached - Check correct pump is on, check wiring to flow switch and check switch is closing. CAD - Check voltage to damper. Check damper is opening.</td>
<td></td>
</tr>
</tbody>
</table>
## Troubleshooting (continued)

**Figure 110 Troubleshooting suggestions — Fault displays, diagnostics and corrective actions**

<table>
<thead>
<tr>
<th>Faults</th>
<th>Display</th>
<th>Condition</th>
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<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configuration fault</strong></td>
<td>Configuration data in the control safety micro does not match that in the control’s application micro.</td>
<td>Correct the invalid configuration information.</td>
<td>Reconfirm all settings within the Control Settings screen. Cycle power to the unit. Perform a factory reset by going to Diagnostics – Control Settings – Factory Default Reset and follow the on-screen instructions.</td>
<td></td>
</tr>
<tr>
<td><strong>DHW Outlet &gt; Boiler Out</strong></td>
<td>&quot;<em>Combi Only</em>&quot; DHW Outlet &gt; Boiler Outlet + 10°F and burner has been firing for at least 30 seconds.</td>
<td>Clears when the DHW Outlet sensor &lt; Boiler Outlet sensor plus 7°F.</td>
<td>Ensure appropriate water flow is being delivered by the installed circulators. Check appropriate valves are open. Check 3-way valve is operating correctly.</td>
<td></td>
</tr>
<tr>
<td><strong>Internal Clock Fault</strong></td>
<td>Occurs when the internal clock of the control is out of sync.</td>
<td>Clears when the control sees a valid clock count within the control.</td>
<td>Cycle power of the boiler. Check the wiring of the display. If problem persists, replace display.</td>
<td></td>
</tr>
<tr>
<td><strong>Supply 60°F &gt; Return</strong></td>
<td>Occurs if either Boiler Out temperatures are greater than Boiler In temperature by more than 60°F or the burner has been on for less than 2 minutes. If this condition occurs when the burner has been on for more than 2 minutes, the burner stops firing but no message or lockout occurs.</td>
<td>The first time a lockout occurs, the time to clear is 2 minutes 30 seconds. The second time a lockout occurs it’s a 3 minutes 30 second lockout. The third time, its 4 minutes 30 seconds, the fourth time its 5 minutes 30 seconds. The fifth time its 6 minutes 30 seconds. The system will retry, indefinitely, every 6 minutes 30 seconds as long as the temperatures return to being &lt; 60 degrees. If the burner first for at least 2 minutes without the temperature difference exceeding 60 degrees, the time condition for the &gt; 60 degree soft lockout is reset back to the minimum value of 2 minutes 30 seconds.</td>
<td>Ensure proper water flow is present through boiler. Ensure circulators are sized correctly per the system installation and are installed correctly. Check wiring to circulators. For Combi applications, add a pre-pump time to the Combi priority to mix and circulate water to reduce chances of this fault occurring.</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature Sensor</strong></td>
<td>Specified sensor is sensed as Open/Short.</td>
<td>Clears automatically when sensor is no longer Open/Short.</td>
<td>Check for loose or damaged wires on the designated sensor and at the control board. Replace appropriate sensor. If issues persist, replace control.</td>
<td></td>
</tr>
<tr>
<td><strong>Blower Fault 1</strong></td>
<td>Blower does not reach zero RPM within 4 minutes when mode is Standby or Prepump.</td>
<td>Clears automatically after 1 hour.</td>
<td>Check for loose or disconnected low voltage wires to blower motor. Inspect low voltage blower motor harness.</td>
<td></td>
</tr>
</tbody>
</table>
### Troubleshooting

**Faults**

<table>
<thead>
<tr>
<th>Display</th>
<th>Condition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Blower Fault 2</td>
<td>Blower unable to reach required pre-purge speed or ignition speed. Blower failed to complete calibration within 4 minutes.</td>
<td>Clears automatically after 1 hour.</td>
<td>Check for loose or damaged wires on high voltage and low voltage blower motor harnesses. Re-calibrate blower motor in Boiler Settings menu.</td>
</tr>
<tr>
<td>Blower Fault 3</td>
<td>Blower is outside of minimum or maximum speed for 10 seconds.</td>
<td>1 hour automatic reset</td>
<td>Check for loose or damaged wires on high voltage and low voltage blower motor harnesses. Re-calibrate blower motor in Boiler Settings menu.</td>
</tr>
<tr>
<td>Voltage Too High</td>
<td>Voltage Configuration jumper on J6 installed incorrectly. 24VAC jumper installed when should be 120VAC. 120VAC jumper installed when it should be 24VAC. No jumper installed</td>
<td>Clears when correct jumper configuration is installed on J6</td>
<td>Ensure the J6 connector is firmly inserted. Check the connector on J6 on the control board. It should match what is specified for this product. Check incoming voltage on the main power to the boiler, as well as across each jumper of the J6 connector.</td>
</tr>
<tr>
<td>Voltage Too Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Voltage Detected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware A2D Fault</td>
<td>The analog reading of the internal voltage reference on U1 read out of range 2 times in a row.</td>
<td>Clears when the analog internal voltage reference is within range.</td>
<td>Power cycle the boiler. If problems persist, replace the control.</td>
</tr>
<tr>
<td>Flame Circuit Fault</td>
<td>When the digital flame input does not sense the circuit to have discharged appropriately.</td>
<td>Unit receives manual reset.</td>
<td>Power cycle the boiler. If problems persist, replace the control.</td>
</tr>
</tbody>
</table>
**Troubleshooting** (continued)

Figure 112 Troubleshooting suggestions — Fault displays, diagnostics and corrective actions

### Warnings

<table>
<thead>
<tr>
<th>Display</th>
<th>Condition</th>
<th>Diagnostics</th>
<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Sensor</td>
<td>Occurs when Supply Sensor are chosen as the Target Modulation sensors and the Boiler In sensor is either open or short.</td>
<td>Clears warning when a valid sensor is detected.</td>
<td>Check all the temperature readings of the boiler on the DIAGNOSTICS - TEMPERATURES menu to determine if any sensors are currently displayed as SHORT or OPEN. Compare this to the boiler temperatures recorded in the DIAGNOSTICS - ERRORS - LOCKOUT HISTORY # - TEMPERATURES during the last several lockout conditions. Determine which sensors are suspect and measure their resistance value and compare it to the values shown in Figure 101, page 115. If the resistance values are incorrect replace the temperature sensor. Refer to repair parts section for proper part number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check wire harness for loose connections and pin engagement at sensor connection, chassis mount connection through control housing, and the control. Unplug connection at sensor and at control and check continuity between ends. If problem persists after checking Items above, replace control. Refer to repair parts section for kit number.</td>
</tr>
<tr>
<td>Return Sensor</td>
<td>Occurs when Return Sensor are chosen as the Target Modulation sensors and the Boiler out sensor is either open or short.</td>
<td>Clears warning when a valid sensor is detected.</td>
<td>Check all the temperature readings of the boiler on the DIAGNOSTICS - TEMPERATURES menu to determine if any sensors are currently displayed as SHORT or OPEN. Compare this to the boiler temperatures recorded in the DIAGNOSTICS - ERRORS - LOCKOUT HISTORY # - TEMPERATURES during the last several lockout conditions. Determine which sensors are suspect and measure their resistance value and compare it to the values shown in Figure 101, page 115. If the resistance values are incorrect replace the temperature sensor. Refer to repair parts section for proper part number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check wire harness for loose connections and pin engagement at sensor connection, chassis mount connection through control housing, and the control. Unplug connection at sensor and at control and check continuity between ends. If problem persists after checking Items above, replace control. Refer to repair parts section for kit number.</td>
</tr>
</tbody>
</table>
| DHW Outlet Sensor| "Combi Only"  
The DHW Outlet sensor read invalid.                                                                                                         | Clears warning when DHW Outlet sensors both read as valid.                                      | Check all the temperature readings of the boiler on the DIAGNOSTICS - TEMPERATURES menu to determine if any sensors are currently displayed as SHORT or OPEN. Compare this to the boiler temperatures recorded in the DIAGNOSTICS - ERRORS - LOCKOUT HISTORY # - TEMPERATURES during the last several lockout conditions. Determine which sensors are suspect and measure their resistance value and compare it to the values shown in Figure 101, page 115. If the resistance values are incorrect replace the temperature sensor. Refer to repair parts section for proper part number. |
|                  |                                                                                                                                             |                                                                                               | Check wire harness for loose connections and pin engagement at sensor connection, chassis mount connection through control housing, and the control. Unplug connection at sensor and at control and check continuity between ends. If measured resistance values of sensors convert to temperatures separated by more than 10°F replace the sensor. If problem persists after checking Items above, replace control. Refer to repair parts section for kit number. |
### Warnings

<table>
<thead>
<tr>
<th>Display</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Outdoor Sensor Error</strong></td>
<td>Outdoor temperature sensor short or OPEN.</td>
<td>Will automatically reset if the condition clears.</td>
<td>Determine which sensors are suspect and measure their resistance value and compare it to the values shown in Figure 101, page 115. If the resistance values are incorrect replace the temperature sensor. Refer to repair parts section for proper part number. Check wire harness for loose connections and pin engagement at sensor connection, chassis mount connection through control housing, and the control. Unplug connection at sensor and at control and check continuity between ends. If problem persists after checking items above, replace control. Refer to repair parts section for kit number.</td>
</tr>
<tr>
<td><strong>Exceeded Flow Rate</strong></td>
<td><em>Combi Only</em>  The Combi block has a flow rate above the Maximum Flow Rate for the boiler model.</td>
<td>Clears warning when the flow rate is below the Maximum Flow Rate for the boiler model minus 0.5 GPM.</td>
<td>Check the flow rate through the Combi block of the boiler and reduce as necessary. Check flow sensor for damages and voltage readings to ensure a working flow sensor.</td>
</tr>
<tr>
<td><strong>Target Reduced - Flue</strong></td>
<td>Flue temperature detected between 200°F and 210°F.  Modifies target temperature to prevent overheating flue.</td>
<td>Clears warning when Flue temperatures have been below 200°F and the target has returned to its original setpoint, then 1 hour of burner run time has elapsed without the Flue temperature exceeding 200°F.</td>
<td>Check the flue pipe for any blockages. Check the CO2 readings using an analyzer and adjust gas valve accordingly to match nominal CO2 readings within manual.</td>
</tr>
<tr>
<td><strong>Target Reduced - Boiler</strong></td>
<td>Boiler Outlet sensor detected above Max Boiler Temp minus Boiler Out On Diff.  <em>Can only occur if using System Supply or DHW Out as a modulation sensor</em></td>
<td>Clears warning when Boiler Outlet sensor is detected below Max Boiler Temp minus Boiler Out On Diff.</td>
<td>No corrective action required. Boiler is operating normally.</td>
</tr>
<tr>
<td><strong>Target Reduced - Flow</strong></td>
<td>Boiler Outlet sensor detected &gt; Boiler Inlet sensor + 50°F.  Modifies Target temperature to prevent overstressing heat exchanger.</td>
<td>Clears warning and target modification when Boiler Outlet sensor is detected ≤ Boiler Inlet sensor + 50°F.</td>
<td>Check water flow through the boiler heat exchanger. Check circulators for malfunction or wiring issues.</td>
</tr>
<tr>
<td><strong>Clock Fault</strong></td>
<td>When the real time clock chip is unable to be read.</td>
<td>When the real time clock chip is working correctly and has had a time written to it.</td>
<td>Enter an updated time/date. + If problems persist, replace display.</td>
</tr>
<tr>
<td><strong>Software Incompatible</strong></td>
<td>Main control and display software are not compatible.</td>
<td>Unit is updated to matching software.</td>
<td>Check software versions for main control and display. Replace the hardware that is the incorrect software version.</td>
</tr>
<tr>
<td><strong>Virtual Input Active</strong></td>
<td>If Modbus is activating any virtual TT input.</td>
<td>No virtual inputs are active.</td>
<td>Check Modbus communication device for virtual TT input commands.</td>
</tr>
</tbody>
</table>
Maintenance

Discontinue power

**WARNING** **Electrical shock hazard** — Disconnect all electrical power to the boiler before attempting maintenance procedures. Failure to complete could result in severe personal injury, death or substantial property damage.

Re-install boiler jacket door after startup or servicing

**WARNING** Reinstall boiler jacket door after start-up or servicing. The boiler jacket door must be securely fastened to the boiler to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances.

Inspect boiler jacket door gaskets on front of cabinet. Gaskets must be in good condition, with no tears or gaps. Replace if necessary.

Failure to keep the jacket door securely sealed and fastened could result in severe personal injury or death.

Start-up and check/out

**WARNING** Removing and reinstalling components can change boiler behavior. After any maintenance procedure, you must prove the boiler is operating correctly. To do so, follow the complete procedure for boiler and system start-up, beginning on page 97. Failure to comply could result in severe personal injury, death or substantial property damage.

Cleaning the heat exchanger

**WATER SIDE**, when required

1. Isolate the boiler from the heating system.
2. Inspect the heating system water. If there is evidence of sediment or corrosion, the boiler must be isolated from the system. The system must then be thoroughly cleaned to remove all sediment.
3. Isolate the cause of the system corrosion and correct the problem(s) before placing the boiler back in service.

**WARNING** Failure to comply could result in severe personal injury, death or substantial property damage.
Cleaning heat exchanger flue side

Cleaning the heat exchanger FLUE SIDE or accessing the burner, if required

**WARNING**
The boiler contains ceramic fiber materials. Use care when handling these materials per instructions on page 106 of this manual. Failure to comply could result in severe personal injury.

**Tools required**
- Long-handled Torx driver, #20 - burner screws
- 3mm Allen wrench - ignition electrode screws
- 8mm Wrench - blower lock nuts
- 10mm Wrench or socket - heat exchanger cover nuts
- Torque wrench - proper tightening
- (1) Large Crescent wrench - gas valve removal
- (1) Pipe wrench - gas valve removal

**Before proceeding:**
1. Shut down the boiler:
   a. Follow “To Turn Off Gas to Appliance” instructions on boiler and Operating instructions.
   b. Close the boiler manual gas valve.
2. Allow time for the boiler to cool to room temperature if it has been firing.
3. Remove jacket door by undoing the two (2) latches on each side.
4. Lift the jacket door up and away from the boiler to remove.
5. Remove Control Bracket Cover by removing the two (2) screws and lifting it up.
6. Unplug display cable from control module and lift display bracket assembly up from bottom. Once bottom tabs are disengaged from control bracket, move assembly down to disengage tabs from top cabinet and place assembly in a safe location.

**Remove components to access the heat exchanger flue side**
1. See Figure 114, page 129 part A to locate components referenced in the following.
2. Remove the air silencer and disconnect gas valve and gas flex line:
   a. See Figure 114, page 129 part A, B and C.
   b. Locate the clip (Item 2) connecting the air silencer (Item 1) to the venturi (Item 7). Gently pull clip out and away from the venturi, set aside. Slide silencer away back to venturi (Item 7). Gently pull clip out and from the venturi. Set the air silencer aside.
   c. Disconnect wire harness connected to gas valve, the low voltage wire harness connected to the blower, and the high voltage wire harness connected to the blower High Voltage jumper harness.
   d. Disconnect the gas valve and gas flex line where it connects to venturi to by loosening the gas valve swivel nut to disconnect gas valve from venturi. Set the valve & gas line to the side.

**WARNING**
**Use two wrenches** when disconnecting the swivel nut and gas line to prevent damage to the gas valve and other gas line components.

3. Remove the blower/venturi assembly.
   a. See Figure 115, page 130, part D.
   b. Remove the two (2) 5mm locknuts connecting the blower and cover plate with 8mm wrench. Remove blower assembly. Inspect blower gasket, replace if gasket has taken a set or if any signs of wear.
   c. Remove burner tube (80/110/199 models only) from cover plate located under blower gasket. Inspect and set aside.
   d. Cut tape, 2 locations, that secures cover plate top insulation to heat exchanger. Remove cover plate top insulation, set to the side.
   e. Gently set blower/venturi assembly aside. Inspect blower/cover plate gasket (Item 9). If gasket appears damaged, discard and replace with a new gasket.
   f. Disconnect the ground wire and ignition cable from the ignition electrode (Item 13).
   g. Remove the ignition electrode (Item 13) by removing the two (2) Socket head 3mm Allen igniter bolts, see Figure 115, page 130 part E. Set the ignition electrode and screws aside. Discard used gasket. Be careful when handling the ignition electrode not to damage the igniter ceramic. Obtain a new ignition electrode gasket before reinstalling the ignition electrode.
   h. Inspect the igniter ceramic and electrodes. Clean the electrodes carefully with steel wool. If the igniter ceramic is cracked or damaged, replace the igniter with a new one.

4. Remove the heat exchanger cover plate and burner:
   a. See Figure 115, page 130 part F and part G.
   b. Use a 10mm wrench or socket to remove the nuts (Item 11) that secure the heat exchanger cover plate (Item 10) to the heat exchanger. [Four (4) nuts (ECO Tec 80/110), five (5) nuts (ECO Tec 150), six (6) nuts (ECO Tec 199).]
   c. Carefully lift the cover plate assembly (part F, Item 10) straight up vertically until the cover plate insulation with integrated seal clears the heat exchanger studs.
   d. Pull the assembly forward and out of the cabinet.
   e. Turn the cover plate assembly over and place on a flat surface.
   f. Be aware of blower studs to avoid damaging studs, insulation or burner.
Cleaning and clean the burner

Inspect and clean the heat exchanger flue side (continued)

Reinstall components

1. See Figure 114, page 129 and Figure 115, page 130 for reference.
2. Reinstall the circuit board to the control bracket and reconnect all connectors and wire harnesses.
3. Reinstall the burner (Item 14), burner insulation (Item 16 and burner gasket (Item 15) on to the cover plate (Item 10). Burner insulation must be aligned on cover plate with blower inlet hole and the two ends of the blower mounting studs. The small holes in the insulation are to align with the two ends of the blower mounting studs. The beveled edge of the insulation should be face up while resting on the bottom side of the cover plate. Tighten the burner screws (Item 17) using a torque wrench. The screws must be secure, but the torque must not exceed 20 inch-pounds. Use new burner screws from Weil-McLain that include thread sealant. If reusing burner screws, apply a High Temperature Loctite to burner screw threads, such as Loctite 638, to ensure proper sealing of combustion chamber.
4. Slide bottom cover plate insulation with integrated seal over burner and align outer seal holes and igniter hole with cover plate heat exchanger mounting holes and igniter hole.
5. Reinstall cover plate / burner / insulation assembly on heat exchanger and secure the cover plate with 10mm hex nuts (Item 11). Be careful to avoid damaging the insulation on the heat exchanger studs.

WARNING You must gradually tighten the cover plate nuts using a torque wrench. The final torque MUST NOT exceed 45 inch-pounds. Alternate tightening until all nuts reach 45 inch-pounds.

6. Reinstall the igniter assembly (Item 13).
   a. The ignition electrode gasket must be replaced with a new gasket.
   b. Insert the ignition electrode (Item 13) into the cover plate opening, with the gasket in position.
   c. Reinstall the two (2) Socket head Allen screws finger tight. Use a torque wrench to tighten the ignition electrode screws. DO NOT exceed 20 inch-pounds torque.
7. Reinstall cover plate top insulation by sliding it on top of the cover plate and over the igniter. Secure insulation by using two (2) pieces of high temperature tape, aluminum foil tape recommended. Tape should secure the insulation to the Heat Exchanger.
8. Reinstall the blower / venturi/gas valve assembly (Items 3, 4 and 7).
   a. Reinstall burner tube (80/110/199 models only) inside top of cover plate. Make sure burner tube flange is flush with cover plate surface when installing. Flange notch should align with the index alignment feature in the Cover Plate burner tube recess.
   b. Install blower gasket (Item 9) between blower and cover plate.
   c. Use 8mm wrench to secure blower to cover plate with two (2) locknuts (Item 8).
   d. Reconnect the two (2) blower wiring harnesses.
9. Reconnect the ignition cable and the igniter ground wire.
10. Replace the gas valve-to-venturi fiber washer (Item 6 Figure 114, page 129 part C) with a new fiber gasket. Slide

Inspect and clean the heat exchanger

1. Access the heat exchanger interior by following the previous instructions.
2. See Figure 115, page 130 part F.
3. Before using water to clean the heat exchanger, remove the circuit board. Label wires if they are not labeled. Set aside. Remove all connectors and wire harnesses from the circuit board and then remove the four (4) screws securing it to the bracket and undo plastic snap-fit standoffs holding circuit board to bracket.
4. Use a strong light to visually inspect the interior of the heat exchanger. Make sure the flue ways (tubes) are clear and unobstructed.
5. Use a vacuum cleaner to remove any accumulation on the heating surfaces. This includes removing any pieces of insulation that may have dropped into the exchanger.

WARNING DO NOT use any solvent when cleaning the exchanger.

6. If the vacuum cleaner is unable to clean completely, wash the heating surfaces with clean, warm water.
   a. Place a shallow pan under the boiler condensate tube connection.
   b. Loosen the condensate tube hose clamp and slide the trap off of the drain connection. (See Figure 67, page 56 for reference.)
   c. Spray fresh water into the heat exchanger and tubes to remove sediment. Collect water in the pan below.

Inspect and clean the heat exchanger

1. See Figure 115, page 130 part G.
   a. Slide the bottom cover plate insulation with integrated seal (Item 19) off of the burner. Set the insulation aside where it will be kept clean and protected from damage. If the insulation and/or the seal is damaged, it must be discarded and replaced with a new one.
   b. Remove the burner and its gasket (Items 14 and 15) by removing the screws with a T20 Torx driver. Discard old burner gasket.
   c. Inspect burner insulation resting on top of cover plate bottom. If damaged or worn, replace with new component. Burner Insulation may be resting on top of inner burner. If on burner, remove, inspect, and replace if necessary.
   d. Clean burner flange and cover plate surface where burner gasket sits removing all old gasket material.
   e. Inspect the interior of the burner. Brush and vacuum the interior if needed to remove lint or sediment. Alternative cleaning methods: • blow air from the inside out; • clean with a water spray from inside the burner; • swirl the burner thoroughly in a bucket of mild liquid laundry detergent water, then rinse thoroughly.
   f. Inspect the burner exterior. It must be in good condition, with no visible damage.
   g. Obtain a new burner gasket before re-installing the burner.

Inspect and clean the heat exchanger

1. Access the heat exchanger interior by following the previous instructions.
2. See Figure 115, page 130 part F.
3. Before using water to clean the heat exchanger, remove the circuit board. Label wires if they are not labeled. Set aside. Remove all connectors and wire harnesses from the circuit board and then remove the four (4) screws securing it to the bracket and undo plastic snap-fit standoffs holding circuit board to bracket.
4. Use a strong light to visually inspect the interior of the heat exchanger. Make sure the flue ways (tubes) are clear and unobstructed.
5. Use a vacuum cleaner to remove any accumulation on the heating surfaces. This includes removing any pieces of insulation that may have dropped into the exchanger.

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   a. Place a shallow pan under the boiler condensate tube connection.
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   c. Spray fresh water into the heat exchanger and tubes to remove sediment. Collect water in the pan below.
Cleaning heat exchanger flue side (continued)

the gas valve, gas line and swivel nut (Item 5) onto the venturi (Item 7) gas inlet. Inspect the gas valve flex line, making sure there are no signs of wear or damage. Replace if necessary. For LP models, confirm LP Gas Orifice is inserted into venturi gas inlet before making the connection.

11. Using two (2) wrenches reconnect gas valve to venturi gas inlet.

12. Reinstall the air inlet silencer (Item 1) by pressing it onto the venturi air inlet. Rotate into the normal vertical position (see part A) of Figure 114, page 129.

13. Place silencer clip (Item 2) back onto the air inlet silencer/venturi.

**WARNING** Perform a complete start-up procedure when putting the boiler back into service. See page 97 and all instructions for start-up and verification. Include a soap suds leak test on all interior and exterior gas piping after starting the boiler.

Legend for Figures 112 and 113

A  Boiler interior, (Display, circuit board and display bracket removed to see combustion components).
B  Boiler interior, (Air silencer and toe top piece of heat exchanger insulation removed for clarity).
C  Gas valve from venturi disassembled to access the burner.
D  Blower and venturi disassembled to access the burner.
E  Ignition electrode assembly.
F  Heat exchanger cover plate and components.
G  Burner and components

- 1. Air silencer
- 2. Air silencer retainer clip
- 3. Blower assembly
- 4. Gas valve
- 5. Gas pipe swivel nut
- 6. Fiber washer (light green)
- 7. Venturi assembly
- 8. Blower lock nuts 8mm (2)
- 9. Blower gasket
- 10. Cover plate
- 11. Combustion chamber cover plate retainer nuts (4)
- 12. Heat exchanger insulation
- 13. Ignition electrode assembly
- 14. Burner
- 15. Burner gasket
- 16. Burner insulation
- 17. Burner retainer screws (3)
- 18. Inspection plate window
- 19. Bottom cover plate w/ integrated seal
- 20. Burner tube

Figure 114  Accessing the burner or heat exchanger, air silencer and gas valve removal. (See Legend above).
Cleaning heat exchanger flue side  (continued)

Figure 115  Accessing the burner, heat exchanger, blower assembly and venturi removal.  (See Legend, page 129).
Cleaning DHW and Brazed Plate Heat Exchanger

Procedure for chemical cleaning of DHW circuit

Carefully read and follow the instructions contained.

Chemical cleaning and maintenance must be carried out by professionally qualified personnel, in compliance with the current regulations and according to the manufacturer’s instructions. Do not carry out any operation on the sealed control parts.

Before carrying out any cleaning or maintenance operation, disconnect the unit from the electrical power supply using the switch and/or the special cut-off devices.

The disposal of chemicals and residues of chemical cleaning should be carried out in an appropriate manner, in accordance with current standards.

Domestic water for hot water production harder than 7 grains must be treated before entering combi boiler to avoid scaling internal combi boiler components.

Prolonged boiler operation with untreated water and/or hard water will reduce the production of domestic hot water. Cleaning the brazed plate and combi components may restore the performance of hot water production. Use only NSF approved chemicals that are safe for consumption and suitable for cleaning the combi components - stainless steel 316 (brazed plate) and brass (water manifolds and temperature sensor). Check chemical manufacturer’s instructions and guidelines.

This procedure is intended as a guideline for restoration of the functionality of domestic hot water production.

![Boiler connections for cleaning domestic water circuit](image)

**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. (If used).
  - Use lowest practical temperature setting.
  - Check water temperature immediately after first heating cycle and after any adjustment.

**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.

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. 30 psig by approved water relief valve.

**NOTICE** Before you start, check the compatibility of chemical cleaning product with the material of the heat exchanger and its components. The material of domestic hot water circuit is stainless steel class AISI 316. The brazed plate and water manifolds and temperature sensor are brass.
Cleaning DHW and Brazed Plate Heat Exchanger

Actions for chemical cleaning of Domestic hot water circuit (Refer to Figure 117)

1. Shut down the boiler:
   a. Follow “To Turn Off Gas to Appliance” instructions on boiler and Operating instructions.
   b. Close the boiler manual gas valve.
2. Close off the of cold water inlet valve (Item 6a) placed before the boiler inlet.
3. Release residual pressure in domestic hot water circuit in the boiler by opening a hot water tap downstream of the boiler. Then close the DHW hot water outlet valve (Item 6b).
4. Connect the pipe fittings and hoses of the pump for chemical cleaning to the cold water inlet (3a) and domestic hot water outlet (3b).
5. Fill the pump tank with the de-scaling chemical that is NSF approved. Be sure to follow the manufacturer’s instructions for proper handling and disposal of the used cleaning solution.
6. Circulate the fluid within the domestic hot water circuit by activating the pump switch. Reversing the cleaning flow through the boiler’s domestic water circuit by placing the circulating pump on the domestic hot water outlet hose may be required for proper cleaning.
7. At the end of the cleaning cycle, empty the pump from chemical and recover the product in appropriate containers for disposal.
8. Fill the pump with water and perform a washing cycle in order to remove the chemical product still present within the coils of the heat exchanger, recovering the liquid in suitable containers for disposal.
9. Repeat the washing with water more than once if necessary.
10. Disconnect the pipe fittings and hoses of the pump for chemical cleaning from the cold water inlet (3a) and domestic hot water outlet (3b).
11. Open the cold water inlet valve placed before the boiler inlet.
12. Reconnect the unit to the electrical power supply using the switch and/or the special cut-off devices and turn it ON.
13. Check the correct operation of the boiler and production of domestic hot water.
Cleaning DHW and Brazed Plate Heat Exchanger

Before servicing Brazed Plate Heat Exchanger Assembly

1. Cool down boiler and brazed plate heat exchanger assembly. The following procedure may be used to cool down boiler and components. First follow the operating instructions on page 101 to properly shut off gas supply, but not the power to the boiler. Turn on a domestic hot fixture and allow cool water to flow through boiler. Boiler will lock out on an Ignition Fault but the internal circulator should continue to run cooling down the internal components. Once components are cooled down, turn off all electrical power going to the boiler following the operating instructions on page 101. If procedure is followed, continue on to #3.

**WARNING** Wait until heat exchanger/boiler is cooled down before proceeding. Water in brazed plate heat exchanger may still be HOT! Failure to do so can cause severe injury.

2. Shut down the boiler:
   a. Follow “To Turn Off Gas to Appliance” instructions on boiler and Operating instructions.
   b. Close the boiler manual gas valve.
   c. Only needed if cool down procedure in Step #1 was not needed or followed.

3. Close the domestic cold water inlet isolation valve.

4. Release residual pressure in the domestic hot water circuit in the boiler by opening a hot water tap downstream of the boiler and drain the DHW components by opening the drain valves.

5. Close the space heating valves Boiler Out (1) and Boiler In (4) placed before the boiler connections.

6. Release residual pressure in boiler by operating relief valve or opening boiler drain. Drain boiler by opening drain on boiler in and boiler out.

**Figure 118** Domestic water circuit on the Combi (Back view shown)

**Figure 119** Removal of brazed plate heat exchanger by loosening the two (2) screws.

---

**Brazed plate heat exchanger removal for cleaning**

1. Remove the Brazed Plate Heat Exchanger from boiler assembly by first removing the two (2) Allen Head bolts with a 4mm Allen wrench, see Figure 119. Push brazed plate back away from brazed plate manifolds clearing the bolt bosses on the brazed plate from the manifolds. Then slide the brazed plate up and to the left, removing it from the boiler.

2. The treatment time must be chosen according to the amount of scale deposits present in the brazed plate heat exchanger. However, the amount of time must always be less than the maximum treatment time specified by the chemical manufacturer’s product data sheet.

**NOTICE** The gas valve does NOT need to be removed to replace brazed plate heat exchanger.

3. Brazed plate heat exchanger can be immersed in a chemical cleaning bath.

4. At the end of the cleaning cycle recover the chemical product in appropriate containers for disposal.

5. Flush the brazed plate with potable water in order to remove the chemical product still present within the coils of the heat exchanger, recovering the liquid in suitable containers for disposal.

6. Repeat the rinsing with water more than once if necessary.

7. The cleaned brazed plate heat exchanger can now be reinstalled.

**NOTICE** The brazed plate heat exchanger must be reinstalled in the same orientation.
Cleaning & Maintenance for Domestic Water Inlet Manifold

1. Follow “To turn off Gas Appliance” instructions on boiler and Operating instructions and procedures 1-3 on page 133 “heat exchanger and its serviceable components”.
2. Remove the flow sensor electronic pickup attached, by carefully lifting up and off of the flow transducer/turbine while keeping the wire attached to the flow sensor electronic pickup.
3. Remove the flow transducer/turbine using an 18mm hexagonal socket.
4. Detach the filter from the flow transducer/turbine, and clean filter by using air or water to push through the inside of the filter, opposite of normal flow. Be careful not to damage plastic filter.
5. Be sure to check the O-Ring and seat in the Inlet Manifold to make sure that they are clean and in good condition. Replace O-ring if damaged.
6. Reassemble flow transducer/turbine and filter, then reinsert flow transducer/turbine into the block and tighten down to 8.9 lbs-ft +/- 1.0 lbs-ft.
7. Re-connecting flow sensor electronic pickup to the flow transducer/turbine by gently pushing it down on the flow transducer/turbine. Make sure the wires are still connected to the flow sensor electronic pickup.
8. When servicing the flow transducer/turbine and filter, it is advised to inspect the by-pass filter.
9. Remove by-pass filter using 16mm (5/8”) wrench. Clean the by-pass filter with water if needed. Make sure by-pass is in good working condition. Spring should be in relaxed state and in good working order.
10. Re-insert by-pass and tighten down to 6.3 lbs-ft +/- 1.0 lbs-ft.
11. The boiler inlet water temperature sensor is located in this manifold. Please refer to page 115 section “Checking temperature sensors” to verify proper working condition.

Figure 121 Domestic Water Inlet Manifold components

When re-installing components, make sure gaskets are in good condition and properly aligned before tightening screws.

3. Open the valve of CH system supply (1) and return (5) and fill the boiler with water. Purge all air from system. Check all water joints and ensure no leaks are present.
4. Open valves of the domestic cold water inlet and the domestic hot water outlet. Flush water through system by opening a fixture. Check all water joints and ensure no leaks are present.
5. Follow the operating instructions on page 101 to turn on the gas supply and to restore the electrical power to the boiler. The 3-way valve may be toggled back and forth to bleed air from the system. Follow procedure 1 through 3 on page 112 under “3 way valve test”. Be sure to reset and clear any faults that may have occurred during this service.

Brazed plate heat exchanger reinstalled

**NOTICE**

Four (4) new gaskets must be placed in the DHW inlet and DHW return plate connections to seal brazed plate heat exchanger. See Figure 132, page 144 for service part numbers.
1. Slide the brazed plate heat exchanger into rear of enclosure (ensure brazed plate is in proper orientation; label stating “This side up” should be facing up)
2. Lift brazed plate heat exchanger slightly up and align with DHW connections, reinstall the two (2) Allen head screws, and tighten securely. (Torque to 31 lb-in. +/- 4 lb-in.).

**WARNING**

When re-installing components, make sure gaskets are in good condition and properly aligned before tightening screws.

3. Open the valve of CH system supply (1) and return (5) and fill the boiler with water. Purge all air from system. Check all water joints and ensure no leaks are present.
4. Open valves of the domestic cold water inlet and the domestic hot water outlet. Flush water through system by opening a fixture. Check all water joints and ensure no leaks are present.
5. Follow the operating instructions on page 101 to turn on the gas supply and to restore the electrical power to the boiler. The 3-way valve may be toggled back and forth to bleed air from the system. Follow procedure 1 through 3 on page 112 under “3 way valve test”. Be sure to reset and clear any faults that may have occurred during this service.
12. Open valves of the domestic cold water inlet and the domestic hot water outlet. Flush water through system by opening a fixture. Check all water joints and ensure no leaks are present.

**Cleaning and maintenance for Domestic Water Outlet Manifold (Refer to Figure 122 and Figure 123)**

1. Follow “To turn off Gas Appliance” instructions on boiler and Operating instructions and procedures 4 and 5 on page 133
2. Slide actuator retaining clip out of the slot, see Figure 122.
3. Remove the actuator from Domestic Water Outlet Manifold while keeping wire attached.
4. Remove spacer using 28mm (1 1/8”) wrench, removing the sanitary shutter with it.
5. Remove heating cartridge using 22mm (7/8”) wrench
6. Clean components for both the Heating Cartridge and the Sanitary Shutter. Ensure springs are working properly by compressing them and shut off valves and valve seats are in good condition. If components are damage or have excessive wear they must be replaced.
7. Check both O-rings and seats to make sure they are undamaged. Replace O-rings if necessary. Clean O-ring seats and then apply a small amount of non-petroleum grease afterwards.
8. Apply a small amount of non-petroleum grease to the tip of the rod of the sanitary shutter, and reassemble it with the spacer.
9. Reinstall shutter/spacer into the Domestic Water Outlet Manifold, but do not tighten part.
10. Screw heating cartridge back into the Domestic Water Outlet Manifold, and tighten it down to 8.9 lbs-ft +/- 1.0 lbs-ft.
11. Tighten spacer down to 8.9 lbs-ft +/- 1.0 lbs-ft.
12. Reinstall actuator and actuator retaining clip back onto the Domestic Water Outlet Manifold.
13. The Domestic Hot Water temperature sensor is located in this manifold. Please refer to page 115 section “Checking temperature sensors” to verify proper working condition
14. Open the valves of CH system supply and return and fill the boiler with water. Purge all air from system. Check all water joints and ensure no leaks are present.
### Replacement parts

**WARNING** **DO NOT SERVICE THE BOILER WITHOUT A MAINTENANCE KIT AVAILABLE**

The maintenance kit includes components that may have to be replaced when accessing or disassembling parts of the boiler. Failure to replace damaged components and to use only the parts specifically intended for the boiler can result in severe personal injury, death or substantial property damage. See Figure 125, page 137 for part number.

**WARNING** Failure to adhere to these guidelines can result in severe personal injury, death or substantial property damage.

**OBTAIN PARTS ONLY THROUGH WEIL-McLAIN**

Replacement parts must be purchased through a local Weil-McLain distributor. When ordering, specify boiler model and size and include description and part number of replacement part. Results from using modified or other manufactured parts will not be covered by warranty and may damage boiler or impair operation.

**THE BOILER CONTAINS CERAMIC FIBER MATERIALS**

The boiler contains ceramic fiber materials. Use care when handling these materials per instructions on page 106 of this manual. Failure to comply could result in severe personal injury.

**REINSTALL Jacket door**

Inspect boiler jacket door gaskets on front of cabinet and reinstall boiler jacket door after start or servicing. The boiler jacket door must be securely fastened to the boiler to prevent boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances. Failure to keep the jacket door securely fastened could result in severe personal injury or death.

**BEFORE SERVICING or MAKING CONNECTIONS —**

ALWAYS TURN POWER OFF TO THE BOILER TO PREVENT ELECTRICAL SURGES, WHICH CAN DAMAGE BOILER COMPONENTS.

**LABEL WIRES BEFORE REMOVING**

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

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### REPLACEMENT PART NUMBERS

Weil-McLain part numbers are found in this manual and in Weil-McLain Boilers and Controls Repair Parts Lists.

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### WHEN OPERATING THE BOILER ON PROPANE GAS

**WARNING** ALL ECO Tec boilers must be converted in order to operate with propane gas.

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### Figure 124  Propane conversion kits and instructions

<table>
<thead>
<tr>
<th>Boiler model</th>
<th>Kit part number</th>
<th>Installation instructions</th>
</tr>
</thead>
</table>
### Replacement parts (continued)

**Figure 125  Miscellaneous service parts and kits**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHEMICALS</strong></td>
<td></td>
</tr>
<tr>
<td>Antifreeze, Sentinel X500, 1 Gallon</td>
<td>592-900-029</td>
</tr>
<tr>
<td>Corrosion inhibitor, Sentinel X100</td>
<td>592-900-002</td>
</tr>
<tr>
<td>Sentinel X100 Quick Test Kit</td>
<td>592-900-005</td>
</tr>
<tr>
<td><strong>BOILER ACCESSORIES</strong></td>
<td></td>
</tr>
<tr>
<td>ECO Tec 80/110 maintenance kit — igniter, igniter gasket, venturi gas valve</td>
<td>383-700-265</td>
</tr>
<tr>
<td>BOILER ACCESSORIES</td>
<td></td>
</tr>
<tr>
<td>ECO Tec 155 maintenance kit — igniter, igniter gasket, venturi gas valve</td>
<td>383-700-266</td>
</tr>
<tr>
<td>ECO Tec 199 maintenance kit — igniter, igniter gasket, venturi gas valve</td>
<td>383-700-267</td>
</tr>
<tr>
<td>Condensate trap kit (supplied with boiler) — condensate tube, barb polypropylene 3/16, and hose clamps</td>
<td>383-700-268</td>
</tr>
<tr>
<td><strong>ECO Tec Pedestal - floor stand</strong></td>
<td>383-700-339</td>
</tr>
<tr>
<td><strong>ECO Tec Easy Up Manifold</strong></td>
<td>383-700-343</td>
</tr>
<tr>
<td><strong>Low Water Cut-Off</strong></td>
<td>511-100-005</td>
</tr>
<tr>
<td><strong>DHW Service Valve</strong></td>
<td>383-700-346</td>
</tr>
<tr>
<td><strong>System sensor (2)</strong></td>
<td>383-700-371</td>
</tr>
<tr>
<td><strong>CONDENSATE HANDLING ACCESSORIES</strong></td>
<td></td>
</tr>
<tr>
<td>Condensate neutralizer kit</td>
<td>383-500-631</td>
</tr>
<tr>
<td><strong>VENT/AIR PARTS AND KITS (PVC or STAINLESS STEEL)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>available from Weil-McLain</strong></td>
<td></td>
</tr>
<tr>
<td>Weil-McLain Direct Exhaust Venting Kit</td>
<td>383-500-778</td>
</tr>
<tr>
<td>Includes interior/exterior intake/exhaust plates. 2” &amp; 3” vent screens, templates and mounting hardware</td>
<td></td>
</tr>
<tr>
<td>Weil-McLain sidewall vent/air cap termination kit for PVC vent and air pipes</td>
<td>383-500-397</td>
</tr>
<tr>
<td>Includes sidewall vent/air termination cap, inside and outside cover plates, and mounting hardware; openings are sized for 3&quot; PVC pipe (requires field-installed 3 x 2 adapter if using 2&quot; vent/air pipes)</td>
<td></td>
</tr>
<tr>
<td>Weil-McLain sidewall vent/air cap termination kit for AL29-4C vent pipe and PVC air pipe</td>
<td>382-200-430</td>
</tr>
<tr>
<td>Includes sidewall vent/air termination cap, inside and outside cover plates, and mounting hardware; openings are sized for 3&quot; SS vent pipe and 3&quot; PVC air pipe (requires field-installed 3 x 2 adapter if using 2&quot; vent/air pipes)</td>
<td></td>
</tr>
<tr>
<td><strong>VENT/AIR PARTS AND KITS (PVC IPEX)</strong></td>
<td></td>
</tr>
<tr>
<td>Available from IPEX ONLY</td>
<td></td>
</tr>
<tr>
<td>PVC concentric vent kit — horizontal or vertical (includes components for concentric assembly)</td>
<td>196005</td>
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<tr>
<td>2&quot; PVC concentric</td>
<td></td>
</tr>
<tr>
<td>Approved for 80/110/150 models only</td>
<td>196006</td>
</tr>
<tr>
<td>3&quot; PVC concentric</td>
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</tr>
<tr>
<td>M&amp;G Simpson-Duravent PolyPro VERTICAL concentric vent/air kit; color = black (part number shown) or terra cotta (add -TC suffix)</td>
<td>2PPS-VK</td>
</tr>
<tr>
<td>2&quot; polypropylene pipe</td>
<td></td>
</tr>
<tr>
<td>3&quot; polypropylene pipe</td>
<td></td>
</tr>
<tr>
<td>M&amp;G Simpson-Duravent PolyPro SIDEWALL separate air and vent pipes</td>
<td>2PPS-HTP</td>
</tr>
<tr>
<td>2&quot; polypropylene pipe</td>
<td></td>
</tr>
<tr>
<td>3&quot; polypropylene pipe</td>
<td></td>
</tr>
<tr>
<td>M&amp;G Simpson-Duravent PolyPro 3&quot; to 2&quot; Adapter Polypropylene</td>
<td>3PPS-R2L</td>
</tr>
<tr>
<td><strong>VENT/AIR PARTS AND KITS (POLYPROPYLENE PIPE)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>available from Centrotherm Eco Systems ONLY</strong></td>
<td></td>
</tr>
<tr>
<td>Centrotherm INNOFLUE SIDEWALL concentric vent/air kit</td>
<td>ICWT352</td>
</tr>
<tr>
<td>3&quot; polypropylene pipe</td>
<td>ICWT242</td>
</tr>
<tr>
<td>Centrotherm INNOFLUE VERTICAL concentric vent/air kit</td>
<td>ICRT2439</td>
</tr>
<tr>
<td>2&quot; polypropylene pipe</td>
<td>ICRT3539</td>
</tr>
<tr>
<td>Centrotherm INNOFLUE</td>
<td>ISRD0302</td>
</tr>
<tr>
<td>3&quot; to 2&quot; Adapter Polypropylene</td>
<td></td>
</tr>
<tr>
<td><strong>Stainless Steel Vent/Flue &amp; Air Adapter Connections</strong></td>
<td></td>
</tr>
<tr>
<td>Heat Fab, Inc. — Saf T Vent</td>
<td>9301PVC</td>
</tr>
<tr>
<td>Z Flex, Inc. — Z Vent</td>
<td>2SVSAFNS03</td>
</tr>
<tr>
<td>Metal Fab, Inc. — CORR/Guard</td>
<td>3CPGVA</td>
</tr>
</tbody>
</table>

Go to www.weil-mcclain.com to locate Weil-McLain distributors
## Replacement parts (continued)

**Figure 126**  
Jacket parts — ECO Tec 80/110/150/199 (see Figure 127, page 139 for illustration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description / contents</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Jacket door</td>
<td>Jacket door, gaskets and labels</td>
<td>383-700-269</td>
</tr>
<tr>
<td>110</td>
<td>Gasket bottom, top &amp; sides for jacket door</td>
<td>Seals for door bottom, sides and top of cabinet</td>
<td>383-700-363</td>
</tr>
<tr>
<td>120</td>
<td>Jacket Assembly</td>
<td>Jacket panels, gaskets and hardware</td>
<td>383-700-271</td>
</tr>
<tr>
<td>130</td>
<td>Flue pipe 80mm Polypropylene</td>
<td>Offset flue pipe</td>
<td>383-700-273</td>
</tr>
<tr>
<td>140</td>
<td>Adapter Vent-Air Inlet</td>
<td>Top air inlet adapter with internal gasket</td>
<td>383-700-274</td>
</tr>
<tr>
<td>150</td>
<td>Adapter Vent-Air Outlet</td>
<td>Top air outlet adapter with internal gasket</td>
<td>383-700-275</td>
</tr>
<tr>
<td>160</td>
<td>Air baffle and screws</td>
<td>Air baffle and screws</td>
<td>383-700-276</td>
</tr>
<tr>
<td>170</td>
<td>Display/bracket gasket</td>
<td>Display gasket</td>
<td>383-700-361</td>
</tr>
<tr>
<td></td>
<td>Display/door gasket</td>
<td>Display housing to door gasket</td>
<td>383-700-361</td>
</tr>
<tr>
<td>180</td>
<td>Panel control bracket/cover</td>
<td>Control bracket, cover and hardware</td>
<td>383-700-280</td>
</tr>
<tr>
<td>190</td>
<td>Display board bracket and gaskets (Not shown)</td>
<td>Mounting for the display to inside of cabinet</td>
<td>383-700-281</td>
</tr>
<tr>
<td>200</td>
<td>Wall mount bracket</td>
<td></td>
<td>383-700-386</td>
</tr>
<tr>
<td>210</td>
<td>Dome plug</td>
<td>Hole plug, 1-3/8&quot; Dia. Black, for sealing Combi pipe holes</td>
<td>383-700-362</td>
</tr>
<tr>
<td></td>
<td>Pipe grommet seal (for 2&quot; I.D. hole)</td>
<td>Seals top water pipe to cabinet</td>
<td>383-700-362</td>
</tr>
<tr>
<td></td>
<td>Pipe grommet seal (for 1-5/8&quot; I.D. hole)</td>
<td>Seals condensate tube to bottom of cabinet</td>
<td>383-700-362</td>
</tr>
<tr>
<td>220</td>
<td>Flue gasket</td>
<td></td>
<td>383-700-384</td>
</tr>
<tr>
<td>230</td>
<td>Kit-Service Cabinet Top</td>
<td></td>
<td>383-700-390</td>
</tr>
<tr>
<td>240</td>
<td>Kit-Service Cabinet Door Top</td>
<td></td>
<td>383-700-391</td>
</tr>
<tr>
<td>250</td>
<td>Water pipe bracket</td>
<td></td>
<td>383-700-393</td>
</tr>
</tbody>
</table>
Replacement parts (continued)

Figure 127  Jacket assembly — ECO Tec 80/110/150/199 (see Figure 126, page 138 for part numbers)
## Replacement parts (continued)

**Figure 128**  Heat exchanger parts ECO Tec 80/110/150/199 (see Figure 129, page 141 for illustration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Part Number</th>
<th>Model 80</th>
<th>Model 110</th>
<th>Model 150</th>
<th>Model 199</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Heat exchanger</td>
<td>383-700-284</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-285</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-286</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>110</td>
<td>Heat exchanger, condensate dish, cover plate, burner, igniter, sight glass, refractory, water sensors, gaskets, silicone, and hardware (includes items 100, 120, 130, 140, 150, 160, 170, 180, 210, 220, and 230)</td>
<td>383-700-287</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-288</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-289</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>120</td>
<td>Insulation with integrated seal - bottom cover plate</td>
<td>383-700-291</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-292</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-293</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>130</td>
<td>Burner</td>
<td>383-700-297</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-298</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-299</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>140</td>
<td>Disc burner refractory</td>
<td>383-700-372</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-373</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>Burner gasket</td>
<td>383-700-300</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-301</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>160</td>
<td>Burner tube</td>
<td>383-700-290</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>Ignition electrode kit (igniter, gasket and screws)</td>
<td>383-700-295</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>Kit - Service Silencer O-ring, blower gasket, gas flex line, and igniter gaskets</td>
<td>383-700-360</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>190</td>
<td>Sight glass kit (bracket, glass, gaskets, and hardware)</td>
<td>383-700-185</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>Condensate dish</td>
<td>383-700-331</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-332</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-333</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>210</td>
<td>Condensate dish gasket</td>
<td>383-700-381</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-382</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-383</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>220</td>
<td>Flue gasket</td>
<td>383-700-384</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>230</td>
<td>Flue restrictor</td>
<td>383-700-364</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240</td>
<td>Top cover insulation &amp; heat exchanger insulation wrap</td>
<td>383-700-366</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-367</td>
<td>•</td>
<td></td>
<td>•</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-368</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>
Replacement parts (continued)

Figure 129  Heat exchanger assembly ECO Tec 80/110/150/199 (see Figure 128, page 140 for part numbers)
## Replacement parts (continued)

**Figure 130** Combustion components parts ECO Tec 80/110/150/199 (see Figure 131, page 143 for illustration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Part Number</th>
<th>Model 80/110</th>
<th>Model 150</th>
<th>Model 199</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Air silencer, clip and gasket</td>
<td>383-700-294</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>110</td>
<td>Kit - Service Silencer O-ring, blower gasket, gas flex line, and igniter gaskets</td>
<td>383-700-360</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>120</td>
<td>Blower, gasket and hardware</td>
<td>383-700-303</td>
<td>●</td>
<td>●</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-304</td>
<td>—</td>
<td>—</td>
<td>■</td>
</tr>
<tr>
<td>130</td>
<td>Venturi</td>
<td>383-700-305</td>
<td>●</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-306</td>
<td>—</td>
<td>●</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>383-700-307</td>
<td>—</td>
<td>—</td>
<td>●</td>
</tr>
<tr>
<td>140</td>
<td>Air silencer clip</td>
<td>383-700-308</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>150</td>
<td>Gas valve assembly</td>
<td>383-700-313</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>160</td>
<td>Adapter gas flex line, elbow, gas valve flange with hardware and the gas pipe</td>
<td>383-700-283</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>170</td>
<td>Gas flex line</td>
<td>383-700-224</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Replacement parts (continued)

Figure 131  Combustion components parts ECO Tec 80/110/150/199 (see Figure 130, page 142 for part numbers)
### Replacement parts (continued)

**Figure 132** Combi water piping for ECO Tec 80/110/150/199 (see Figure 134, page 145 for illustration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description / contents</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Grommet - water pipe sealing</td>
<td></td>
<td>383-700-361</td>
</tr>
<tr>
<td>110</td>
<td>Pipe - water top</td>
<td></td>
<td>383-700-377</td>
</tr>
<tr>
<td>120</td>
<td>Condensate drain tube</td>
<td>with hose nipple</td>
<td>383-700-268</td>
</tr>
<tr>
<td>130</td>
<td>Pipe - water flex 1&quot;</td>
<td></td>
<td>383-700-378</td>
</tr>
<tr>
<td>140</td>
<td>Pipe - water return</td>
<td></td>
<td>383-700-375</td>
</tr>
<tr>
<td>150</td>
<td>Brazed plate heat exchange</td>
<td>includes Item 230</td>
<td>383-700-355</td>
</tr>
<tr>
<td>160</td>
<td>DHW flow manifold</td>
<td>includes Item 210</td>
<td>383-700-356</td>
</tr>
<tr>
<td>170</td>
<td>Actuator - 3-way valve</td>
<td>includes retaining clip</td>
<td>383-700-358</td>
</tr>
<tr>
<td>180</td>
<td>DHW return manifold</td>
<td>with sensor tapping, includes Item 220</td>
<td>383-700-357</td>
</tr>
<tr>
<td>190</td>
<td>Circulator</td>
<td></td>
<td>383-700-379</td>
</tr>
<tr>
<td>200</td>
<td>Flow transducer/turbine</td>
<td></td>
<td>383-700-380</td>
</tr>
<tr>
<td>210</td>
<td>DHW flow manifold components</td>
<td></td>
<td>383-700-349</td>
</tr>
<tr>
<td>220</td>
<td>DHW return manifold components</td>
<td></td>
<td>383-700-350</td>
</tr>
<tr>
<td>230</td>
<td>Brazed plate gaskets (not shown)</td>
<td></td>
<td>383-700-359</td>
</tr>
<tr>
<td>240</td>
<td>DHW, return &amp; supply gaskets</td>
<td></td>
<td>383-700-392</td>
</tr>
<tr>
<td>250</td>
<td>Pressure switch</td>
<td></td>
<td>383-700-329</td>
</tr>
<tr>
<td>260</td>
<td>Water temperature sensor</td>
<td></td>
<td>383-700-319</td>
</tr>
<tr>
<td>270</td>
<td>Flow sensor electronic pickup</td>
<td></td>
<td>383-700-389</td>
</tr>
</tbody>
</table>

**Figure 133** Heating Only water piping for ECO Tec 80/110/150/199 (see Figure 134, page 145 for illustration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description / contents</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Grommet - water pipe sealing</td>
<td></td>
<td>383-700-361</td>
</tr>
<tr>
<td>110</td>
<td>Pipe - water top</td>
<td></td>
<td>383-700-377</td>
</tr>
<tr>
<td>120</td>
<td>Condensate drain tube</td>
<td>with hose nipple</td>
<td>383-700-268</td>
</tr>
<tr>
<td>240</td>
<td>DHW, return &amp; supply gaskets</td>
<td></td>
<td>383-700-392</td>
</tr>
<tr>
<td>250</td>
<td>Pressure switch</td>
<td></td>
<td>383-600-073</td>
</tr>
<tr>
<td>260</td>
<td>Water temperature sensor</td>
<td></td>
<td>383-700-319</td>
</tr>
<tr>
<td>280</td>
<td>Pipe - water flex 1&quot;</td>
<td></td>
<td>383-700-378</td>
</tr>
<tr>
<td>290</td>
<td>Pipe - water return</td>
<td></td>
<td>383-700-375</td>
</tr>
<tr>
<td>300</td>
<td>Pipe - water return bottom</td>
<td>with sensor tapping</td>
<td>383-700-376</td>
</tr>
<tr>
<td>310</td>
<td>Pipe - water supply bottom</td>
<td></td>
<td>383-700-374</td>
</tr>
</tbody>
</table>
Replacement parts (continued)

Figure 134  Combi and Heating Only water piping for ECO Tec 80/110/150/199
(see Figure 132, page 144 or Figure 133, page 144 for part numbers)
### Replacement parts (continued)

**Figure 135  Controls and electrical components - ECO Tec 80/110/150/199 (see Figure 136, page 147 for illustration)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description / contents</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Flue temperature sensor &amp; grommet</td>
<td>One (1) sensor &amp; grommet</td>
<td>383-500-600</td>
</tr>
<tr>
<td>110</td>
<td>Outdoor temperature sensor</td>
<td></td>
<td>383-500-125</td>
</tr>
<tr>
<td>120</td>
<td>System temperature sensor</td>
<td>Two (2) sensors</td>
<td>383-700-371</td>
</tr>
<tr>
<td>130</td>
<td>Transformer 120V/50V/24V</td>
<td>50 VA transformer</td>
<td>383-700-320</td>
</tr>
<tr>
<td>140</td>
<td>Display board assembly</td>
<td>Includes circuit board and plastic housing</td>
<td>383-700-321</td>
</tr>
<tr>
<td>150</td>
<td>Control module assembly</td>
<td>Control module and housing</td>
<td>383-700-322</td>
</tr>
<tr>
<td>160</td>
<td>Wire harness — line voltage (not shown)</td>
<td></td>
<td>383-700-323</td>
</tr>
<tr>
<td>170</td>
<td>Wire harness — low voltage (not shown)</td>
<td></td>
<td>383-700-324</td>
</tr>
<tr>
<td>180</td>
<td>Ignition cable (not shown)</td>
<td></td>
<td>383-500-619</td>
</tr>
<tr>
<td>190</td>
<td>Fuse 2.5 amp, (qty. 5) fast blow Ato 4 amp, fast blow Fuse 3 amp, (qty. 1) fast blow Ato 4 amp, fast blow Fuse 4 amp, (qty. 1) fast blow Ato 4 amp, fast blow</td>
<td>(not shown — see Figure 102, page 115)</td>
<td>383-700-369</td>
</tr>
<tr>
<td>200</td>
<td>Jumper for low voltage terminal blocks (not shown)</td>
<td>Five (5) Jumpers</td>
<td>383-500-641</td>
</tr>
<tr>
<td>210</td>
<td>Connector electrical control (not shown)</td>
<td>Includes Eight (8) connectors</td>
<td>383-900-111</td>
</tr>
<tr>
<td>220</td>
<td>Low voltage sealed wire grommet (not shown)</td>
<td>Seals thermostat wire at entrance to cabinet</td>
<td>383-700-385</td>
</tr>
<tr>
<td>230</td>
<td>Harness - Blower jumper (not shown)</td>
<td></td>
<td>383-700-351</td>
</tr>
<tr>
<td>240</td>
<td>Harness - Display to control module (not shown)</td>
<td></td>
<td>383-700-352</td>
</tr>
<tr>
<td>250</td>
<td>Harness - Actuator (Combi only) (not shown)</td>
<td></td>
<td>383-700-353</td>
</tr>
<tr>
<td>260</td>
<td>Harness - Flow sensor (Combi only) (not shown)</td>
<td></td>
<td>383-700-354</td>
</tr>
<tr>
<td>270</td>
<td>Harness - BMS (not shown)</td>
<td></td>
<td>383-700-272</td>
</tr>
<tr>
<td>280</td>
<td>Relief valve</td>
<td>30 PSIG relief valve — shipped loose for field installation</td>
<td>383-500-095</td>
</tr>
<tr>
<td>290</td>
<td>Pressure &amp; temperature gauge</td>
<td>Shipped loose for field installation</td>
<td>380-000-000</td>
</tr>
</tbody>
</table>
Replacement parts (continued)

Figure 136  Controls and electrical assemblies - ECO Tec 80/110/150/199 (see Figure 135, page 146 for part numbers)

ECO Tec 154
Dimensions

Figure 137  Dimensional data — ECO Tec 80/110/150/199 (all dimensions in inches)

1. Boiler Out tapping — 1” Male NPT
2. Boiler In tapping — 1” Male NPT
3. Control display and navigation buttons
4. DHW In/Out tapping — 3/4” Male NPT
5. Vent connection: 3” PVC/PP/SS
6. Gas connection 1/2” Male NPT
7. Condensate tube connection
8. Air connection: 3” PVC/PP/SS
9. Boiler tapping for relief valve - 3/4” Male NPT
10. Electrical entrance openings
## Ratings — ECO Tec boilers

### AHRI Certified Ratings

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>CSA Input</th>
<th>Heating Capacity</th>
<th>Seasonal Efficiency</th>
<th>Net Water Rating</th>
<th>Boiler Water Content</th>
<th>Vent/Comb. Air Connection Diameter</th>
<th>% Input derate vs vent length</th>
<th>Natural gas Vent/air piping</th>
<th>Propane Vent/air piping</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Tec 80</td>
<td>80,000 Btuh (Note 5)</td>
<td>74,000 Btuh (Note 2)</td>
<td>95.0 AFUE, % (Note 1)</td>
<td>64 MBH (Note 3)</td>
<td>2.2 Gallons (Note 4)</td>
<td>3&quot; PVC/PP/SS</td>
<td>5%</td>
<td>—</td>
<td>5%</td>
</tr>
<tr>
<td>ECO Tec 110</td>
<td>110,000 Btuh</td>
<td>100,000 Btuh</td>
<td>95.0 AFUE, %</td>
<td>87 MBH</td>
<td>2.2 Gallons</td>
<td>3&quot; PVC/PP/SS</td>
<td>10%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>ECO Tec 150</td>
<td>150,000 Btuh</td>
<td>139,000 Btuh</td>
<td>95.0 AFUE, %</td>
<td>121 MBH</td>
<td>3.1 Gallons</td>
<td>3&quot; PVC/PP/SS</td>
<td>13%</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>ECO Tec 199</td>
<td>199,000 Btuh</td>
<td>184,000 Btuh</td>
<td>95.0 AFUE, %</td>
<td>160 MBH</td>
<td>3.8 Gallons</td>
<td>3&quot; PVC/PP/SS</td>
<td>13%</td>
<td>5%</td>
<td>13%</td>
</tr>
</tbody>
</table>

### Notes

1. As an Energy Star Partner, Weil-McLain has determined that ECO Tec 80, 110, 150 and 199 boilers meet the Energy Star guidelines for energy efficiency. NOTE: Adjusting boiler firing rate will affect AFUE rating.

2. Based on standard test procedures prescribed by the United States Department of Energy. Ratings also referred to as CSA Output. NOTE that only DOE Heating Capacity and AFUE are certified by AHRI. AFUE is also known as Annual Fuel Utilization Efficiency or Seasonal Efficiency.

3. 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 pickup. Ratings are based on a piping and pickup allowance of 1.15. An additional allowance should be made for unusual piping and pickup loads.

4. ECO Tec boilers must be direct-vented. ECO Tec boilers require special venting, consistent with Category IV boiler. Use only the vent materials and methods specified in this manual. ECO Tec boilers may be direct exhaust vented with Kit option.

5. ECO Tec vent/air pipes can be either 2" or 3". An adapter is required for 2" venting.

6. All vent and air pipe elbows must be sweep elbows, NOT short-radius elbows.

## THE OUTDOOR SENSOR SUPPLIED WITH THE BOILER MUST BE INSTALLED UNLESS EXEMPTED BELOW:

### IMPORTANT

In accordance with [Section 303 of the 2007 Energy Act](https://leg小腿.leg小腿.leg小腿), 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 Combi model).
## Ratings — ECO Tec boilers

### Figure 139  Engineering Data — ECO Tec 80/110/150/199 boilers

<table>
<thead>
<tr>
<th>Boiler Model</th>
<th>Shipping weight</th>
<th>Operating weight</th>
<th>Water content</th>
<th>Water flow rate per boiler</th>
<th>Vent/air pipe size: (Provide a separate vent for each boiler)</th>
<th>Electrical service required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pounds per boiler</td>
<td>Pounds per boiler</td>
<td>Gallons per boiler</td>
<td>GPM @ 20°F rise</td>
<td>GPM @ 40°F rise</td>
<td>Note 1</td>
</tr>
<tr>
<td>HO / Combi HO / Combi 80</td>
<td>138 / 147</td>
<td>141 / 152</td>
<td>2.2</td>
<td>7.4</td>
<td>3.7</td>
<td>2&quot; or 3&quot;</td>
</tr>
<tr>
<td>110</td>
<td>138 / 147</td>
<td>141 / 152</td>
<td>2.2</td>
<td>10.0</td>
<td>5.0</td>
<td>2&quot; or 3&quot;</td>
</tr>
<tr>
<td>150</td>
<td>150 / 159</td>
<td>162 / 172</td>
<td>3.1</td>
<td>13.9</td>
<td>7.0</td>
<td>2&quot; or 3&quot;</td>
</tr>
<tr>
<td>199</td>
<td>161 / 170</td>
<td>178 / 187</td>
<td>3.8</td>
<td>18.4</td>
<td>9.2</td>
<td>2&quot; or 3&quot;</td>
</tr>
</tbody>
</table>

### Notes

1. Operating weight is the total weight of the boiler, including water.

2. Vent/air pipes can be either 2" or 3" pipe.
   All of the boilers will automatically de-rate as vent/air pipe length increases, due to the pressure loss through the piping. See Figure 138, page 149 for details.
   All **ECO Tec** installations require a separate vent pipe and termination for each boiler. **Vent piping cannot be manifolded.** Install and terminate vents as described in vent/air installation instructions in this manual.
   Combustion air piping can be individually piped or manifolded.

3. Total amp requirement includes up to four (4) circulators, not exceeding 2.2 amps per circulator.

### Figure 140  DHW Temperature Rise vs Flow  (Chart 3)

**Chart 3**

DHW Temperature Rise vs. Flow

- 110
- 150
- 199

DHW Flow Rate (gpm) vs DHW Delta (°F)
## Installation and Service Certificate

### Boiler Data

<table>
<thead>
<tr>
<th>Boiler Model / Series</th>
<th>ECO Tec / Series</th>
<th>Date Installed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Consumer Protection (CP) Number</th>
<th>FUEL: Natural</th>
<th>LP</th>
<th>Btu Input</th>
</tr>
</thead>
</table>

### CERTIFIED THAT:

- Installation instructions have been followed.
- Check-out sequence has been performed.
- Information on next two pages is certified to be correct.
- Information received and left with owner/maintenance person.

### Installer

<table>
<thead>
<tr>
<th>Installer</th>
<th>(Company)</th>
<th>(Address)</th>
<th>(Phone)</th>
<th>(Installer’s Signature)</th>
</tr>
</thead>
</table>


# Installation and Gas Boiler Data Collection Sheet

<table>
<thead>
<tr>
<th>Boiler Model / Series</th>
<th>Date Installed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO Tec __________ / Series______</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CP Number:</th>
<th>Fuel Type: Natural__ LP__</th>
<th>BTU Input:</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flame signal on control display at HIGH fire:</th>
<th>Flame signal on control display at LOW fire:</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Was venturi changed? YES___ NO___</th>
<th>Was gas valve throttle adjusted? YES___ NO___</th>
<th>Was gas valve offset adjusted? YES___ NO___</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

### Boiler Settings

<table>
<thead>
<tr>
<th>System Type:</th>
<th>Target Modulation Sensor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Altitude: Feet</th>
<th>Target Adjust:</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuel Type: NG___ Propane___</th>
<th>Max Target Temp: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ODT Sensor Exempt: YES___ NO___</th>
<th>Min Target Temp: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manual Reset High Temp Limit: __________ 'F</th>
<th>Outdoor Temp for Min Target: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWSD Temp: __________ 'F</th>
<th>Outdoor Temp for Max Target: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

### Circulator Exercising

<table>
<thead>
<tr>
<th>Voltage for Max Target: __________ V</th>
<th>0-10V Min: __________ V</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target Boost Time: __________ Mins</th>
<th>System Supply On Diff: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Supply Off Diff: __________ 'F</th>
<th>Cold Start Error: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max BLR Temp: __________ 'F</th>
<th>Boiler Out On Diff: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boiler Out Off Diff: __________ 'F</th>
<th>Max On Time: __________ Mins</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Min On Time: __________ Mins</th>
<th>Run Boiler Pump: YES___ NO___</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Run Aux Pump/Output: YES___ NO___</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
</tr>
</tbody>
</table>

### Input Assignments

<table>
<thead>
<tr>
<th>Pre Pump: __________ Sec</th>
<th>Post Pump: __________ Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max Rate: __________ %</th>
<th>Min Rate: __________ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Heat Demand: 1st___ 2nd___ OFF___</th>
<th>Response Time: __________ Mins</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Combi enabled: ON___ OFF___</th>
<th>Hot Water Temp.: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DHW On Diff: __________ 'F</th>
<th>DHW Off Diff: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREHEAT Mode: OFF___ ECON___ H.PERF___</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREHEAT Temp.: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREHEAT Circ Diff: __________ 'F</th>
<th>PREHEAT On Diff: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREHEAT Off Diff: __________ 'F</th>
<th>ECO BOOST: ON___ OFF___</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECO BOOST Setpoint: __________ 'F</th>
<th>ECO BOOST On Diff: __________ 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

| ECO BOOST Off Diff: __________ 'F | __________ |
|---------------------------------|___________|
## Installation and Gas Boiler Data Collection Sheet

### CO2 @: High Fire _______ %  Low Fire _______ %

### CO2@: High Fire _______ ppm  Low Fire _______ ppm

Natural Gas / LP input rate measured: HIGH _______ CFH / LOW _______ CFH

<table>
<thead>
<tr>
<th>Priority 2 Settings</th>
<th>Priority 3 Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Type:</td>
<td>System Type:</td>
</tr>
<tr>
<td>Target Modulation Sensor:</td>
<td>Target Modulation Sensor:</td>
</tr>
<tr>
<td>Target Adjust:</td>
<td>Target Adjust:</td>
</tr>
<tr>
<td>Max Target Temp:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Min Target Temp:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Outdoor Temp for Min Target:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Outdoor Temp for Max Target:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Voltage for Max Target:</td>
<td>___________ V</td>
</tr>
<tr>
<td>Voltage for Min Target:</td>
<td>___________ V</td>
</tr>
<tr>
<td>Target Boost Time:</td>
<td>___________ Mins</td>
</tr>
<tr>
<td>System Supply On Diff:</td>
<td>___________°F</td>
</tr>
<tr>
<td>System Supply Off Diff:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Cold Start Error:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Max BLR Temp:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Boiler Out On Diff:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Boiler Out Off Diff:</td>
<td>___________°F</td>
</tr>
<tr>
<td>Max On Time:</td>
<td>___________ Mins</td>
</tr>
<tr>
<td>Min On Time:</td>
<td>___________ Mins</td>
</tr>
<tr>
<td>Run Boiler Pump:</td>
<td>YES __ NO ___</td>
</tr>
<tr>
<td>Run Aux Pump/Output:</td>
<td>YES __ NO ___</td>
</tr>
<tr>
<td>Pre Pump:</td>
<td>___________ Sec</td>
</tr>
<tr>
<td>Post Pump:</td>
<td>___________ Sec</td>
</tr>
<tr>
<td>Max Rate:</td>
<td>___________ %</td>
</tr>
<tr>
<td>Min Rate:</td>
<td>___________ %</td>
</tr>
<tr>
<td>Additional Heat Demand:</td>
<td>1st __ 2nd __ OFF__</td>
</tr>
<tr>
<td>Response Time:</td>
<td>___________ Mins</td>
</tr>
</tbody>
</table>
# Customer Info:

- **Contact:**
- **Contractor:**
- **Job name:**
- **City, state:**
- **Distributor:**

# Maintenance Info:

- **Name:**
- **Phone:**
- **Model:**
- **CP#:**
- **Installed:**

## System Components:

- **Near boiler pipe size:**
- **DHW tank (yes/no):**
- **DHW direct/system:**
  - **DHW model:**
  - **DHW pipe size:**
- **DHW circulator model:**
- **Is there air in system?:**

## Diagnostic Errors:

- **Ignition retries:**
- **Manual reset CNT:**
- **Auto reset CNT:**

## Software Versions:

- **Display:**
- **Main micro:**
- **Second micro:**

## Boiler/System Piping Details (Please Sketch)

## Lockout History #1

<table>
<thead>
<tr>
<th>Fault Name</th>
<th>Fault Type</th>
<th>Fault Time</th>
<th>Fault Date</th>
<th>Status</th>
</tr>
</thead>
</table>

## Outputs:

- **Output 1:**
- **Output 2:**
- **Output 3:**
- **Output 4:**
- **Boiler Circ:**
- **Blower signal:**
- **Additional Heat Demand:**
- **Alarm:**

## Temperatures:

- **Boiler out 1:**
- **Boiler out 2:**
- **DHW out 1:**
- **DHW out 2:**
- **Boiler in:**
- **Flue 1:**
- **Flue 2:**
- **Outdoor:**

## Inputs:

- **Status:**
- **Input 1:**
- **Input 2:**
- **Input 3:**
- **Input 4:**
- **Manual limit:**
- **Auto limit:**
- **Low WTR Cutoff:**
- **Air Pressure Switch:**
- **Closure Switch:**
- **Blower Speed:**
- **Flame signal:**
- **DHW Flow:**

## Outputs:

- **Status:**
- **Gas valve:**

## Lockout History #2

<table>
<thead>
<tr>
<th>Fault Name</th>
<th>Fault Type</th>
<th>Fault Time</th>
<th>Fault Date</th>
<th>Status</th>
</tr>
</thead>
</table>

## Outputs:

- **Output 1:**
- **Output 2:**
- **Output 3:**
- **Output 4:**
- **Boiler Circ:**
- **Blower signal:**
- **Additional Heat Demand:**
- **Alarm:**

## Temperatures:

- **Boiler out 1:**
- **Boiler out 2:**
- **DHW out 1:**
- **DHW out 2:**
- **Boiler in:**
- **Flue 1:**
- **Flue 2:**
- **Outdoor:**

## Inputs:

- **Status:**
- **Input 1:**
- **Input 2:**
- **Input 3:**
- **Input 4:**
- **Manual limit:**
- **Auto limit:**
- **Low WTR Cutoff:**
- **Air Pressure Switch:**
- **Closure Switch:**
- **Blower Speed:**
- **Flame signal:**
- **DHW Flow:**

## Outputs:

- **Status:**
- **Gas valve:**
<table>
<thead>
<tr>
<th>Lockout History #3</th>
<th>Outputs:</th>
<th>Lockout History #4</th>
<th>Outputs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Name:</td>
<td>Output 1:</td>
<td>Fault Name:</td>
<td>Output 1:</td>
</tr>
<tr>
<td>Fault Type:</td>
<td>Output 2:</td>
<td>Fault Type:</td>
<td>Output 2:</td>
</tr>
<tr>
<td>Fault Time:</td>
<td>Output 3:</td>
<td>Fault Time:</td>
<td>Output 3:</td>
</tr>
<tr>
<td>Fault Date:</td>
<td>Output 4:</td>
<td>Fault Date:</td>
<td>Output 4:</td>
</tr>
<tr>
<td>Status:</td>
<td>Boiler Circ:</td>
<td>Status:</td>
<td>Boiler Circ:</td>
</tr>
</tbody>
</table>

**Temperatures:**
- Status: Blower signal:
- Additional Heat Demand: Alarm:

**Inputs:**
- Status: 
- Input 1: 
- Input 2: 
- Input 3: 
- Input 4: 
- Manual limit: 
- Auto limit: 
- Low WTR Cutoff: 
- Air Pressure Switch: 
- Closure Switch: 
- Blower Speed: 
- Flame signal: 
- DHW Flow: 

**Outputs:**
- Status: 
- Gas valve: 

<table>
<thead>
<tr>
<th>Lockout History #5</th>
<th>Outputs:</th>
<th>Lockout History #6</th>
<th>Outputs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Name:</td>
<td>Output 1:</td>
<td>Fault Name:</td>
<td>Output 1:</td>
</tr>
<tr>
<td>Fault Type:</td>
<td>Output 2:</td>
<td>Fault Type:</td>
<td>Output 2:</td>
</tr>
<tr>
<td>Fault Time:</td>
<td>Output 3:</td>
<td>Fault Time:</td>
<td>Output 3:</td>
</tr>
<tr>
<td>Fault Date:</td>
<td>Output 4:</td>
<td>Fault Date:</td>
<td>Output 4:</td>
</tr>
<tr>
<td>Status:</td>
<td>Boiler Circ:</td>
<td>Status:</td>
<td>Boiler Circ:</td>
</tr>
</tbody>
</table>

**Temperatures:**
- Status: Blower signal:
- Additional Heat Demand: Alarm:

**Inputs:**
- Status: 
- Input 1: 
- Input 2: 
- Input 3: 
- Input 4: 
- Manual limit: 
- Auto limit: 
- Low WTR Cutoff: 
- Air Pressure Switch: 
- Closure Switch: 
- Blower Speed: 
- Flame signal: 
- DHW Flow: 

**Outputs:**
- Status: 
- Gas valve: 

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**ECO® Tec** GAS-FIRED WATER BOILER – 80/110/150/199 BOILER MANUAL

**Fault Name:** Output 1:
**Fault Type:** Output 2:
**Fault Time:** Output 3:
**Fault Date:** Output 4:
**Status:** Boiler Circ:

**Temperatures:**
- Status: Blower signal:
- Additional Heat Demand: Alarm:

**Inputs:**
- Status: 
- Input 1: 
- Input 2: 
- Input 3: 
- Input 4: 
- Manual limit: 
- Auto limit: 
- Low WTR Cutoff: 
- Air Pressure Switch: 
- Closure Switch: 
- Blower Speed: 
- Flame signal: 
- DHW Flow: 

**Outputs:**
- Status: 
- Gas valve: 

---

**Fault Name:** Output 1:
**Fault Type:** Output 2:
**Fault Time:** Output 3:
**Fault Date:** Output 4:
**Status:** Boiler Circ:

**Temperatures:**
- Status: Blower signal:
- Additional Heat Demand: Alarm:

**Inputs:**
- Status: 
- Input 1: 
- Input 2: 
- Input 3: 
- Input 4: 
- Manual limit: 
- Auto limit: 
- Low WTR Cutoff: 
- Air Pressure Switch: 
- Closure Switch: 
- Blower Speed: 
- Flame signal: 
- DHW Flow: 

**Outputs:**
- Status: 
- Gas valve: