

80/110/150/199 Series 3

Wall Mount Gas - Fired

Condensing Boilers – Combi and Heating Only Models

Boiler Manual

- Installation
- Startup
- Maintenance
- Parts

*Now With Built-In
Bluetooth[®] Capability*



⚠ WARNING

Installation and service of the boiler must be performed by a qualified installer or service technician. Read all instructions, including this manual and all other information shipped with the boiler, before installation or operation. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.



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⚠ WARNING

DO NOT SERVICE THE BOILER WITHOUT AN ECO[®]Tec 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 152, page 171** for part number.

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Abbreviations

Table 1 Common abbreviations

Abbreviation	Description
AHD	Additional Heat Demand
AMP	Ampere or Amperage
ANSI	American National Standards Institute
BMS	Building Management System
BTUH	British Thermal Unit per Hour
CAD	Combustion Air Damper
CH	Comfort Heat
CP	Consumer Protection
CSA	Canadian Standards Association
DHW	Domestic Hot Water
LWCO	Low Water Cut-Off
MBH	Thousands of Btuh
NFPA	National Fire and Protection Agency
ODT	Outdoor Temperature
P/T	Pressure and Temperature
VAC	Volts Alternating Current
VDC	Volts Direct Current
WWSD	Warm Weather Shut Down

Tools

Table 2 Tools

Tools Needed	Used For	Purpose
Flat blade screwdriver	Wiring on terminal blocks	I, M
Phillips Screwdriver	Gas valve replacement	I, M
5/16" Socket	Door removal	I, M
2.5 & 4mm Allen wrench	To adjust gas valve settings	I, M
3mm Allen wrench	For removing ignition electrode screws	M
8mm wrench	To remove blower	M
10mm wrench	To remove heat exchanger cover plate	M
T20 long-handled Torx driver	To remove burner screws and mixer/venturi	M
Large crescent wrench	To remove gas valve	M
Multimeter	Measurements on sensors and electrical components	M
Manometer (Inclined or digital)	Measure the INLET gas pressure to the boiler	I, M
Combustion analyzer (Digital preferred)	Combustion testing and boiler adjustments	I, M
Contact thermometer	Checking surface temperatures of heat exchanger and pipes	I, M
Pipe wrenches	Gas train installation.	I, M
Maintenance kit	ALWAYS have this kit on hand when performing maintenance in case replacement is required.	M

Purpose:

I = Install, M = Maintenance



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SECTION 1

Safety

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 result in severe personal injury, death or substantial property damage.

WARNING

Indicates presence of hazards that can result in severe personal injury, death or substantial property damage.

CAUTION

Indicates presence of hazards that will or can result in 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.

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.
- 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 186](#) if not already shown.

When calling or writing about the boiler, please have the boiler model number from the boiler rating label and the 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.

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 WARNING and instructions on [page 139](#).

Carbon Monoxide Detector –

- The installer must verify that at least one carbon monoxide alarm has been installed and is operational within a residential living space or home following the alarm manufacturer's instructions and applicable local codes before putting the appliance into operation.

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.

Surge Protector –

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

Boiler Water –

- The 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 130](#) 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. Install a strainer or other sediment removal equipment if necessary.
- 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 heat 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 WM Technologies for use with this boiler. See [page 109](#) 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.

DANGER

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.

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

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



SECTION 2

Installation

2

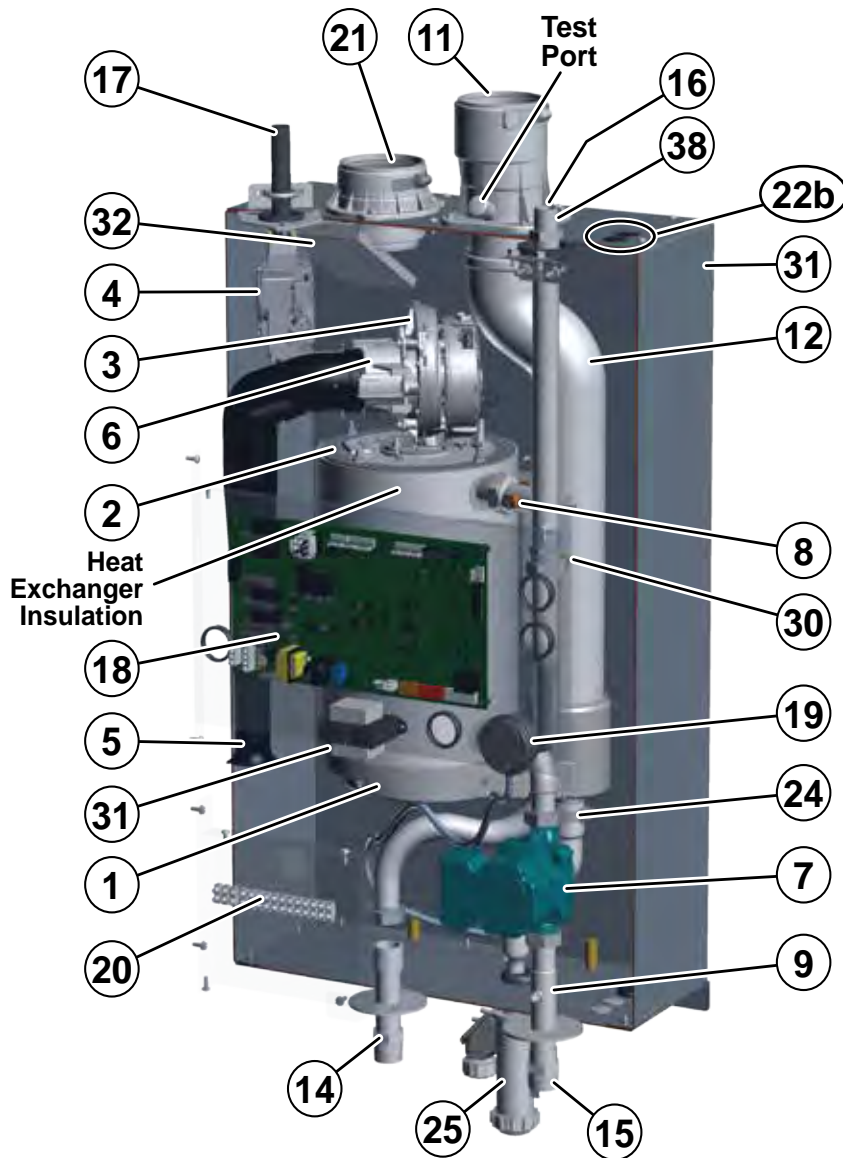
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Boiler Components

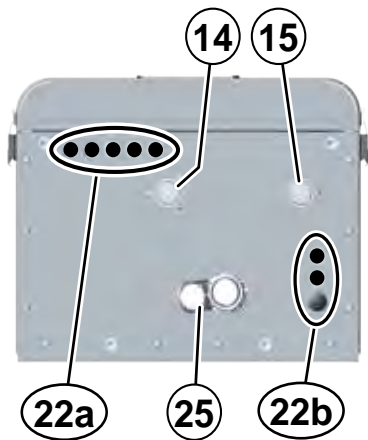
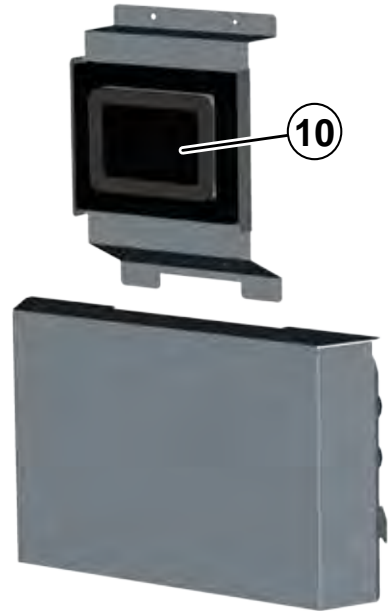
2

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 ! : 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 184](#)) 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:** *All Heat Only Models and 199 Combi; 1" Male NPT; 150/110 Combi Models: ¾" Male NPT*
15. **Boiler Water Inlet Pipe:** *All Heat Only Models and 199 Combi; 1" Male NPT; 150/110 Combi Models: ¾" Male NPT*
16. **LWCO**
A Tee will need to be installed here for the addition of a Low water cut-off.
17. **Gas Line**
The rigid 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 84](#))
19. **Air Pressure Switch**
Air pressure switch monitors maximum flue pressure.
20. **High Voltage Junction Box** – 120VAC field wiring connections.
21. **Air intake adapter** (*Only fits 3" PVC*)
- 22a. **Electrical Entrances** (*line voltage*)
The knockouts on the front left lead to the high voltage box, these are designated for line voltage and external pump voltage only.
- 22b. **Electrical Entrances** (*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 18](#) 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**
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. **Door Latches**
Two (2) latches secure the door in place.
28. **Ignition electrode/flame sensor** (*shown on Combi, page 10*)
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 10*)
The quartz glass window provides a view of the burner surface and the flame.
30. **Flue Gas Temperature Sensor**
This 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 increase 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*) (*not shown*)
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** ¾" Male NPT
Use ¾" tee and ¾" street elbow to connect relief valve. It is recommended to connect an automatic air vent to top tee connection.
39. **DHW Inlet Pipe:** *199 Model: ¾" NPT; 150/110 Models: ½" NPT* (*Combi Only*)
40. **DHW Outlet Pipe** - *199 Model: ¾" NPT; 150/110 Models: ½" NPT* (*Combi Only*)

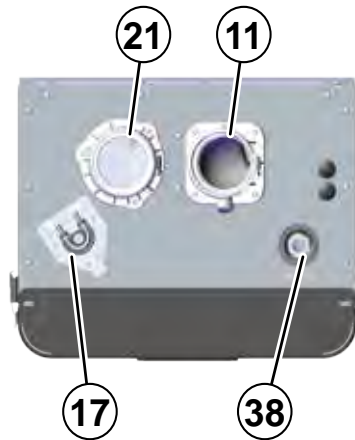
Boiler Components (Model 80 shown) (continued)



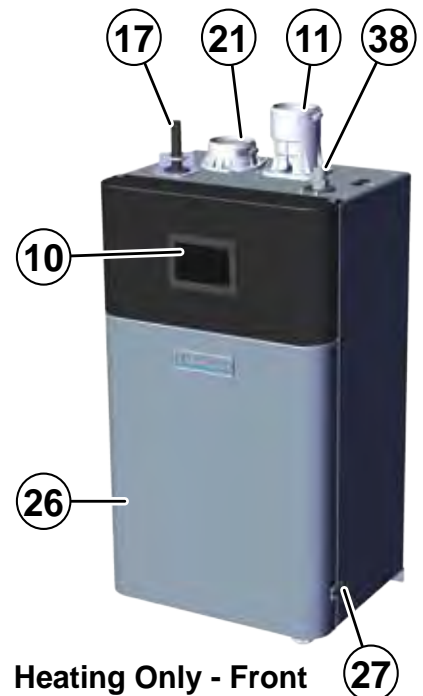
Heating Only - Interior
(some components removed for clarity)



Heating Only - Bottom



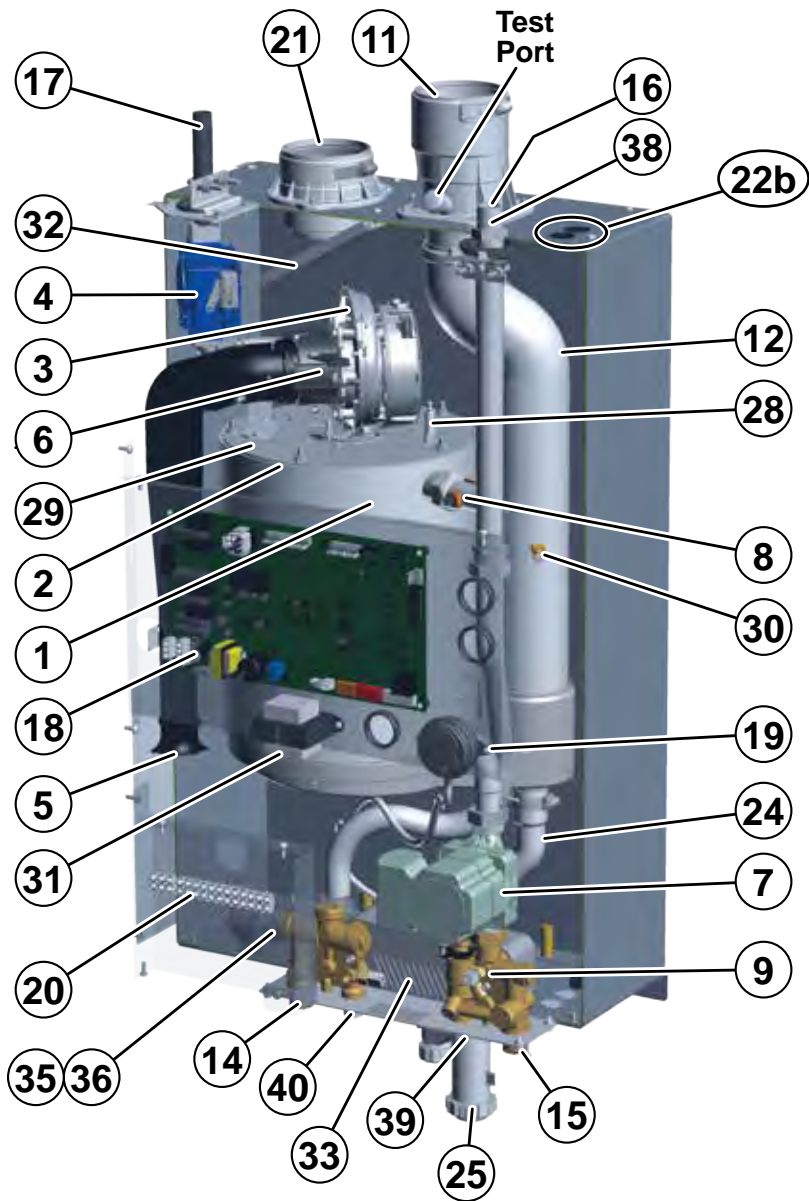
Heating Only - Top



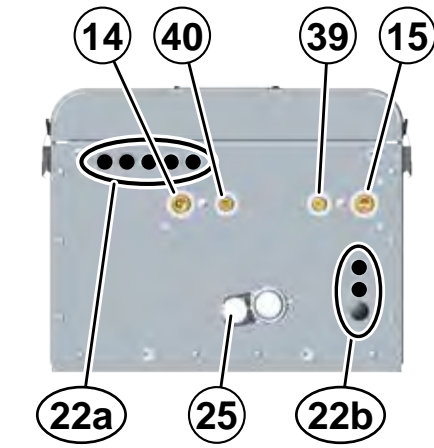
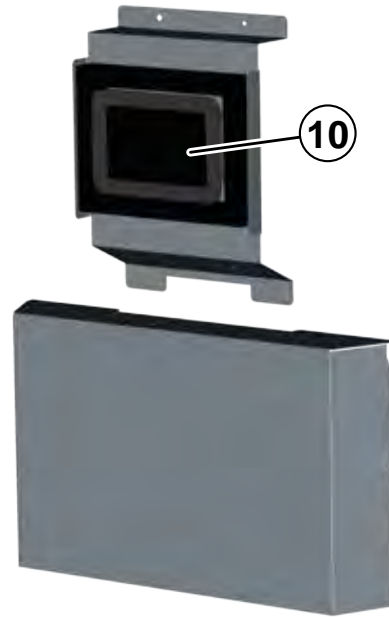
Heating Only - Front

Boiler Components (Model 150 shown) (continued)

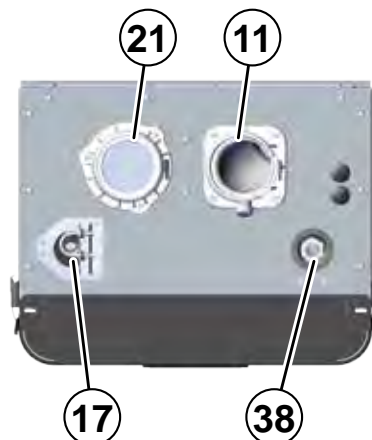
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COMBI - Interior
(some components removed for clarity)



COMBI - Bottom



COMBI - Top



COMBI - Front

Boiler Location

Installations Must Comply With:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition.
- National Electrical Code ANSI/NFPA 70 – latest edition. Electrical installation and grounding must be in accordance with CSA C22.1, Part 1, Canadian Electrical Code, and/or local codes.
- For Canada only: CAN/CSA B149.1, Natural Gas and Propane Installation Code, and any local codes.
- Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1 – latest edition.

NOTICE

- The boiler gas manifold and controls met safe lighting and other performance criteria when boiler underwent tests specified in ANSI Z21.13 – latest edition.
- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 14](#) for instructions.
3. The boiler is suitable for INDOOR installation only.
4. Check for nearby connection to:
 - System water piping
 - Venting connections
 - Gas supply piping
 - Electrical power
 - 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 130](#).
 - 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/NFPA 54 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.

WARNING

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

- 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 with 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 12](#).
2. For spaces that DO NOT supply the minimum service clearances, provide two openings as shown in [Figure 2, page 12](#). Each opening must provide 1 square inch free area per 1,000 Btuh of boiler input.

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

Follow the sizing requirements shown in [Figure 33, page 31](#).

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 25](#).
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 25](#) when considering vent/air termination.
3. Direct exhaust venting can be done with the approved Weil-McLain Direct Exhaust Kit, please see [page 171](#) 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 25](#).



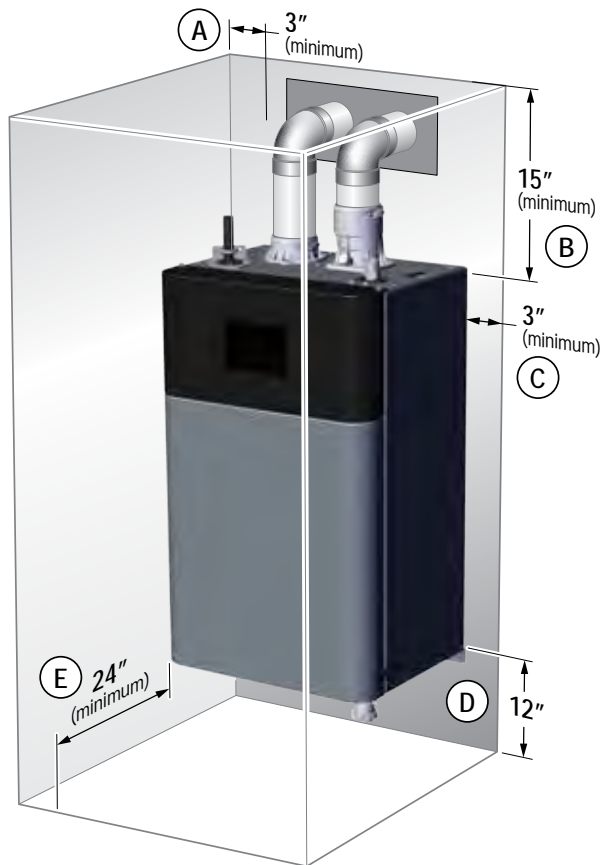
Boiler Location (continued)

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**.

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.

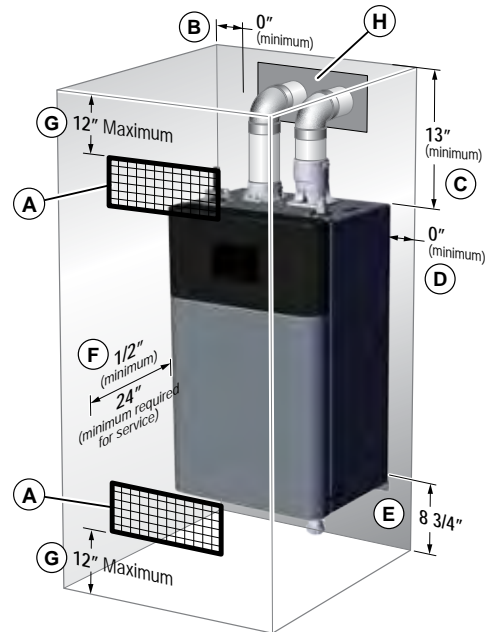
Provide Clearances from Combustible Materials – Required

1. See **Figure 2** for REQUIRED minimum clearances. ALL installation must provide at least these minimums.
2. Hot water pipes – at least 1/2 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 2 REQUIRED minimum clearances (all dimensions are in inches)



- A. Provide combustion air/ventilation openings per **Figure 33, page 31** 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 = 0 inches minimum.
- C. Top of boiler clearance to combustibles = 13.00 inches minimum.
- D. Right side clearance to combustibles = 0 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

- 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.
- The minimum foundation size is:
 - ECO Tec:** 20 inches wide x 20 inches deep.
- 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.
- 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.

- The **ECO Tec** boiler is generally easier to handle and maneuver after removing the shipping container.
- Remove Items 1, 2, 3, 5, and 8 in **Figure 3**. Remove trim kit and accessory materials.
- Leave the boiler resting on the styrofoam protective base** (Item 6) and bottom cardboard cap (Item 7), 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.

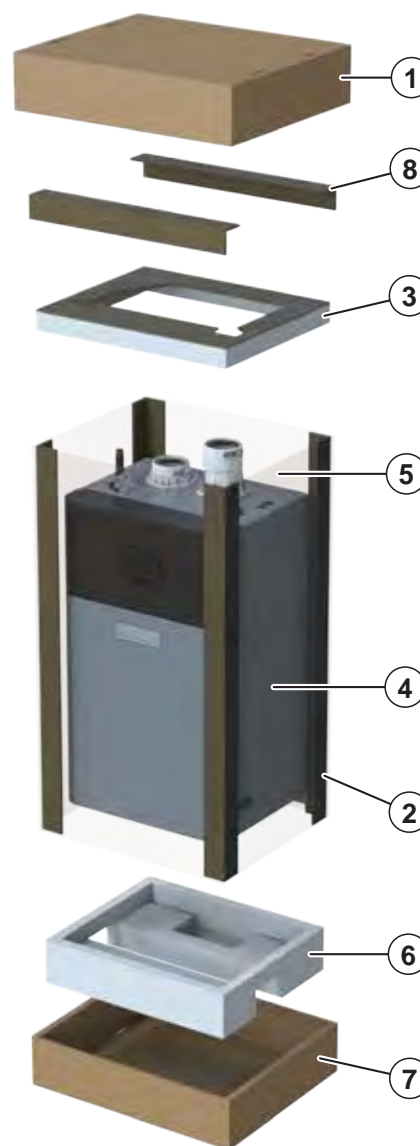
⚠ WARNING

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

Table 1 Boiler operating weights

ECO Tec Boiler Model	Heating Only		Combi	
	Without Pedestal lbs.	With Pedestal lbs.	Without Pedestal lbs.	With Pedestal lbs.
80/110	114	144	124	154
150	131	161	141	171
199	144	174	154	184

Figure 3 Boiler shipping container



- 1) Cardboard cap, top
- 2) Cardboard angles
- 3) Styrofoam protective cap
- 4) Boiler
- 5) Cardboard sleeve
- 6) Styrofoam protective base
- 7) Cardboard cap, bottom
- 8) Top Angle Brace

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 13](#) 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.

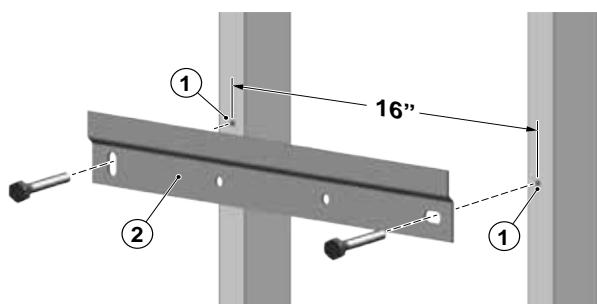
Place Boiler on Bracket

1. See [Figure 4](#). 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.

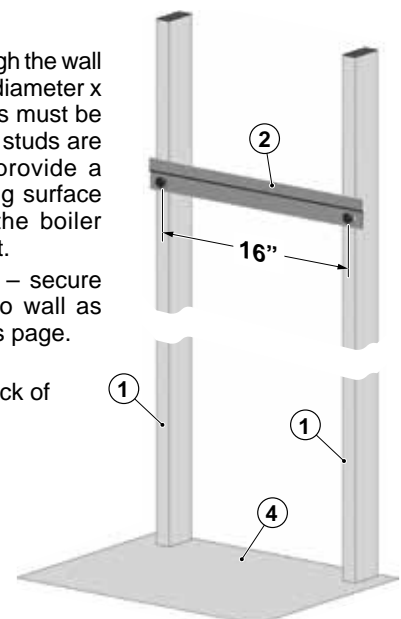
Figure 4 Wall-mount bracket and studs



- 1) **Studs** – Pre-drill through the wall into the studs 1/4 inch diameter x 3 inches deep for 3/8-inch lag screws – Studs must be on 16-inch centers. If studs are any other spacing, provide a secure, solid mounting surface on which to attach the boiler wall-mounting bracket.
- 2) **Wall-Mount Bracket.**

Figure 5 Place boiler on wall-mount bracket

- 1) **Studs** – Pre-drill through the wall into the studs 1/4 inch diameter x 3 inches deep – Studs must be on 16-inch centers. If studs are any other spacing, provide a secure, solid mounting surface on which to attach the boiler wall-mounting bracket.
- 2) **Wall-Mount Bracket** – secure wall mount bracket to wall as instructed on previous page.
- 3) **Boiler Mounting Bracket** ([Figure 6](#) back of boiler).
- 4) **Floor surface.**



Wall-Mounting the Boiler (continued)

Figure 6 Boiler mounting bracket



WARNING

The jacket door can be left in place when handling the boiler, but the boiler must ONLY be lifted by the bottom and rear of the sheet metal housing — NOT by any pipe or plastic part.

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 14, 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 14 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.

Pedestal Floor Stand Assembly

Pedestal Floor Stand (with Kit option only)

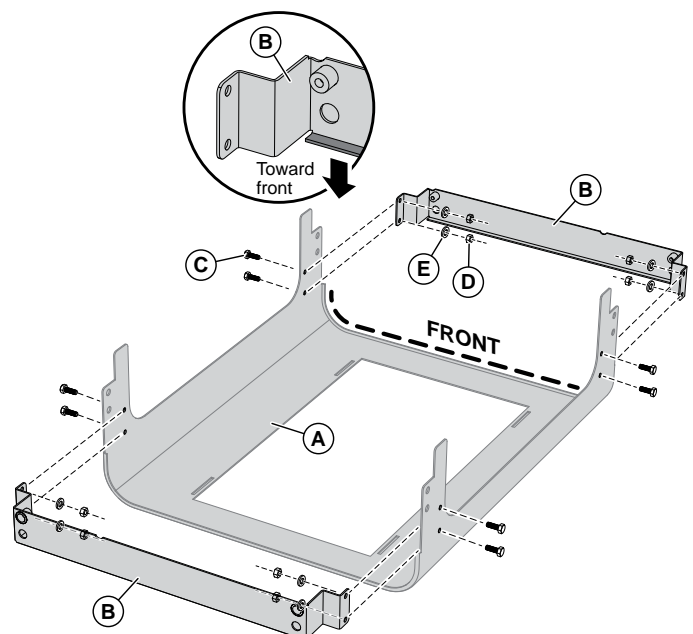
WARNING

- 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.
- Once boiler is installed on stand and orientated correctly, it may become top-heavy and may be prone to tipping without proper support. Once the boiler has proper flue and water pipe connections, according to installation instructions, the boiler will be stable. An unsupported boiler may fall causing severe personal injury or death.

1. Carefully remove boiler from the styrofoam protective base and set on back.
2. Remove front section (A) from Floor Stand Kit 383-800-245 and place flat as shown. Paying close attention to orientation, install cross-supports (B) as shown. From the floor stand hardware trim bag, use eight (8) 1/4" machine screws (C), nuts (D) and washers (E). (Figure 7)

IMPORTANT: Bent flange of cross-supports (B) should face front as detailed in Figure 7.

Figure 7 Pedestal floor stand front section



Pedestal Floor Stand Assembly (continued)

- Remove the back section (F) from Floor Stand Kit 383-800-245, place on its back as shown in **Figure 8**.
- Position the assembled front section (A) and over the back section (F) as shown and secure together using the 8 provided 3/8" screws (G), nuts (H) and washers (J). Hand tighten only at this time. (**Figure 8**)

IMPORTANT: Be sure to attach front section to back section (F) according to the boiler model. See **Figure 8** for mounting holes designations for specific models.

- Install leveling legs (K) into rivets (L) on the bottom of the stand. Screw them all the way in. Do not overtighten. (**Figure 9**)
- Install four (4) 5/16" studs (M) by hand into rivet nuts (N) on bottom of boiler cabinet (O). Hand tighten all studs. (**Figure 10**)

IMPORTANT: Insert the short threaded end of the studs (M) into the bottom of boiler cabinet (O). (**Figure 10**)

- Carefully position the stand assembly (A, F) over the previously installed studs (M) and against the bottom of boiler cabinet (O). Secure the stand to the boiler cabinet using four 5/16" nuts (P) from trim bag. Do not overtighten. (**Figure 11**)

IMPORTANT: Make sure to align the sides and curved corners of the stand with the sides of cabinet and curved corners of door.

- Install the condensate trap assembly following instructions on **page 63**.
- Fully tighten all nuts (D, H, P). Obtain assistance and lift the boiler into upright position.
- Set boiler in place and level by adjusting leveling legs (K) with flat head screwdriver.
- Install the floor stand door on to front section (A).

Figure 11 Pedestal floor stand final assembly

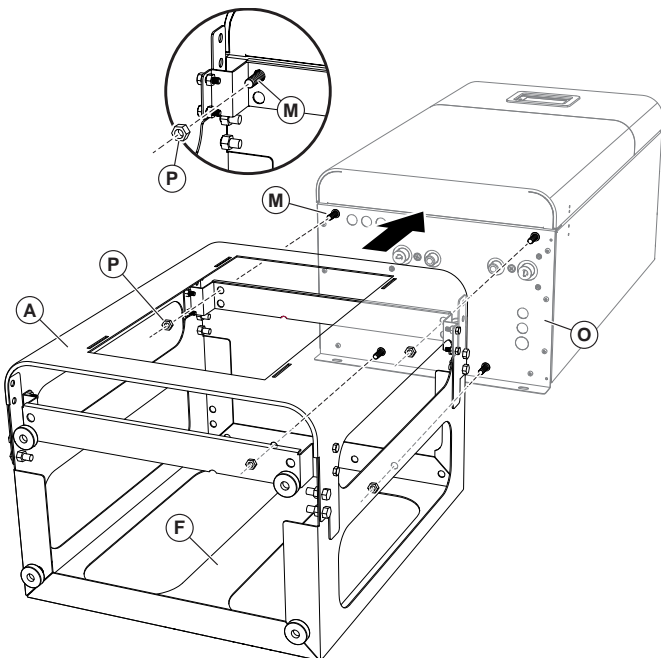


Figure 8 Pedestal floor stand front and back assemble

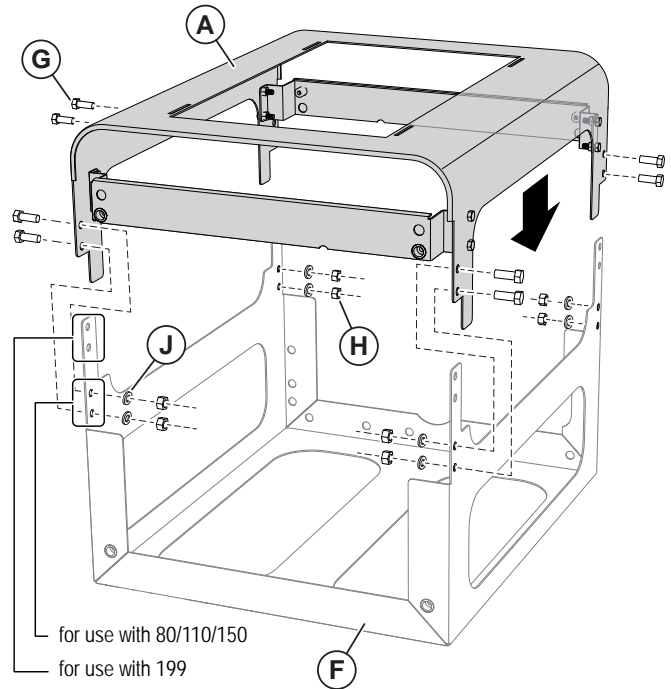


Figure 9 Pedestal floor stand leveling legs attach

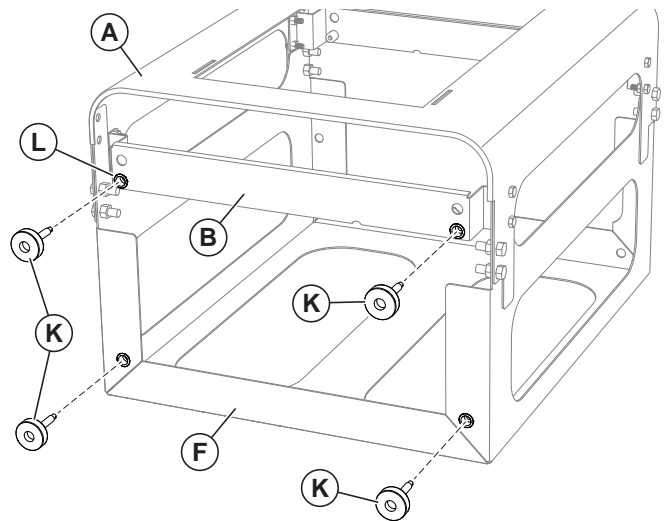
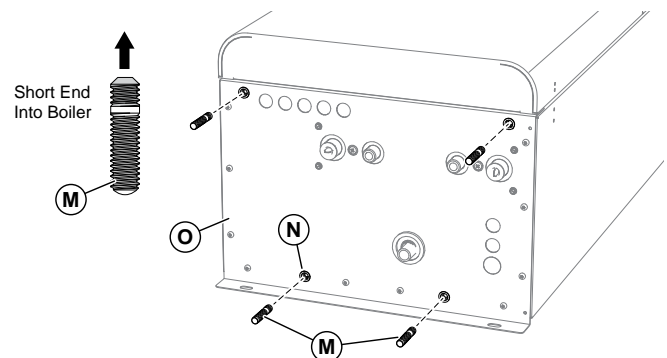


Figure 10 Pedestal floor stand stud insert



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.
- **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 12, page 18](#).

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 12, page 18](#).

Install Fittings and Valves Required for Hydrostatic Testing

1. The following piping components (supplied by installer) are required for the test configuration:
 - a. Two (2) shut-off valves (1" NPT on 80/110, 1¼" NPT on 150/199).
 - b. Two (2) 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 13, page 18](#) 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 ¾" 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 ¾" 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.

⚠ WARNING

- **Leaks must be repaired at once.** Failure to do so can damage boiler, resulting in substantial property damage.
- 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 58](#) 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 12 Install pipe fittings for relief valve and pressure/temperature gauge — **DO NOT** mount relief valve until **AFTER** hydrostatic testing (see legend below)

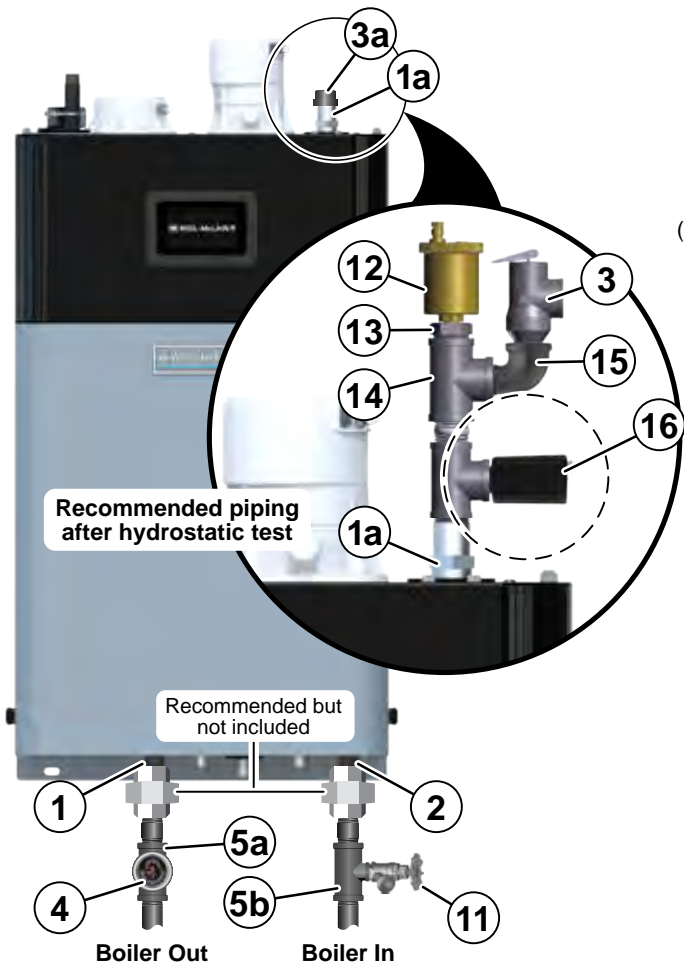
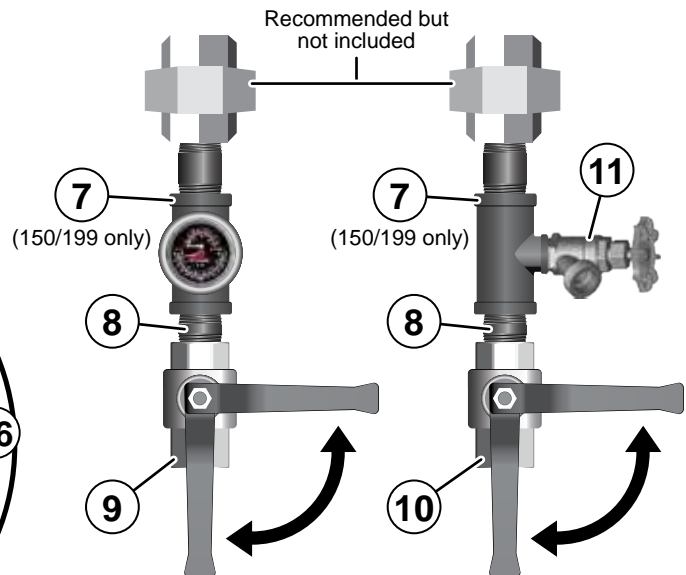


Figure 13 Install piping components required for hydrostatic test (see legend below)



1. Boiler Out (Supply) connection (*All Heat Only Models and 199 Combi: 1" Male NPT; 150/110 Combi Models: 3/4" Male NPT.*)
- 1a. Air Elimination/Relief Valve Connection Water Pipe, (*male, 3/4" NPT*) use for relief valve and air elimination.
2. Boiler In (Return) connection (*All Heat Only Models and 199 Combi: 1" Male NPT; 150/110 Combi Models: 3/4" Male NPT.*)
3. Boiler relief valve, shipped loose with boiler — **DO NOT** mount relief valve until **AFTER** hydrostatic testing.
- 3a. TEMPORARILY ONLY — Install a 3/4" 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 1/4" on 80/110, & 1 1/4" x 1 1/4" x 1/4" on 150/199, shipped loose with boiler.
- 5b. Reducing tee, NPT, 1" x 1" x 3/4" on 80/110, & 1 1/4" x 1 1/4" x 3/4" on 150/199, shipped loose with boiler.
7. Bushing: NPT (*7. 80HO and 110HO do not require bushings; 199 (HO and Combi) and 150 HO ship with 1" x 1-1/4" Bushings; 110 Combi and 150 Combi ship with 3/4" x 1-1/4" Bushings*)
8. Nipple, NPT 1" x close on 80/110, & 1 1/4" x close on 150/199, by installer .
9. Isolation valve on supply connection, by installer (*1" NPT on 80/110, 1 1/4" NPT on 150/199*).
10. Isolation valve on return connection, by installer (*1" NPT on 80/110, 1 1/4" NPT on 150/199*).
11. 3/4" 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.
14. Tee, NPT 3/4" x 3/4" x 3/4", shipped loose with boiler.
15. Street elbow, NPT 3/4" x 3/4", shipped loose with boiler.
16. LWCO, installer supplied.



Gas Conversions

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

Propane Operation



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 130](#) of this manual.

Verify propane gas venturi— See [Figure 14, page 20](#) Propane 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.



- This conversion kit shall be installed by a qualified installer, service agency, or the gas supplier in accordance with the manufacturer’s instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions are 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 installer, service agency, or the gas supplier 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.
- Follow all instructions in proper order.
- Do not tamper with venturi. DO NOT change or modify venturi in any way.
- Dispose of an uninstalled venturi; do not leave in the building.
- Caution – the gas supply shall be shut off prior to disconnecting the electrical power, before proceeding with the conversion.
- Whenever the venturi is removed, all gaskets must be replaced with new gaskets.

Natural Gas to Propane Gas Conversion Kits

ECO Tec 80/110 LP P/N 510-811-415 NG to Propane Gas Conversion Kit contents:	
Venturi - Propane Gas	1
Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3.53mm x 63.50 I.D. mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia. mm	1
Label Gas Conversion	1
Orifice Gas Propane 80/110 ECO Tec	1
Instructions Conversion Nat to Propane Gas	1

ECO Tec 150 LP P/N 510-811-416 NG to Propane Gas Conversion Kit contents:	
Venturi - Propane Gas	1
Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3.53mm x 63.50 I. D. mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia. mm	1
Label Gas Conversion	1
Orifice Gas Propane 150/199 ECO Tec	1
Instructions Conversion Nat to Propane Gas	1

ECO Tec 199 LP P/N 510-811-417 NG to Propane Gas Conversion Kit contents:	
Venturi - Propane Gas	1
Screw Pan Hd. T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3mm x 70mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia. mm	1
Label Gas Conversion	1
Orifice Gas Propane 150/199 ECO Tec	1
Instructions Conversion Nat to Propane Gas	1

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:
3. Maximum: 14” (356 mm) w.c. with no flow (lockup).
 - a. Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire): 3½” (89 mm) w.c.



Gas Conversions (continued)

Propane Gas to Natural Gas Conversion Kits

ECO Tec 80/110 NG P/N 383-700-305 LP to Natural Gas Conversion Kit contents:	
Venturi - Natural Gas	1
Screw Pan Hd T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3.53mm x 63.50 I.D. mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia.mm	1
Label Gas Conversion	1
Instructions Conversion Propane to Natural Gas	1

ECO Tec 150 NG P/N 383-700-306 LP to Natural Gas Conversion Kit contents:	
Venturi - Natural Gas	1
Screw Pan Hd T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3.53mm x 63.50 I.D. mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia. mm	1
Label Gas Conversion	1
Instructions Conversion Propane to Natural Gas	1

ECO Tec 199 NG P/N 383-700-307 LP to Natural Gas Conversion Kit contents:	
Venturi - Natural Gas	1
Screw Pan Hd T20 M4-.7x12mm w/Sq. Con. Lock Washer	3
Washer .64 I.D. x .93 O.D. Garlock	1
O-Ring 3mm x 70mm Black	1
Gasket 2-Lips EPDM Ring 50 Dia. mm	1
Label Gas Conversion	1
Instructions Conversion Propane to Natural Gas	1

Installing Propane Venturi —

1. Propane venturi will have a black label identifying venturi part number. See **Figure 14** for correct part number.
2. Verify that the label on the propane venturi is correct for the model size (see **Figure 14** 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 16**).

Figure 14 Propane gas venturi label identification (Black label)

Boiler Model	Part Number	Gas Type	Venturi Ø
80/110	511-050-233	LPG	20
150	511-050-234	LPG	26
199	511-050-235	LPG	28

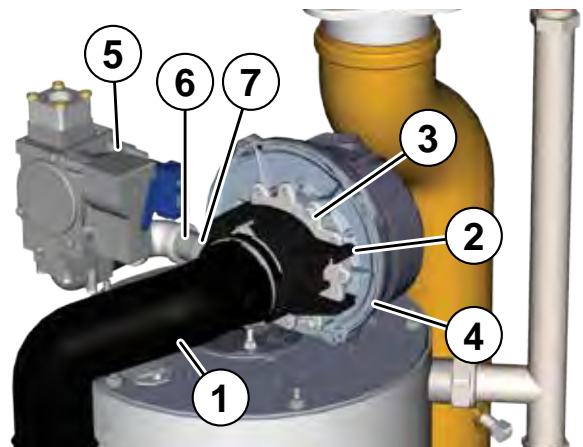
Figure 15 Natural gas venturi label identification (White label)

Boiler Model	Part Number	Gas Type	Venturi Ø
80/110	511-050-230	NG	22
150	511-050-231	NG	26
199	511-050-232	NG	28

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

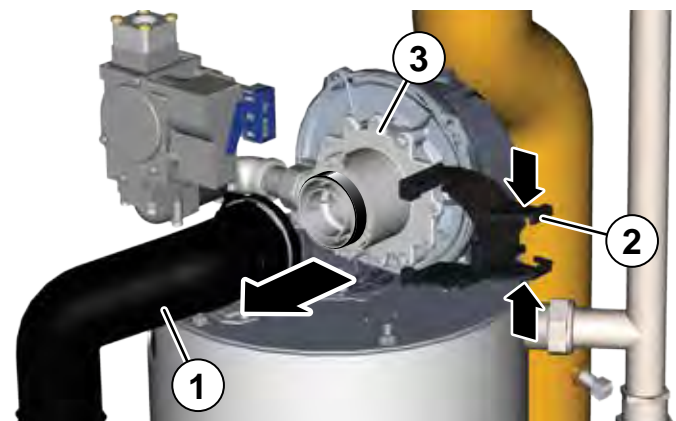
- | | |
|----------------------|---------------------|
| 1. Air Silencer | 6. Gas pipe |
| 2. Air silencer clip | 7. Swivel nut |
| 3. Venturi | 8. Fiber Washer |
| 4. Blower | 9. O-Ring |
| 5. Gas valve | 10. Propane Orifice |

Figure 16 Blower, gas valve, venturi assembly



6. Gently open up the "U" part of the silencer clip and remove from venturi / silencer assembly, see **Figure 16** and **Figure 17**.

Figure 17 Air silencer removal



Gas Conversions (continued)

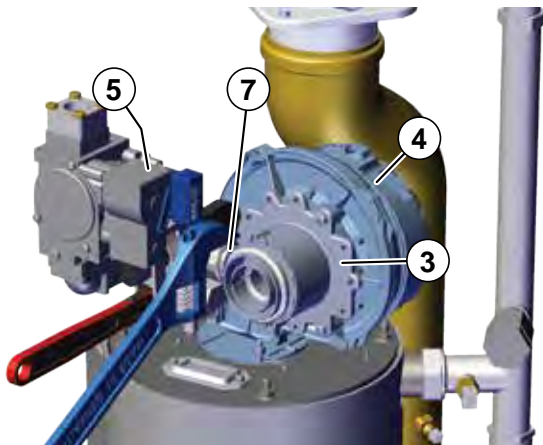
Label Wires Before Removing

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 18, Item 7) on venturi-gas valve connection (Figure 16 Item 6). U-Bolt holding gas line (not shown) may have to be loosened to allow the gas valve to move out of way as shown in Figure 19.

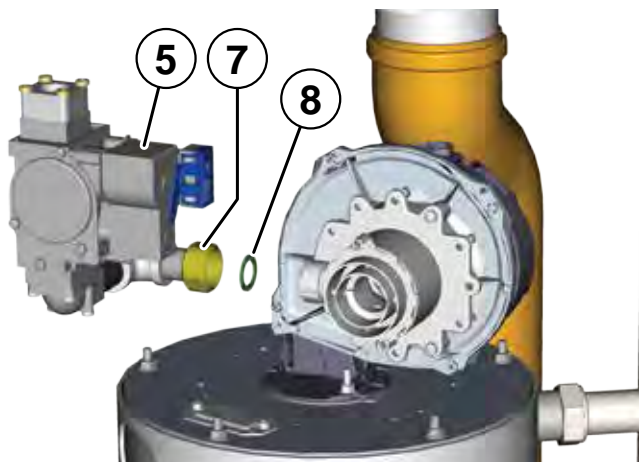
Figure 18 Gas pipe swivel nut loosened for propane conversion (silencer removed)



WARNING

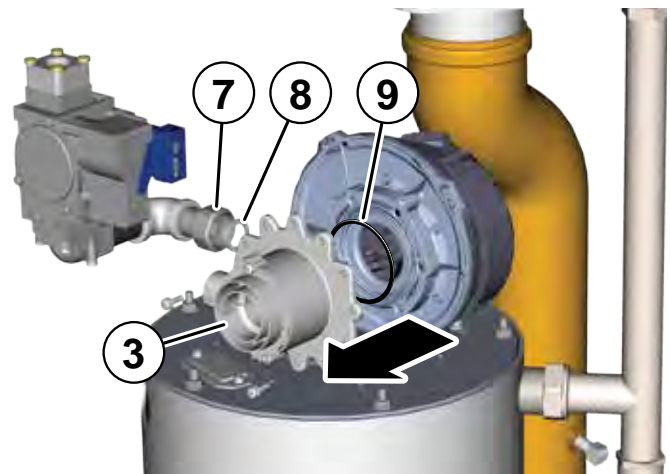
Use two wrenches when loosening swivel nut at venturi, using pipe wrench on gas pipe (Item 6) to prevent the gas pipe connection from turning. Failure to support the gas connection pipe to prevent it from turning could damage gas line components.

Figure 19 Gas valve separated from venturi (Note - fiber washer location)



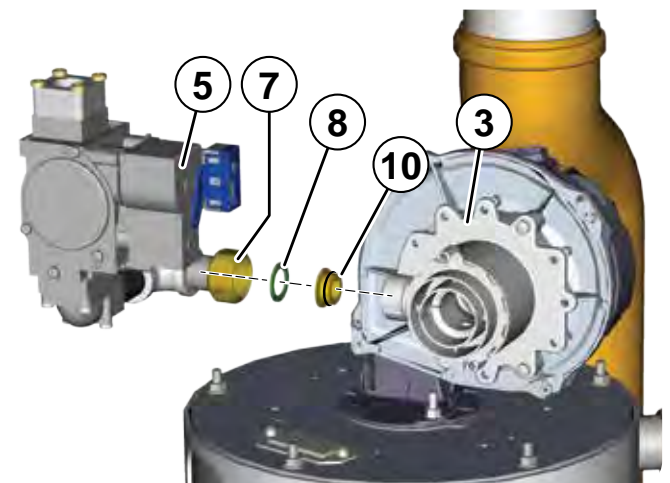
9. Remove three (3) T20 Torx screws holding the venturi, (Item 3) in place. Remove venturi, change O-Ring (Item 9), change fiber washer (Item 8) and inspect blower surface. Discard old O-Ring and fiber washer, see Figure 20.

Figure 20 Venturi removed from blower



10. Install new propane venturi and o-ring from conversion kit.
11. Ensure O-Ring (Item 9) is seated properly in groove on blower.
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 Propane orifice (Item 10) into venturi gas inlet, see Figure 21.
14. Reassemble gas pipe with new fiber washer (Item 8) from conversion kit to the venturi connection, using two wrenches to tighten swivel nut. Retighten the U-Bolt on the gas line if it was loosened in step 8.
15. Reassemble silencer and silencer clip, locking silencer to venturi clip locking silencer to venturi. Ensure silencer clip is seated on the silencer/venturi correctly.

Figure 21 Installing the new propane gas orifice.



DANGER

Inspect the gas pipe fitting connections on the gas valve and new venturi (Item 3, Figure 21, page 21). Check the seal of the connections. Failure to comply will cause a gas leak, resulting in severe personal injury or death.



Gas Conversions (continued)

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.

Gas Valve Course Adjustments

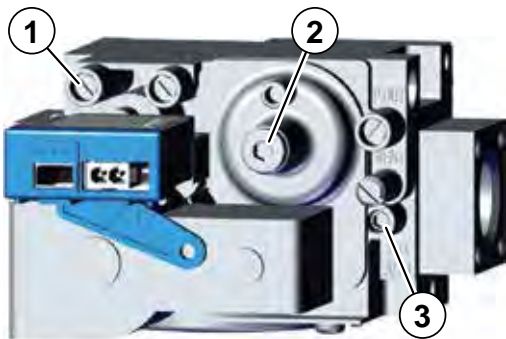
- Prior to the boiler's first ignition, adjust the throttle adjustment screw (2.5mm Allen Head) by first turning the screw clockwise (↻) until it bottoms out – do not apply any additional or excess torque. Adjust the throttle screw in a counterclockwise (↺) direction with precisely the number of turns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

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

Boiler Model	Throttle Turns (Counterclockwise ↺ from Bottom-out Position)	Offset Turns (Counterclockwise ↺ Factory NG Position)
80/110 LP	6-3/4	1/8
150 LP	10-3/4	0
199 LP	13	0

- 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.
- Reconnect wire harness to gas valve.

Figure 22 Gas valve adjustment locations—ONLY for use by a qualified technician, using properly working, calibrated combustion test instruments.

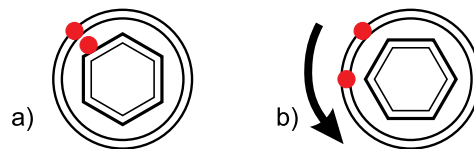


- Gas Inlet Pressure Test Port
- Offset Regulating Screw
 - Turn clockwise ↻ to increase CO₂. P
 - Turn counter-clockwise ↺ to decrease CO₂. Q Note: Must remove cover.
- Throttle adjustment screw
 - Turn counter-clockwise ↺ to increase CO₂. Q
 - Turn clockwise ↻ to decrease CO₂. P

Adjust the offset regulating screw using the following steps, referencing **Figure 23**:

- After removing cap, insert Allen wrench into offset hex feature (4mm Allen Head) and mark position of wrench on offset housing.
- Turn the offset regulating screw counterclockwise (↺), according to **Table 2**, ensuring that the Allen wrench is moved accordingly, as shown in **Figure 23b**.

Figure 23 Offset regulating screw adjustment—(a) Marking factory-provided NG position. (b) View after turn CCW adjustment.

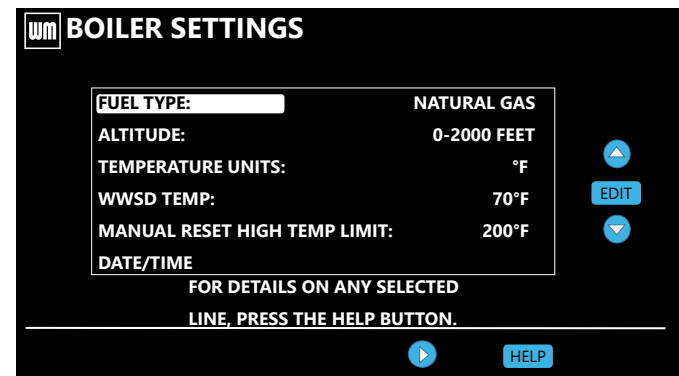


- Restore electrical power, turn on gas by opening manual gas valve and check for leaks and ensure all calls for heat & DHW have been shut off.

Final Conversion Steps

- 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 101, page 115**.
- Before firing, verify that the Boiler Settings are for Propane 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 126, page 146** for proper low-fire rate based on altitude settings.

Figure 24 ECO Tec fuel type in Boiler Settings screen



Gas Conversions (continued)

- Prior to turning on the boiler, review the procedure and control sequence for the operation of the Manual Test Mode in the section of the Boiler Manual titled “Manual Test Mode” starting on [page 143](#).

⚠ 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.

- 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 121, page 136](#), 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 121, page 136](#), 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 136**.
- 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 (↺) 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 WM Technologies Technical Services for assistance.
- Check for gas leaks and confirming proper performance.

Perform Boiler Manual Start-up

Perform complete start-up sequence (beginning on [page 130](#)), 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 136](#).

Install Front Door

⚠ WARNING

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

- 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).
- 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.

Figure 25 Installer conversion label

NOTICE THIS BOILER HAS BEEN CONVERTED TO PROPANE.

THIS MODEL _____ BOILER HAS BEEN CONVERTED ON _____ (DATE OF CONVERSION) TO PROPANE GAS WITH A HIGH FIRE % CO₂ OF _____ (% CO₂) CONVERSION KIT P/N: _____

BY _____ (NAME)
 _____ (ADDRESS)

WHO ACCEPTS THE RESPONSIBILITY FOR THE CORRECTNESS OF THIS CONVERSION.

NOTICE MINIMUM AND MAXIMUM GAS PRESSURE, MANIFOLD PRESSURE AND INPUT RATINGS DO NOT CHANGE WITH THIS CONVERSION. REFER TO THE RATING LABEL FOR THIS INFORMATION.

DANGER! DO NOT PERFORM THIS CONVERSION WITHOUT A FLUE GAS ANALYZER. THE PROPER USE OF A FLUE GAS ANALYZER IS REQUIRED TO DETERMINE PROPER GAS VALVE SETTINGS. IMPROPER GAS VALVE SETTINGS CAN CAUSE SEVERE PERSONAL INJURY, DEATH OR PROPERTY DAMAGE. SEE BOILER INSTALLATION MANUAL FOR GAS VALVE ADJUSTMENT INFORMATION.

AFFIX THIS LABEL AS CLOSE AS POSSIBLE TO THE RATING LABEL. 550-225-336 (0724)

Propane to Natural Gas Conversion

- Follow the same instructions as Propane conversion, except using the correct Natural gas conversion kit, See [page 20](#).
- Ensure Propane Gas Orifice has been removed from location between gas pipe and the venturi. Natural gas boilers do not require an orifice.
- If Propane 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 “Natural Gas”.
- Turn throttle screw clockwise until it stops, and then turn counter-clockwise number of turns per [Figure 26](#). [Figure 26](#) is intended to make rough adjustment to gas valve to allow the boiler to fire. They are NOT intended to replace proper adjustment of combustion valves per instructions on [page 135](#) and [page 136](#) of this manual.

Figure 26 Throttle screw adjustment

Boiler Model	Number of Turns
80/110 NG	9-1/8
150 NG	12
199 NG	14-1/2

⚠ WARNING

The door must be in place during operation. DO NOT operate the boiler with the jacket door removed except for inspection and testing as directed in this manual.



Gas Piping - Sizing Gas Lines

NOTICE

Boiler gas connection is 1/2" NPT. Size gas lines large enough to provide gas to all connected appliances.

Natural Gas:

Pipe Sizing for Natural Gas

- Size gas piping from meter outlet to entrance of boiler in accordance with **Figure 27** and **Figure 28**.
- Use total input of all connected appliances. Divide total input in Btuh by 1,000 to obtain cubic feet per hour of natural gas.
 - Pipe lengths in **Figure 27** are equivalent length of straight pipe. Convert pipe fittings to equivalent lengths using data from **Figure 28**.
 - Figure 27** is only for natural gas with specific gravity 0.60, with a pressure drop through the gas piping as listed in the table.
 - 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

- Pressure required at gas valve inlet pressure port, see **Figure 120, page 135**:
 - Maximum: 14" (355 mm) w.c. with no flow (lockup).
 - Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire):
 - ECO Tec 80:** 3 1/2" (89 mm) w.c.
 - ECO Tec 110:** 3 1/2" (89 mm) w.c.
 - ECO Tec 150/199:** 3 1/2" (89 mm) w.c.
 - Nominal gas pressure: 7.0" (178 mm) w.c.
- 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 19**, 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

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

Propane Supply Pressure

- Adjust propane supply regulator provided by gas supplier for 14" (355 mm) w.c. maximum pressure.
- Pressure required at gas valve inlet pressure port, see **Figure 120, page 135**:
 - Maximum: 14" (355 mm) w.c. with no flow (lockup).
 - Minimum gas pressure, with gas flowing (verify during boiler startup, while boiler is at high fire):
 - ECO Tec 80:** 3 1/2" (89 mm) w.c.
 - ECO Tec 110:** 3 1/2" (89 mm) w.c.
 - ECO Tec 150/199:** 3 1/2" (89 mm) w.c.
 - Nominal gas pressure: 11.0" (279 mm) w.c.

Figure 27 Pipe capacity for 0.60 specific gravity natural gas; pipe length is in equivalent feet.

Gas pipe total length, feet	Capacity						
	Cubic feet per hour, natural gas, 0.60 specific gravity Gas pressure 13" (330 mm) w.c. or less Pressure drop 0.3 inches (7.6 mm) w.c.						
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
10	132	278	520	1050	1600	3050	4800
20	92	190	350	730	1100	2100	3300
30	73	152	285	590	890	1650	2700
40	N/A	130	245	500	760	1450	2300
50	N/A	115	215	440	670	1270	2000
75	N/A	105	175	360	545	1020	1650
100	N/A	96	150	305	460	870	1400
150	N/A	90	120	250	380	710	1130

Figure 28 Equivalent lengths of straight pipe for typical gas line fittings.

Pipe Size Inches	Equivalent Length, Feet			
	90° Elbow		Tee	
	Short Radius	Long Radius	Line Flow	Branch Flow
1/2	3.6	2.2	1.7	4.2
3/4	4.4	2.3	2.4	5.3
1	5.2	2.7	3.2	6.6
1 1/4	6.6	3.2	4.6	8.7
1 1/2	7.4	3.4	5.6	9.9
2	8.5	3.6	7.7	12.0
2 1/2	9.3	4.0	9.3	13.0

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.
- Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.
- Use **ONLY** the venting materials and venting manufacturers' components and systems approved by WM Technologies. Follow all instructions provided by the venting component and system manufacturer. Failure to do so can cause flue gas spillage and carbon monoxide emissions, resulting in 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 29 Corrosive contaminants and sources

Products to avoid
Spray cans containing chloro/fluorocarbons
Permanent wave solutions
Chlorinated waxes/cleaners
Chlorine-based swimming pool chemicals
Calcium chloride used for thawing
Sodium chloride used for water softening
Refrigerant leaks
Paint or varnish removers
Hydrochloric acid/muriatic acid
Cements and glues
Antistatic fabric softeners used in clothes dryers
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Adhesives used to fasten building products and other similar products
Excessive dust and dirt
Areas likely to have contaminants
Dry cleaning/laundry areas and establishments
Swimming pools
Metal fabrication plants
Beauty shops
Refrigeration repair shops
Photo processing plants
Auto body shops
Plastic manufacturing plants
Furniture refinishing areas and establishments
New building construction
Remodeling areas
Garages with workshops



Venting/Air Piping - General (continued)

WARNING

- 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 29, page 25**. 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 the vent connections. Inlet air connection must be 3" PVC at the boiler.
- Provide 3" transitions at the boiler connections if using 2" piping.
- Refer to **page 171** for a list of compliant adapters.
- 3" to 2" PP adapter must have smooth, straight section of pipe to insert into the boiler vent 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.

NOTICE

For locations with regulatory or code requirements to use only listed plastic or polymeric venting systems, the use of ULC S636 listed venting systems are allowed. See **Figure 30, page 27** and **Figure 31, page 28**.

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 171** 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 3 Supplier and Size of Flex Pipe Vent Length - Equivalent

Flex Pipe Vent Length - Equivalent	
Duravent 2" diameter	1 foot equals 3.3 ft.
Duravent 3" diameter	1 foot equals 1.7 ft.
Centrotherm 2" diameter	1 foot equals 5.0 ft.
Centrotherm 3" diameter	1 foot equals 2.3 ft.

Example: Using 20 feet of Duravent 3": $20' \times 1.7 = 34'$ 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 or questions should contact WM Technologies 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.

For locations with regulatory or code requirements to use only listed plastic or polymeric venting systems, the approved venting systems are identified in **Figure 30, page 27**.

Venting/Air Piping - General (continued)

Figure 30 Venting and air piping — DIRECT VENT ONLY — OPTIONS and PIPING LIMITS

NOTICE

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 31, page 28**. For these applications, use ONLY the manufacturers' parts listed and follow all instructions provided by the pipe manufacturer.

ECO Tec Model	<p align="center">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)</p> <p align="right">USE SWEEP ELBOWS ONLY</p> <p>(All applications include allowance for the termination fittings plus one elbow in air piping and one elbow in vent piping).</p> <p align="center">See Figure 31, page 28 for material specifications See Figure 152, page 171 for part/kit numbers</p> <p align="center">Vent pipe sizes: (Air connection must be 3" PVC at the boiler.) Maximum vent lengths apply for either 2" or 3" vent 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 165, page 184 for derate amounts.</p>												
	SIDEWALL termination						VERTICAL termination						
	Separate pipes [Note 1]		PVC Concentric [Note 1 & 2]		3" Weil-McLain PVC vent/air cap [Note 1 & 2]		Separate pipes [Note 1]		PVC or PP Concentric [Note 1 & 2]		Vertical vent, Side Air [Note 1]		
	See page 33		See page 35		See page 37		See page 39		See page 41		See page 43		
	Size, inches	Materials Figure 31, page 28	Size, inches	Materials Figure 31, page 28	Size, inches	Materials Figure 31, page 28	Size, inches	Materials Figure 31, page 28	Size, inches	Materials Figure 31, page 28	Size, inches	Materials Figure 31, page 28	
	80/110	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS
		3	PVC/PVC-DWV CPVC, PP, SS	3	PVC	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS
	150	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS
		3	PVC/PVC-DWV CPVC, PP, SS	3	PVC	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS
199	2	CPVC, PP, SS	2	CPVC	2	CPVC, PP, SS	2	CPVC, PP, SS	2	CPVC, PP, SS	2	CPVC, PP, SS	
	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS	

WARNING

All elbows in vent and air piping must be sweep elbows ONLY. DO NOT use short-radius elbows. When transitioning to 3-inch to 2-inch, use tapered reducer with 3" PVC nipple (I ≥ 6"). Do not use 3-inch to 2-inch bushing. Bushing will Not seal in boiler adapter.

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 termination fittings.

PP •	90° Elbow: PP		45° Elbow: PP		90° Elbow: PP		45° Elbow: PP	
	Centrotherm	Duravent	Centrotherm	Duravent	Centrotherm	Duravent	Centrotherm	Duravent
	2" = 8'	2" = 5'	2" = 3'	2" = 3'	3" = 8'	3" = 7'	3" = 3'	3" = 3'

Note 1: ABS may be used for Intake air.
 Material abbreviations: PP = polypropylene, SS = AL29-4C stainless steel.
 If using polypropylene or stainless pipe other than Simpson-Duravent, provide adapters for 3" boiler connections. Terminations will require additional adapters if going to different size, material, or manufacturer from vent to termination. IPEX 3" PVC concentric vent kits can be used with standard PVC pipe, fittings and cement (ANSI/ASTM D1785) except if ULC S636 compliance is required. For ULC S636 compliance, all pipe, fittings and cement must be IPEX System S636. For UL 1738 compliance all pipe, fittings and cement must be IPEX System 1738. If using IPEX venting termination kits, use only IPEX product code 196006 for 3" venting.
 Contact WM Technologies for ordering information and availability of Weil-McLain venting kits.

Note 2: Use only WM Technologies approved termination kits listed in **Figure 152, page 171** .



Venting/Air Piping - General (continued)

Figure 31 Vent and air piping materials — Use only the materials listed below, ensuring that all materials meet local codes (see **Figure 152, page 171** for part/kit numbers)

Item	Material	Standards for installations in:		
		United States	Canada (Note 2)	
Plastic piping materials		Vent or air piping	Vent piping	Air piping
Vent or air pipe & fittings	PVC schedule 40 (Note 1)	ANSI/ASTM D1785 UL1738/ULC S636	ULC S636	3" PVC is only material acceptable at boiler air inlet
	PVC-DWV schedule 40 (Note 1)	ANSI/ASTM D2665	N/A	
	CPVC schedule 40 (Note 1)	ANSI/ASTM F441/ULC S636	ULC S636	
	ABS-DWV schedule 40 (Intake Only)	ANSI/ASTM D2661	ULC S636	
PVC & ABS pipe cement & primer	PVC (Note 1)	ANSI/ASTM D2564/F656/ UL1738	ULC S636	Use only cement and primer suitable for piping material used
	CPVC (Note 1)	ANSI/ASTM F493	ULC S636	
	ABS schedule 40 (Note 1)	ANSI/ASTM D2235	ULC S636	
Polypropylene vent pipe, fittings, terminations and cement	Simpson-DuraVent — Obtain all materials from M&G Simpson-DuraVent Centrotherm Eco Systems InnoFlue [®] Single-wall — Obtain all materials from Centrotherm Note: See page 171 for correct appliance adapters to be used.	See manufacturer's literature for detailed information MUST USE LOCKING COLLAR ON EVERY JOINT	ULC S636	3" PVC is only material acceptable at boiler air inlet
AL29-4C stainless steel piping materials				
Vent pipe AL29-4C stainless steel	Heat Fab, Inc. — Saf-T-Vent [®] Z-Flex, Inc. — Z-Vent II Dura-Vent — FasNSeal™ Metal-Fab, Inc. — CORR/GUARD See Figure 152, page 171 for Mfg's adapter part numbers.	Certified for Category IV and direct vent appliance venting	Certified for Category IV and direct vent appliance venting	

Weil-McLain stainless steel bird screens, 2" or 3" (purchase separately) — see **Figure 152, page 171** 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 S636 pipe, fittings and cement. If UL1738 compliance is required, use only System 1738 pipe, fittings and cement.

⚠ WARNING

- DO NOT mix piping from different pipe manufacturers unless using adapters specifically designed for the purpose by the manufacturer.
- Every joint on **polypropylene vent piping** must include a locking collar.
- DO NOT use cellular core PVC (ASTM F891), cellular core CPVC, or Radel[®] (polyphenolsulfone) in venting systems.
- DO NOT cover non-metallic vent pipe and fittings with thermal insulation.

⚠ WARNING

- ADAPTERS — The boiler comes with a 3" 3-in-1 adapter as standard on the vent only. 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. The air inlet adaptor only accepts 3" PVC. A suitable PVC to (other material) adaptor will need to be used if material other than PVC is used
- 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 WM Technologies 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 WM Technologies. 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) **REQUIREMENTS:** 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) **PLASTIC VENTING SYSTEMS.**
The only plastic piping which may be used for venting appliances shall be:
1. Allowed by the appliance manufacturer.
 2. Listed to a national/international standard for plastic venting systems.
 3. Product-accepted for that purpose by the board.
- (f) **INSTALLATION INSTRUCTIONS.** 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.



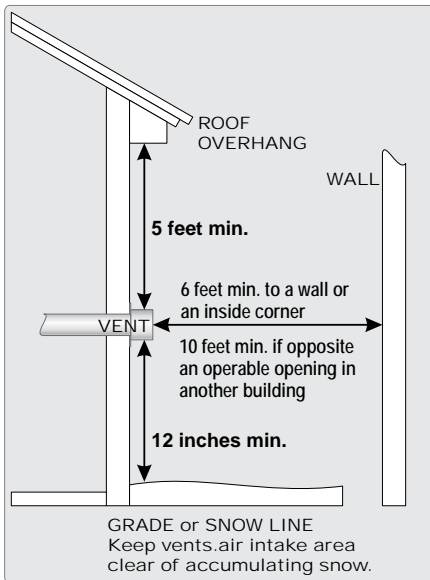
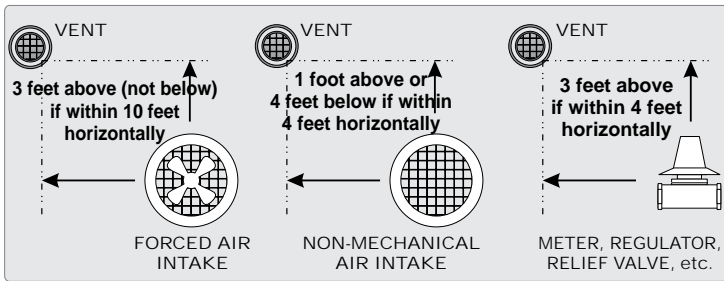
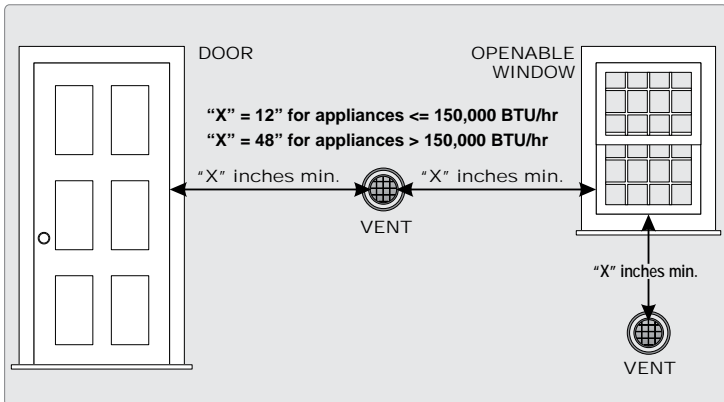
Vent Termination Requirements

Figure 32 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.

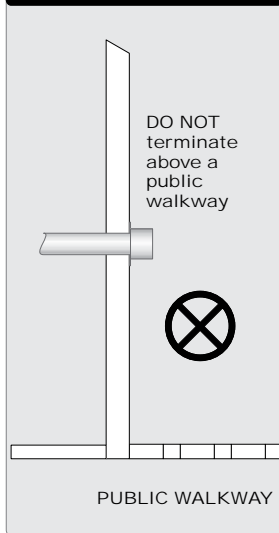
2



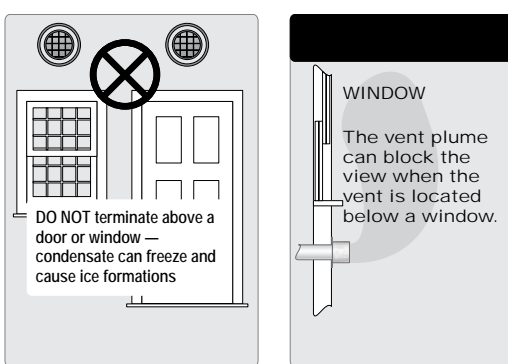
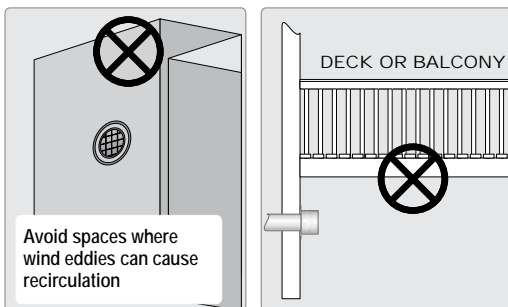
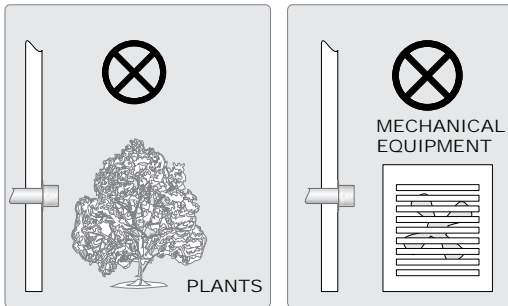
MINIMUM CLEARANCES



DO NOT TERMINATE:



DO NOT TERMINATE



Boiler Room Air Openings

Figure 33 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

For Direct Exhaust installations, see Warning on [page 45](#). 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 12](#).

<p>Air openings The required air opening sizes below are FREE AREA, after reduction for louver obstruction. Note the exception below for large spaces.</p>	<p>ECO Tec boiler WITH other appliances in room</p>	<p>ECO Tec boiler WITHOUT other appliances in room</p>
<p>a</p>	<p>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)</p>	
<p>b</p>	<p>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)</p>	<p>NO openings are required if the boiler installation provides at least the recommended service clearances shown in Figure 1, page 12.</p>
<p>Outside or Ventilated Attic</p> <p>c</p>	<p>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)</p>	<p>If the space is smaller than Figure 1, page 12, provide openings ONLY as shown in Figure 2, page 12. Each opening must have a free area no less than 1 square inch per 1,000 Btuh input of the boiler.</p>
<p>d</p>	<p>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)</p>	
<p>** NOTICE: Requirements for using the SINGLE air opening option.</p>	<p>A single combustion air opening can be used for cases b, c or d above (ECO Tec with other appliances in room only), sized as listed, provided that:</p> <ul style="list-style-type: none"> • 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. 	
<p>SPECIAL EXCEPTION FOR LARGE SPACES (ECO Tec WITH other appliances in room only):</p>	<p>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.</p> <p>Example: For a total input of 500 MBH (500,000 Btuh), the minimum volume would be 50 x 500 = 25,000 cubic feet.</p>	

Vent and Air Piping and Boiler Connections

Follow Termination Instructions

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 31, page 28**.

Installing Vent and Air Piping

Polypropylene

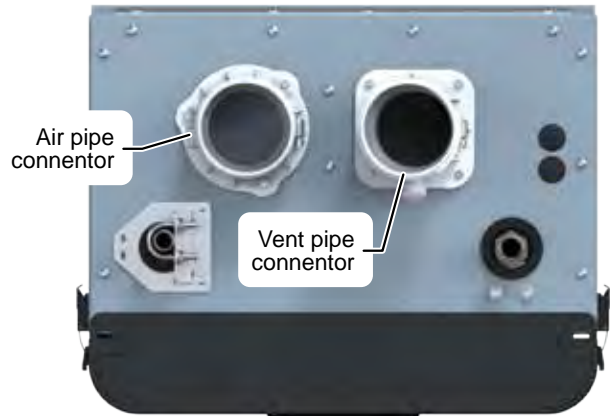
For polypropylene applications, see venting and air piping notes on **page 26**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 26**.

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 34** for attaching vent (and air) pipes at the boiler. Connections must be 3" PVC for the air inlet. 3" PVC, SS or 3" PP are options for the vent — 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 ¼ 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.

Figure 34 Boiler vent and air connections



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). Use only 3" PVC, CPVC, SS (Simpson-Duravent only) and PP (Simpson-Duravent & Centrotherm) pipe at boiler vent connection. Use only 3" PVC on the air inlet 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.

WARNING

The vent pipe end must be smooth and chamfered to prevent possible damage to sealing gasket in vent pipe adapter.

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 make a mark with felt-tip pen.
6. Loosen adapter clamp screw.
7. Apply 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 31, page 28**. 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 30, page 27**.

Polypropylene

For polypropylene applications, See venting and air piping notes on **page 26**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 26**.

Determine Termination Location

1. The air and vent terminations must be installed as shown in **Figure 35** and **Figure 38, page 34**.
2. The terminations must comply with clearances and limitations shown in **Figure 32, page 30**.
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 35**. 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

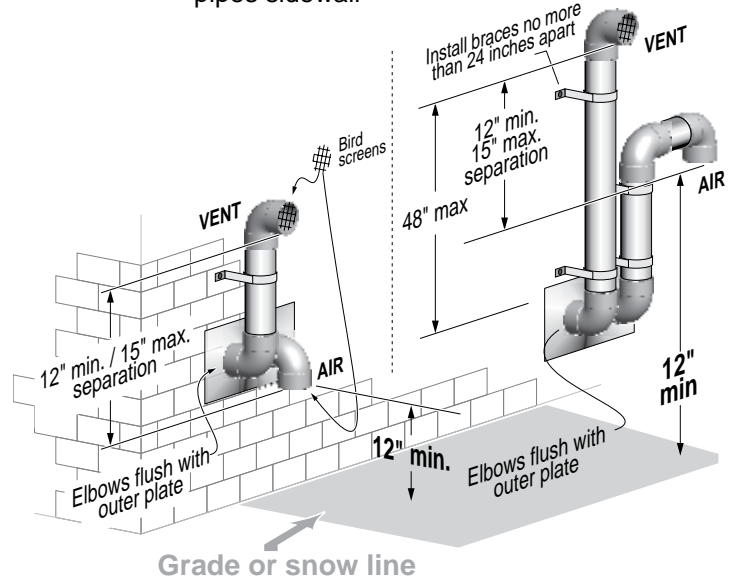
1. When terminating multiple boilers, terminate each vent/air connection as described in this manual.

⚠ 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 36, page 34** 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 — Separate pipes sidewall



- Step 1** Read and follow all instructions in this manual. **DO NOT proceed with vent/air installation until you have read page 25 through page 28.** **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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 32, page 30**. (Multiple boiler sidewall plates must also comply with **Figure 36, page 34**.)
- Step 4** Use only the vent materials listed in **Figure 31, page 28**. Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in **Figure 30, page 27**.
- Step 5** Prepare the sidewall penetrations and secure the sidewall plates as instructed in this section. See **"Prepare Wall Penetrations" on page 34**. **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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 32** for general guidelines. **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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. **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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** Individual external vent and air pipes having a total length of up to 4 feet (each) do not require an insulated enclosure to be installed around the piping. 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** Individual external vent and air pipes having a total length greater than 4 feet (each) must have an insulated enclosure installed around the vent and air pipes to reduce the risk of condensate freezing inside of the exposed piping. The vent and air terminations must exit through the enclosure as shown in the illustration above, maintaining all required clearances.



⚠ 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 (continued)

Polypropylene AL29-4C S.S. See notices on previous page.

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 38**.
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 WM Technologies. See "VENT/AIR PARTS AND KITS" on **page 171**.
 - 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 35, page 33**.) 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 35, page 33**.
4. You can orient the vent termination elbow either directly outward or 90 degrees away from the air inlet elbow as shown in **Figure 35, page 33**.
5. Maintain the required dimensions of the finished termination piping as shown in **Figure 35, page 33**.
6. For multiple boiler terminations, see **Figure 36**.
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.

1 Vent piping	4 Corrosion resistant thimbles, by installer
2 Air piping	5 Bird screen, by installer
3 Sidewall termination plates: for 3" PVC, use plates supplied with boiler in W-M vent/air plate kit; for 3" AL29-4C or 2" PVC, purchase optional sidewall separate pipes plate kit	6 Air inlet elbow
	7 Elbow
	8 Nipple
	9 Elbow (vent termination)

Figure 36 Multiple terminations — separate pipes — clearance from vent of one air intake of the next

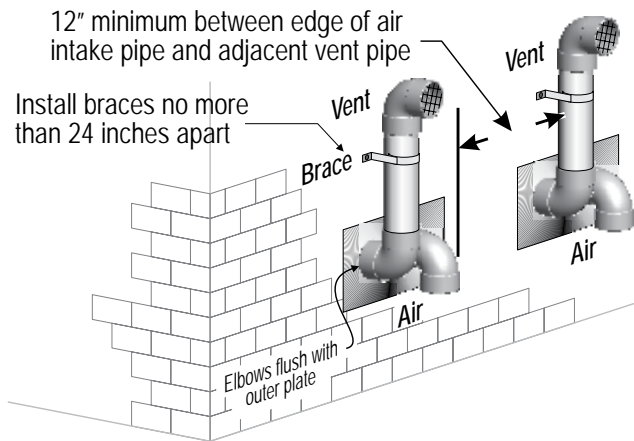


Figure 37 Multiple terminations — separate pipes — clearance from vent of one air intake of the next — alternate configuration of air and vent terminations.

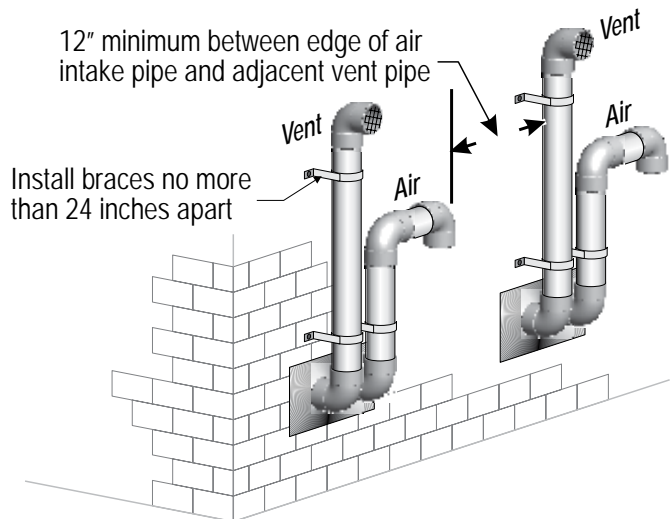
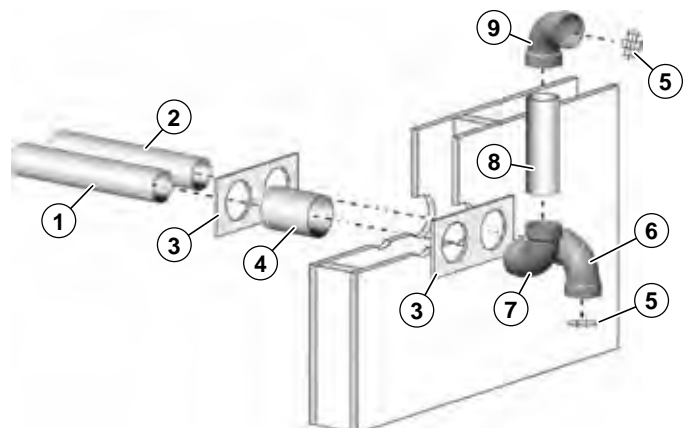


Figure 38 Sidewall termination assembly — using separate pipes



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 31, page 28** and **Figure 152, page 171**. 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 30, page 27**.
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 26**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 26**.

Determine Termination Location

1. The concentric termination kit must be installed as shown in **Figure 41, page 36**.
2. The termination must comply with clearances and limitations shown in **Figure 32, page 30**.
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.

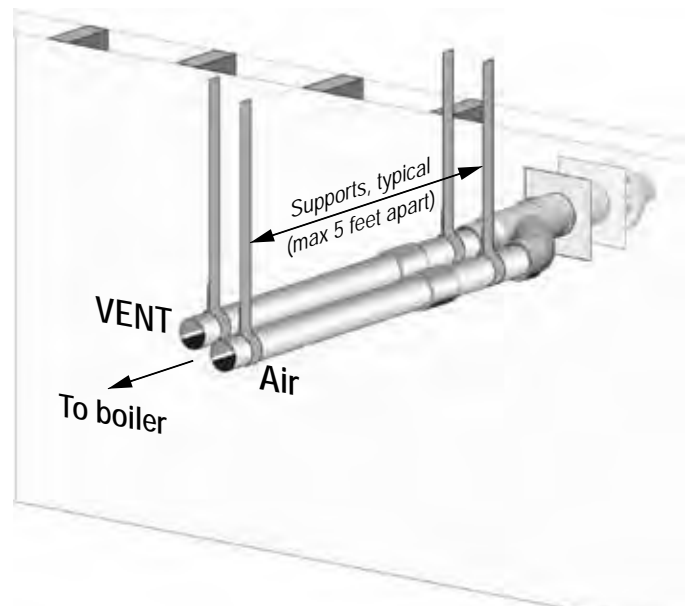
⚠ WARNING

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 40, page 36** 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 39 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 25 through page 28.** **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 32, page 30**. (Multiple boiler concentric terminations must also comply with **Figure 40, page 36**.)
- Step 4** Use only the vent materials listed in **Figure 31, page 28**. Provide pipe adapters where required.
- Step 5** Vent piping and air piping lengths must not exceed the values shown in **Figure 30, page 27**.
- 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 36**. **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 26** 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 26**.
- 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.



DIRECT VENT - Sidewall Concentric (continued)

Polypropylene AL29-4C S.S. See notices on previous page.

Install Termination — Concentric Pipes

1. Assemble the vent termination as described for concentric terminations, on [page 46](#).

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 41](#).

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 41](#).
4. Before beginning vent and air piping from the boiler to the concentric termination, mount and secure the concentric termination as shown in [Figure 41](#).

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.

- 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.

- 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 54, page 46](#), or per concentric kit instructions for polypropylene kits.
 - b. Cement the rain cap in place as shown.

Figure 40 Termination location — concentric termination — multiple boilers — clearance from vent of one to air intake of the next

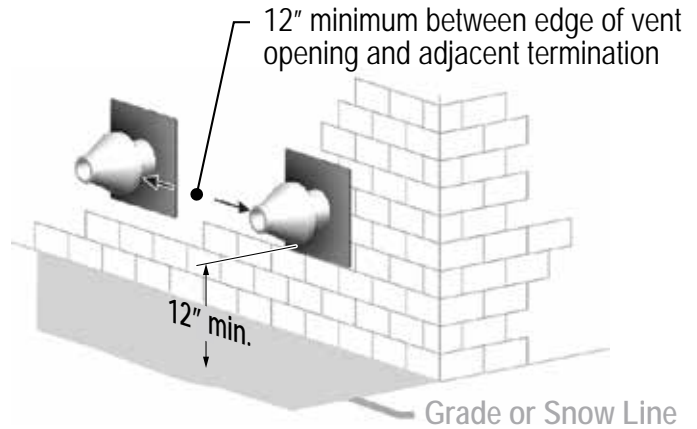
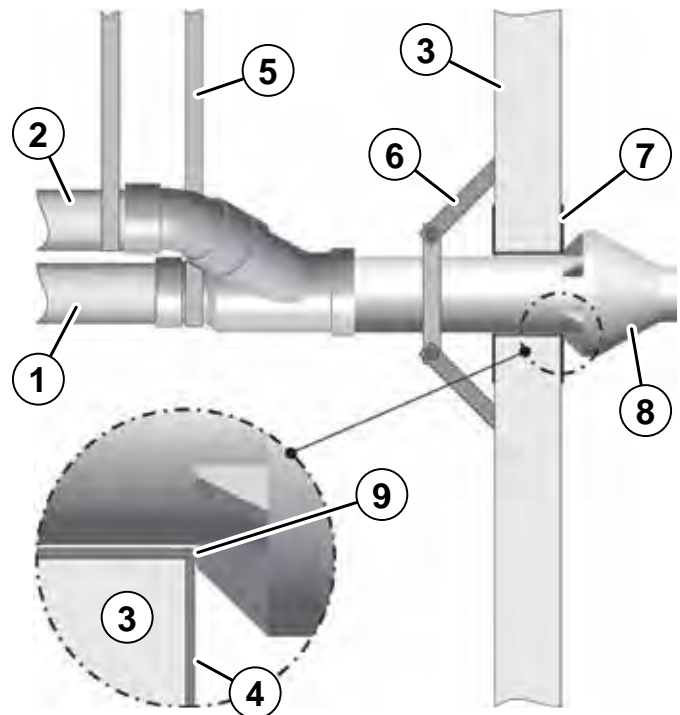


Figure 41 Installing and supporting the concentric sidewall vent assembly



LEGEND

- | | |
|--|--|
| 1. Vent pipe | 6. Wall brace, by installer, (or see vent pipe mfg's instructions) |
| 2. Air pipe | 7. Thimble, by installer |
| 3. Wall | 8. Rain cap |
| 4. Outer thimble plate | 9. Rain cap ribs must butt against outer thimble plate or wall opening |
| 5. Supports every 5 feet or per vent pipe mfg's instructions | |

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 31, page 28** and **Figure 152, page 171**. 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 30, page 27**.

Polypropylene

For polypropylene applications, See venting and air piping notes on **page 26**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 26**.

Determine Termination Location

1. The vent/air cap must be installed as shown in **Figure 45, page 38**.
2. The termination must comply with clearances and limitations shown in **Figure 32, page 30**.
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

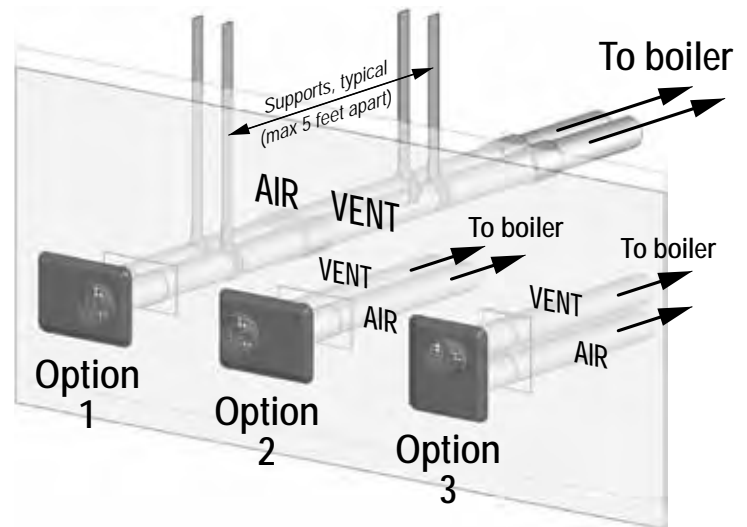
All vent pipes and air inlets must terminate at the same height to avoid possibility of severe personal injury, death or substantial property damage.

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 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.

⚠ WARNING

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

Figure 42 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 25 through page 28.** **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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 32, page 30**. (Multiple boiler sidewall plates must also comply with **Figure 43, page 38**.)
- Step 4** Use only the vent materials listed in **Figure 31, page 28**. Provide pipe adapters where required.
- Step 5** Vent piping and air piping lengths must not exceed the values shown in **Figure 30, page 27**.
- 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 38**.
- 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 32** 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 26**.
- 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 26**.



⚠ 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 W-M Vent/Air Plate (continued)

Install Weil-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.

⚠ WARNING

For the Weil-McLain plate, the template must be level to ensure the flue and air pipe will be side-to-side, as shown in Figure 40. Failure to comply could result in severe personal injury, death or substantial property damage.

- e. Cut holes in the wall as shown in **Figure 44**, using the location marks made with the template. For best results, use a small-diameter, long drill bit to drill centering holes for the flue and air pipe openings. Then drill the large openings from both the inside and outside.
 - f. The flue pipe and air pipe may be run through a rectangular cutout (as marked on the template) in lieu of two separate holes if desired.
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 1/2" sheet metal screws and lock washers (see **Figure 45**).

NOTICE

Vent/air pipes and W-M vent/air plate can be oriented in any of the configurations shown in **Figure 42, page 37**.

Figure 43 Adjacent terminations — OUTSIDE VIEW — clearance from air inlet to exhaust from another appliance

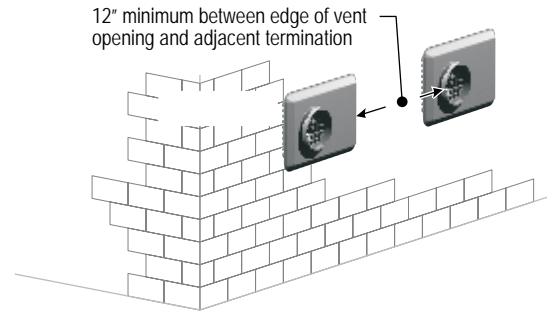
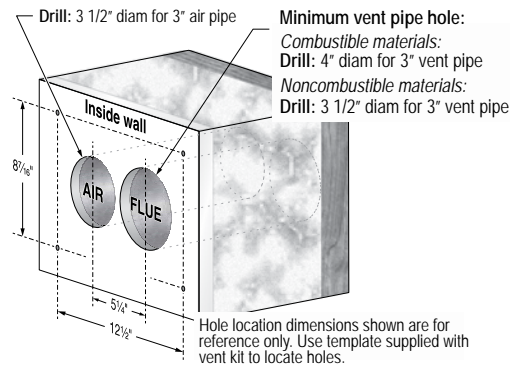
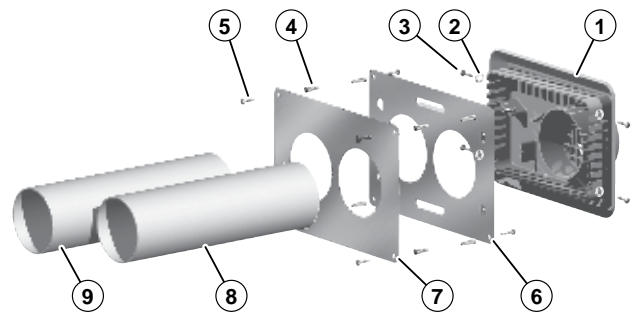


Figure 44 Hole preparation in wall — INSIDE VIEW (use template provided)



1. Inside wall
2. Drill: 3 1/2" diameter for 3" air pipe; locate using template provided
3. For combustible materials, drill: 4" diameter for 3" vent pipe For noncombustible materials, drill 3 1/2" diameter for 3" vent pipe Locate opening using template provided
4. Drill mounting screw holes using template provided

Figure 45 Termination assembly — INSIDE VIEW Weil-McLain vent/air cap and plates



- | | |
|--|--|
| 1. Vent termination (3") | 6. Outer mounting plate |
| 2. Lock washer, #10 (4) | 7. Inner mounting plate |
| 3. Sheet metal screw, #10 x 1/2" (4) | 8. Vent pipe (butt to screen in termination) |
| 4. Plastic wall anchor (8) | 9. Air pipe (butt to stops in termination) |
| 5. Sheet metal screw, #10 x 1 1/4" (8) | |

DIRECT VENT - Vertical with Separate Pipes

Allowable Vent/Air Pipe Materials & Lengths

⚠ WARNING

Use only the vent materials and kits listed in [Figure 31, page 28](#). Provide pipe adapters if specified.

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 30, page 27](#).

Polypropylene

For polypropylene applications, See venting and air piping notes on [page 26](#).

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on [page 26](#).

Determine Termination Location

1. The air and vent terminations must be installed as shown in [Figure 46](#).
2. The terminations must comply with clearances and limitations shown in [Figure 32, page 30](#).
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

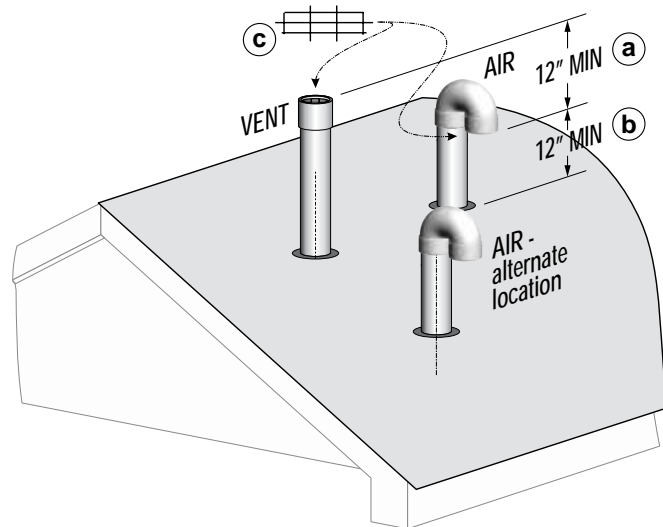
1. When terminating multiple boilers, terminate each vent/air connection as described in this manual.

⚠ 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 47, page 40](#)). 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 46 Separate pipes vertical termination



Terminate vent and air pipes such that:

- 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 25](#) through [page 28](#).** **Polypropylene AL29-4C S.S.** See notices at left and [page 26](#).
- 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 32, page 30](#). (Multiple boiler terminations must also comply with [Figure 47, page 40](#).)
- Step 4** Use only the vent materials listed in [Figure 31, page 28](#). Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in [Figure 30, page 27](#).
- Step 5** Prepare the vertical penetrations and secure penetration components as instructed in this section. See **"Prepare Roof Penetrations"** on [page 40](#) and **"Termination and Fittings"** on [page 40](#).
- 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 32](#) for general guidelines. Also comply with vent pipe manufacturer's instructions. **Polypropylene AL29-4C S.S.** See notices at left and [page 26](#).
- 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.

DIRECT VENT - Vertical with Separate Pipes (continued)

Polypropylene AL29-4C S.S. See notices on previous page.

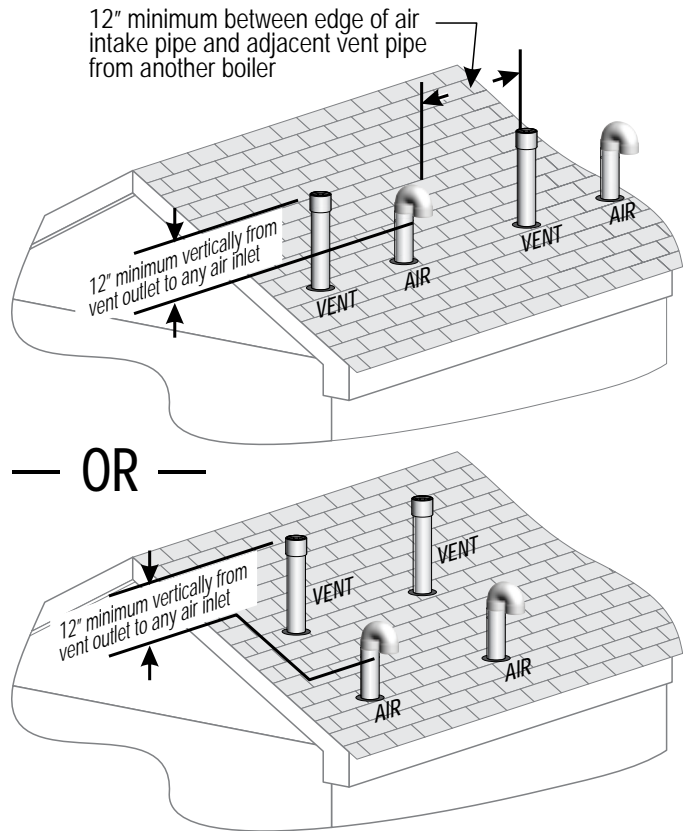
Prepare Roof Penetrations

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 47**.
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 46, page 39**) 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 46, page 39**. 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 46, page 39**. 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 46, page 39**.
5. Do not extend exposed vent pipe outside of building more than shown in this document. Condensate could freeze and block vent pipe.

Figure 47 Terminations for multiple boilers



WARNING

Also maintain maximum distances between the vent and air pipes for each boiler as shown in **Figure 35, page 33**.

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 31, page 28** and **Figure 152, page 171**. 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 30, page 27**.
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 26**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 26**.

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 50, page 42**
2. The termination must comply with the clearances and limitations shown in **Figure 32, page 30**.
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

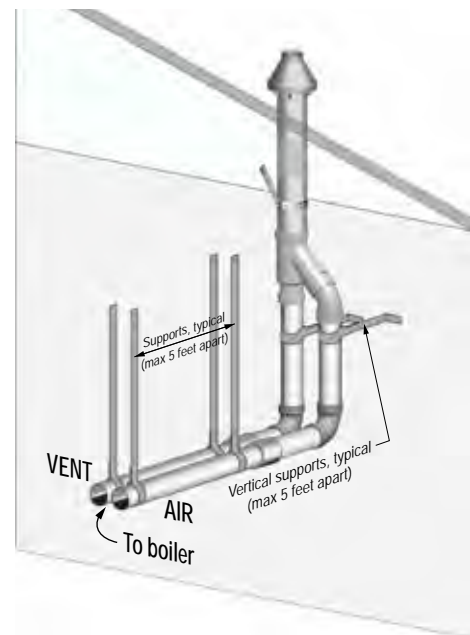
1. When terminating multiple boilers, install the concentric vent/air termination assemblies as described in this manual.

⚠ 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 49**).
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.

Figure 48 INSTALLATION SEQUENCE — Concentric vertical



- Step 1** Read and follow all instructions in this manual. **DO NOT proceed with vent/air installation until you have read page 25 through page 28.** **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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 32, page 30**. (Multiple boiler concentric terminations must also comply with **Figure 49, page 42**.)
- Step 4** Use only the vent materials listed in **Figure 31, page 28**. Provide pipe adapters where required.
- Step 5** Vent piping and air piping lengths must not exceed the values shown in **Figure 30, page 27**.
- 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 42** and **"Mount Concentric Termination" on page 42.** **Polypropylene AL29-4C S.S.** See notices at left and **page 26**.
- 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 32** 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 26**.
- 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 26**.



⚠ 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 Concentric (continued)

Polypropylene AL29-4C S.S. See notices on previous page.

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.
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 46](#).
2. Mount the termination as shown in [Figure 50](#).
3. Support the concentric vent/air termination at the roof penetration as shown in [Figure 50](#) 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.
 - 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.
 - If using AL29-4C stainless vent pipe, use the vent pipe manufacturer's PVC adapter if connecting to a PVC concentric vent attachment.
 - 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 54, page 46](#), or per kit instructions for polypropylene kits.
 - b. Cement the rain cap in place.

Figure 49 Vertical termination — 3" PVC concentric — single or multiple boilers

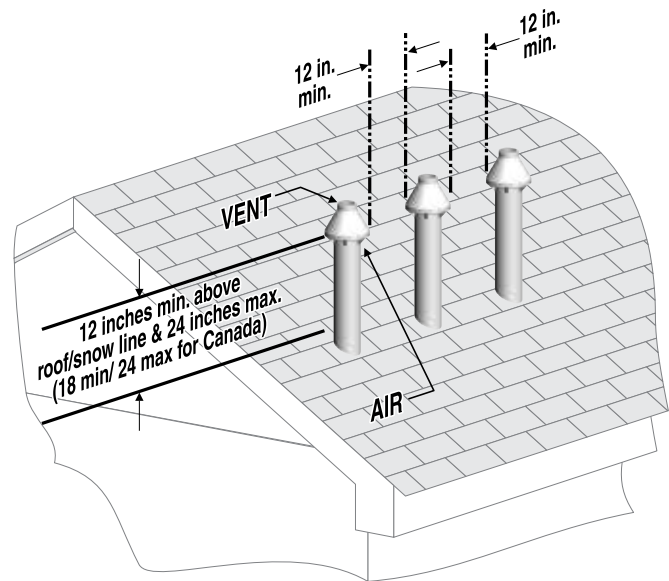
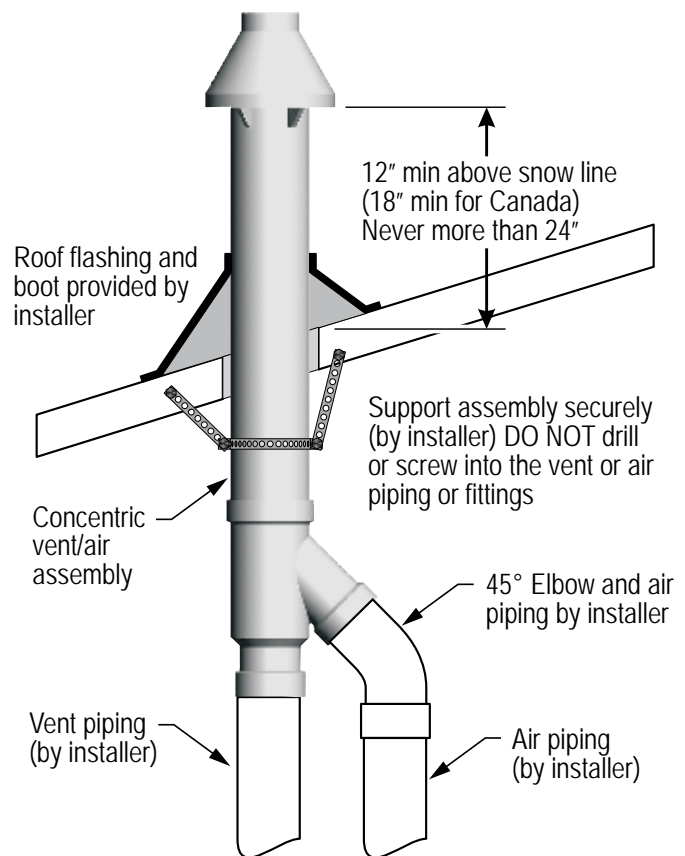


Figure 50 3" PVC concentric termination supports



DIRECT VENT - Vertical vent /sidewall air

Allowable Vent/Air Pipe Materials & Lengths

⚠ WARNING

Use only the vent materials and kits listed in **Figure 31, page 28**. 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 30, page 27**.

Polypropylene

For polypropylene applications, See venting and air piping notes on **page 25**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 25**.

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.

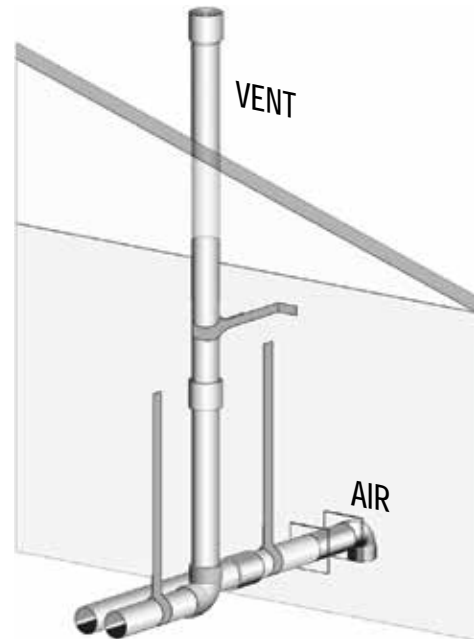
Vent termination and Fittings

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 52, page 44**.

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.

Figure 51 INSTALLATION SEQUENCE — Vertical vent/sidewall air



- Step 1** Read and follow all instructions in this manual. **DO NOT proceed with vent/air installation until you have read page 25 through page 27** . **Polypropylene** **AL29-4C S.S.** See notices at left and **page 25**.
- 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 32, page 30** .
- Step 4** Use only the vent materials listed in **Figure 31, page 28**. Provide pipe adapters where required. Vent piping and air piping lengths must not exceed the values shown in **Figure 30, page 27**.
- 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. **Polypropylene** **AL29-4C S.S.** See notices at left and **page 25**.
- 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 53**.
 - a. Apply the configuration on the left side of **Figure 53** unless the terminations would fail to meet minimum clearance to grade or snow line.
 - b. Apply the configuration on the right side of **Figure 53** 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.
2. Seal exterior openings thoroughly with exterior caulk.

Termination and Fittings

1. Prepare the air termination elbow (**Figure 53**) 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 38, page 34**.

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.

Figure 52 Vent termination (through the roof) for direct vent: vertical vent / sidewall air

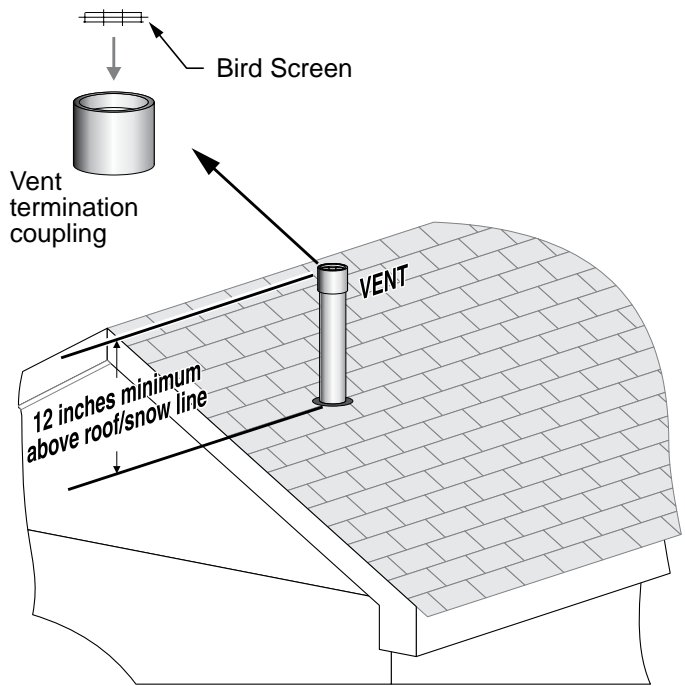
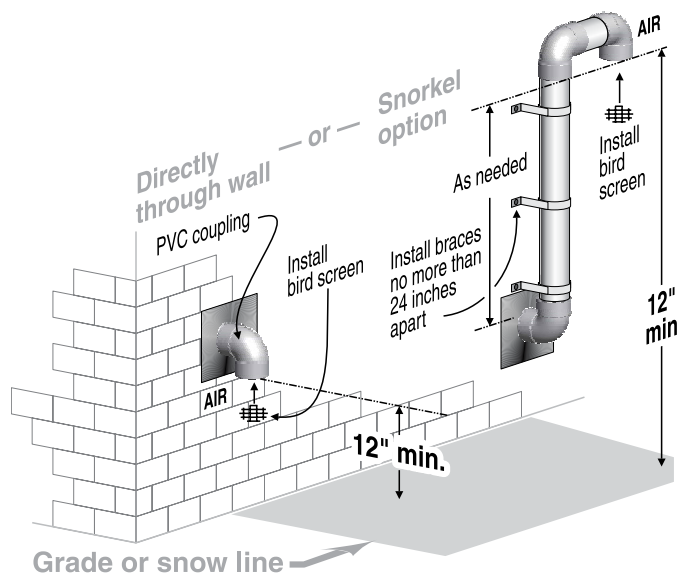


Figure 53 Sidewall air inlet (termination) for direct vent: vertical vent / sidewall air



DIRECT Exhaust - Kit Option

Weil-McLain's Direct Exhaust Kit must be used to field convert the ECO Tec Boiler to a Direct Exhaust Boiler. All instructions contained in this manual and in the Direct Exhaust Venting Kit Instructions must be followed. For complete installation guide, please refer to the Direct Exhaust Venting Kit Instructions are included inside the Direct Exhaust Venting Kit, part number listed below.

VENT/AIR PARTS AND KITS (PVC or STAINLESS STEEL) Available from WM Technologies	
Weil-McLain Direct Exhaust Venting Kit Includes interior/exterior intake/exhaust plates, 2" & 3" vent screens, templates & mounting hardware	383-500-778

Installation Instructions

Installer

⚠ WARNING

Read all instructions before installing. Follow all instructions in proper order to prevent personal injury or death.

NOTICE

Inlet and outlet pipe and fittings provided by installer.

1. Install 3" diameter PVC or CPVC pipe and elbow on air inlet of boiler.
2. Install 3" screen in opening of elbow.

NOTICE

Installation of pipe and elbow in inlet is to prevent objects from inadvertently entering or blocking air inlet.

3. Use the template to cut appropriate hole in wall for exhaust. Use only the exhaust hole!
4. Run the exhaust vent piping to the wall in accordance with the instructions shown on the following pages.
5. Install appropriate size bird screen in end termination.

Combustion Air Provision

The boiler can use inside air if no contaminants are present in the boiler space. (If contaminants are likely to be present, install the boiler as a direct vent appliance, using the appropriate vent instructions in the boiler manual.)

The boiler room must be fitted with combustion air openings large enough to provide air for all appliances in the room. Use the following information to size the openings. Ensure the installation complies with all applicable codes and standards.

Sizing Combustion Air Openings

Air openings provide for ventilation (as well as combustion air) to prevent overheating of the boiler controls and boiler space. Air is also needed for other appliances located in the same space.

Use **Figure 33, page 31**, selecting the appropriate installation conditions.

⚠ WARNING

- Air openings must be sized to handle all appliances and air movers (exhaust fans, etc.) using the air supply.

The sizing given in **Figure 33, page 31** is based on the National Fuel Gas Code, ANSI Z223.1/NFPA 54 - latest edition, allowing adequate air openings for gravity-vented gas appliances (Category I) in addition to that needed for the ECO Tec boiler.

- Installers must add in ECO Tec's BTU rating into calculations in **Figure 33, page 31**, along with all the other appliances in the room.

The air openings recommended in **Figure 33, page 31** will allow adequate ventilation and combustion air provided the boiler room is not subjected to negative pressure due to exhaust fans or other mechanical ventilation devices.

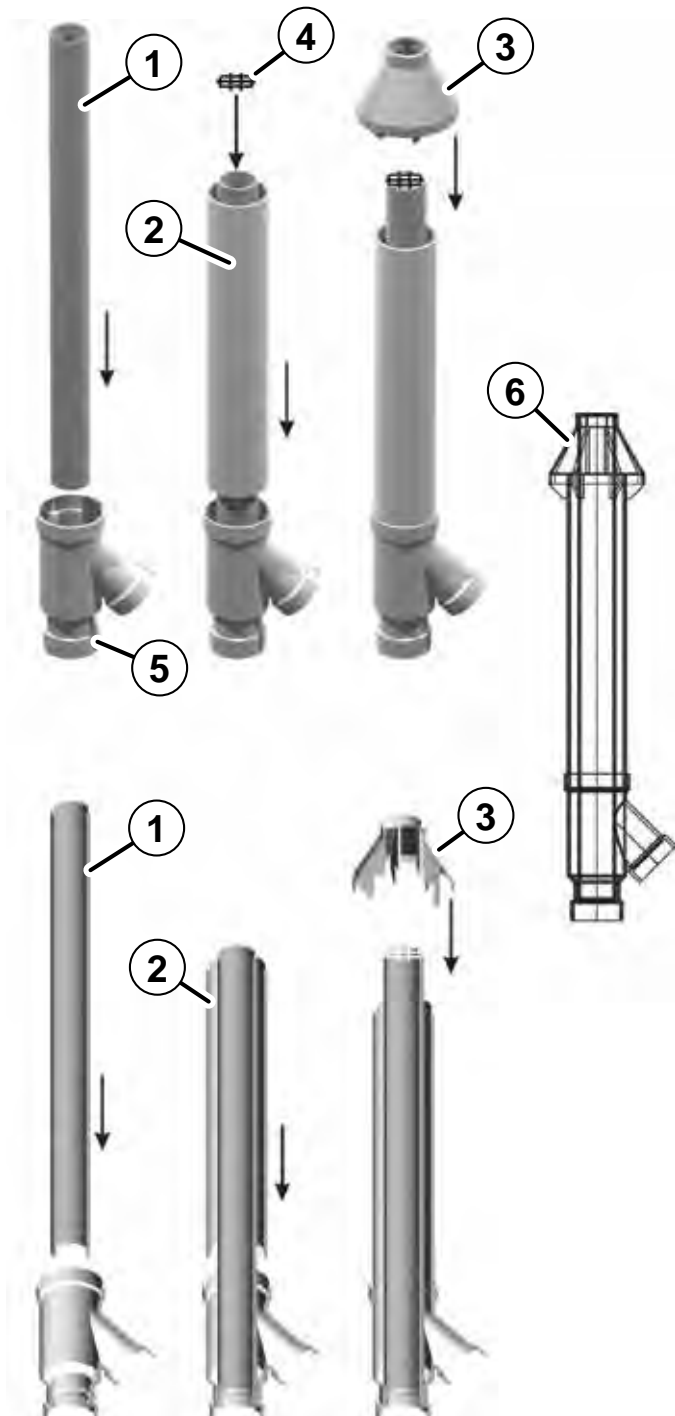
Refer to the National Fuel Gas Code for dealing with other conditions.

<p>Maximum vent and air pipe length (for each)</p> <p>80/110/150 - 2" & 3" = 100 feet</p> <p>199 - 3" = 100 feet / 199 - 2" = 50 feet</p> <p>(Minimum length for all applications is 2 feet)</p> <p>(All applications include allowance for the termination fittings plus one elbow in air piping and one elbow in vent piping).</p>
--

ECO Tec Model	USE SWEEP ELBOWS ONLY (Please refer to all notes and warning on page 27 . For Vent and Air piping materials, refer to Figure 31, page 28 .)			
	SIDEWALL termination (Note 1 & 2, Figure 30, page 27 .)		VERTICAL termination	
	Size, inches	Materials (page 4)	Size, inches	Materials (page 4)
80/110	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS
	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS
150	2	PVC/PVC-DWV CPVC, PP, SS	2	PVC/PVC-DWV CPVC, PP, SS
	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS
199	2	CPVC, PP, SS	2	CPVC, PP, SS
	3	PVC/PVC-DWV CPVC, PP, SS	3	PVC/PVC-DWV CPVC, PP, SS

Concentric Termination, Typical (sidewall or vertical)

Figure 54 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.



LEGEND for Figure 54

- | | |
|--------------------------|----------------------|
| 1. Inner PVC pipe (vent) | 4. Bird screen |
| 2. Outer PVC pipe (air) | 5. Y fitting |
| 3. Rain cap | 6. Finished assembly |

Assembling Concentric Termination

- Follow all instructions provided with the concentric termination kit. The following are general guidelines for information only.
- See **Figure 54** for the typical assembly of a concentric termination assembly.
- 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.
- Partially assemble the vent termination kit in the sequence shown in **Figure 54**, 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.
- 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 28**.

AL29-4C S.S.

For AL29-4C vent pipe applications, See venting and air piping notes on **page 28**.

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

⚠ WARNING

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.)

⚠ WARNING

- **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 65](#) 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

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. An additional tee will need to be installed between the top pipe and pressure sensor for the use of a LWCO, see [Figure 55](#).
3. Use a low water cutoff designed for water installations. Electrode probe-type is recommended. See [Replacement Parts](#) 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 65](#).

Figure 55 LWCO 3/4" female NPT port location



Back Flow Preventer

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

System/Zone Pipe Sizing

(Baseboard, convectors or cast iron radiators ONLY)

For residential space heating applications (other than radiant heating or unit heaters) ONLY, you can use the sizing suggestions in [Figure 56](#).

Figure 56 Suggested pipe sizing for system headers and zone piping — RESIDENTIAL with baseboard, convectors or cast iron radiators ONLY (20°F temperature rise)

Boiler Models	System header
80/110	1" or larger
150/199	1¼" or larger

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

Suggested maximum load per zone	
Copper pipe and baseboard size	Maximum recommended feet of baseboard
¾"	67
1"	104

Size zone circulators to handle the required flow and head loss for each zone.



Install Boiler Water Piping (Continued)

General Piping Information

Figure 57 Head Loss through Boiler – Tables 4 and 5

Table 3 Head Loss through Boiler (ECO Tec Heat Only)

Flow Rate (GPM)	80/110 HO	150 HO	199 HO
	Head Loss (ft. w.c.)	Head Loss (ft. w.c.)	Head Loss (ft. w.c.)
6	1.0	—	—
8	2.2	1.3	0.4
10	3.4	3.1	2.6
12	4.5	4.8	4.7
14	--	6.6	6.8
16	--	8.3	8.9
18	--	--	11.0
20	--	--	13.1

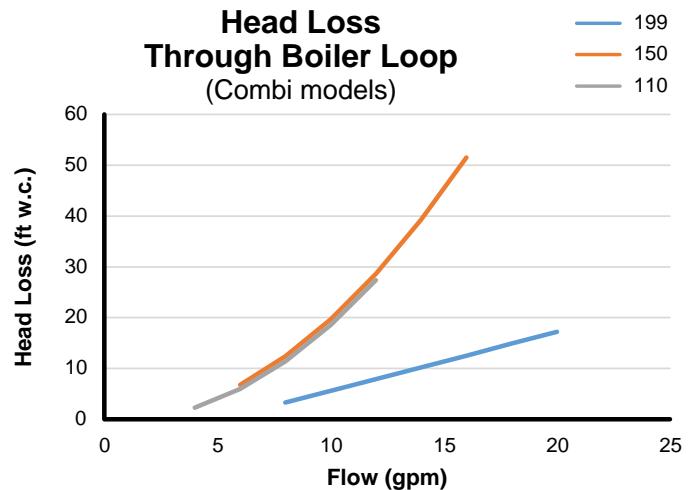
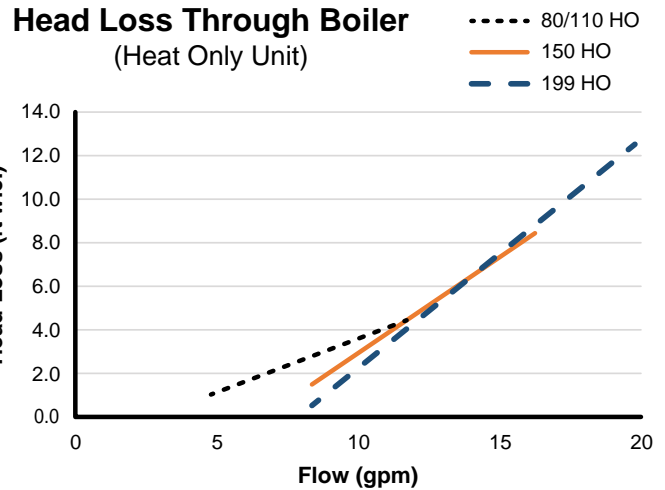
Table 4 Head Loss through Boiler (ECO Tec Combi)

Flow Rate (GPM)	110 C	150 C	199 C
	Head Loss (ft. w.c.)	Head Loss (ft. w.c.)	Head Loss (ft. w.c.)
4	2	--	--
6	6	7	--
8	11	12	3
10	19	20	6
12	27	29	8
14	--	39	10
16	--	52	13
18	--	--	15
20	--	--	17

Internal Circulator

This boiler is equipped with an internally installed Taco 0015e3 boiler circulator. This circulator may provide enough head for a direct connect system for HEAT ONLY 80/110/150 boilers. All COMBI boilers must be piped primary/secondary. The 199 Heating Only must be piped primary/secondary. Reference **Figure 58** to see if the internal circulator provides enough head for the given application. In all other cases, this circulator will provide the proper boiler flow for a primary/secondary system piping. See instructions starting on **page 57** 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. The Combi boiler **must** have its circulator set to **HIGH**. In some installations on Heating only boilers, the speed can be reduced, if the boiler temperature rise is smaller than the desired rise at the boiler's maximum input.



LED COLOR	STATUS
ORANGE	CIRCULATOR ON
FLASHING WHITE	AIR BOUND OR CAVITATION
RED	BLOCKED
OFF	CIRCULATOR OFF

Figure 58 Boiler Pump Head available to system

	Boiler Pump Head available to system			
	ECO Tec			
	80-H	80-H	110-H	150-H
	20°	30°		
Ft. w.c.	6.6	12.7	9.1	3.9
GPM	7.2	4.8	6.5	9.0

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 means to prevent gravity circulation of the boiler water during the cooling cycle.

To Pipe DHW, see [Figure 59, page 50](#).

1. Pipe sizing for DHW inlet and outlet is ¾" NPT on the 199 model. 110 and 150 models have ½" NPT connections for DHW.
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 WM Technologies, 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 Z21.22 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 58](#). 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.

NOTICE

Check Valve – A check valve must be field provided and installed on the outlet of the mixing valve to prevent reverse flow. Failure to prevent the back flow will cause water to flow through the flow switch, activating it, when the cold water draw has ended and the water pressure increases.

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 59](#) for Weil-McLain's DHW Service Valve Kit installation and [Figure 49, page 42](#) for kit part number.
9. **Cleaning** – refer to [Maintenance](#) 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.
2. Consult local codes and American Society of Plumbing Engineers (ASPE) Domestic Water Heating Design Manual - latest edition, for further information.

Recirculation Pump (Figure 60, page 51, 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 60, page 51** for recommend recirculation pump piping diagram. This piping strategy is for a dedicated DHW return pipe.

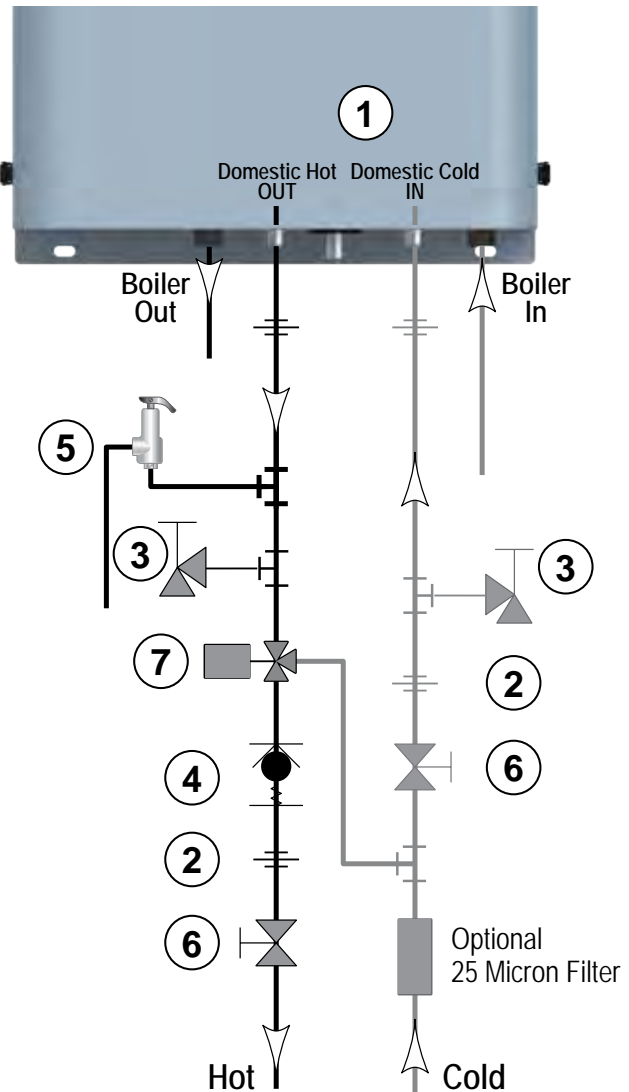
Aquastat (Figure 60, page 51, Item 9)

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**.

Figure 59 Domestic Piping - Brazed Plate Heat Exchanger - Ports 2 and 4



- | | |
|----------------------------|---------------------------|
| 1) Combi Boiler | 6) Isolation Valve |
| 2) Union | 7) Three Way Mixing Valve |
| 3) Drain/Purge Valve | |
| 4) Spring Check Valve | |
| 5) Relief Valve (150 PSIG) | |

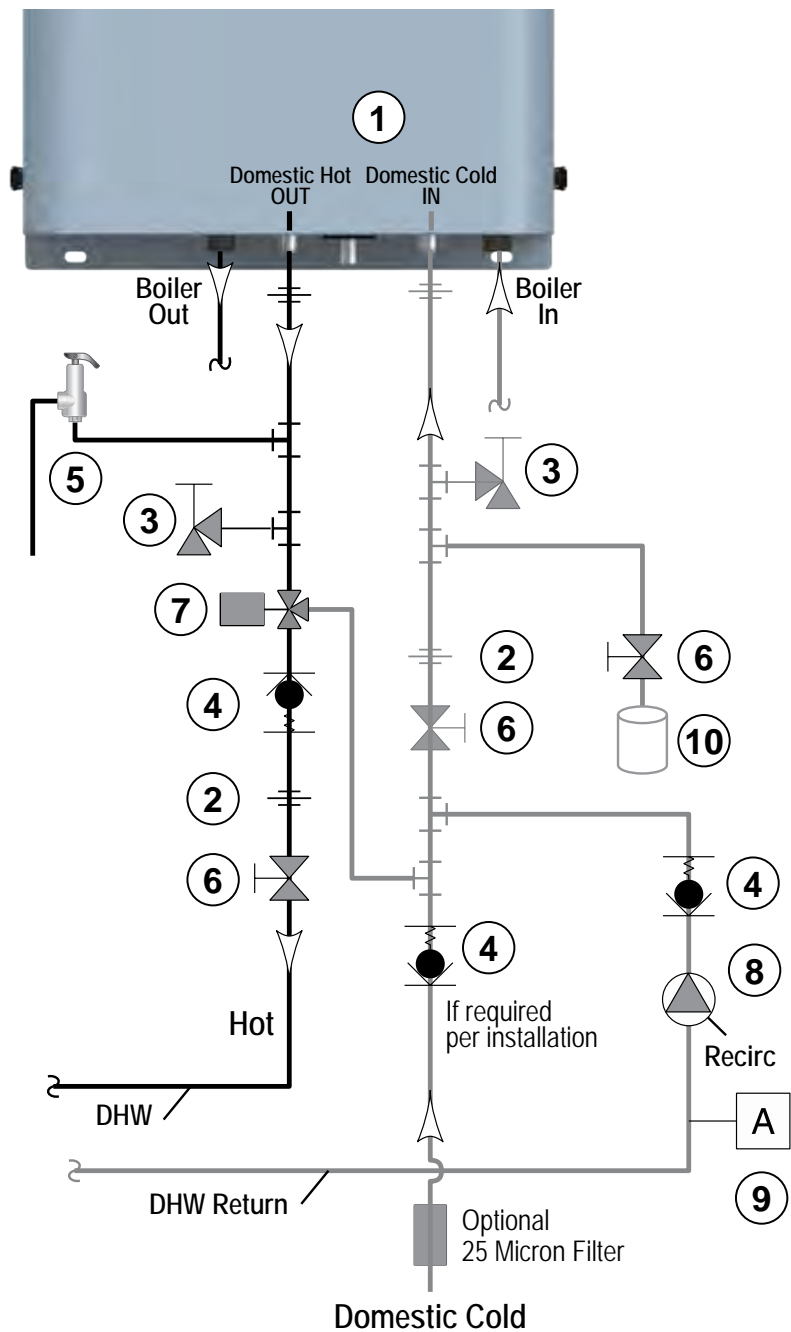
Check Valves (Figure 60, page 51, Item 4)

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 60 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 60, Item 10)

⚠ WARNING

- **THERMAL EXPANSION TANK** — If a back flow 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 the pressure relief valve.

The pressure 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.

Tankless Water Heater Piping (On Demand Domestic Hot Water)

Tankless Water Heater Only

The EcoTec Boiler can be installed for Tankless Water Heater Only.

1. The boiler must be filled and pressurized. See [page 17](#) for proper Boiler Hydrostatic Test, [page 57](#) & [page 58](#) for additional information on Expansion Tanks, and [page 58](#) for the Boiler's Relief Valve Warning.

2. The Boiler's hydronic piping must be piped as a closed loop system as shown in the piping diagram in [Figure 61](#). The Domestic Water must be piped to the secondary heat exchanger by means of the domestic piping manifolds and external connections, see [Figure 61](#). Do not pipe the Domestic Water to the Primary Heat Exchanger (the boiler's Hydronic Connections) for Domestic Hot Water usage.

Note: Ensure Hydronic piping leaves room for Domestic Hot Water Piping.

3. The Boiler's Hydronic Inlet and Outlet must be piped as primary/secondary. The WM Easy Up Manifold may be used for this piping and for future Hydronic usage. Plugs should be placed in the threads of the Easy Up Manifold's Ball Valves. If using Pipe Fittings and pipes instead of Easy Up Manifold, it is recommended to use Tee's to connect the horizontal run of the Primary Secondary piping for future Hydronic usage. See [Figure 61](#).

4. An Expansion Tank must be piped into the Boiler's system piping, see [Figure 61](#) for proper location. Additional fittings may be used on the Easy Up Manifold's Drain Valve Port to accommodate the Expansion Tank, fill, and drain valve.

Note: In future, when Boiler is connected to Hydronic System for space heating, expansion tank must be moved to proper location. See info starting on [page 57](#) for proper location

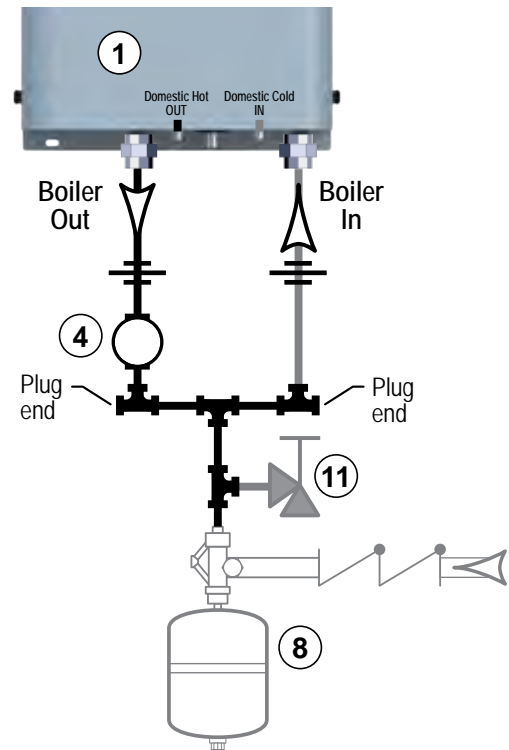
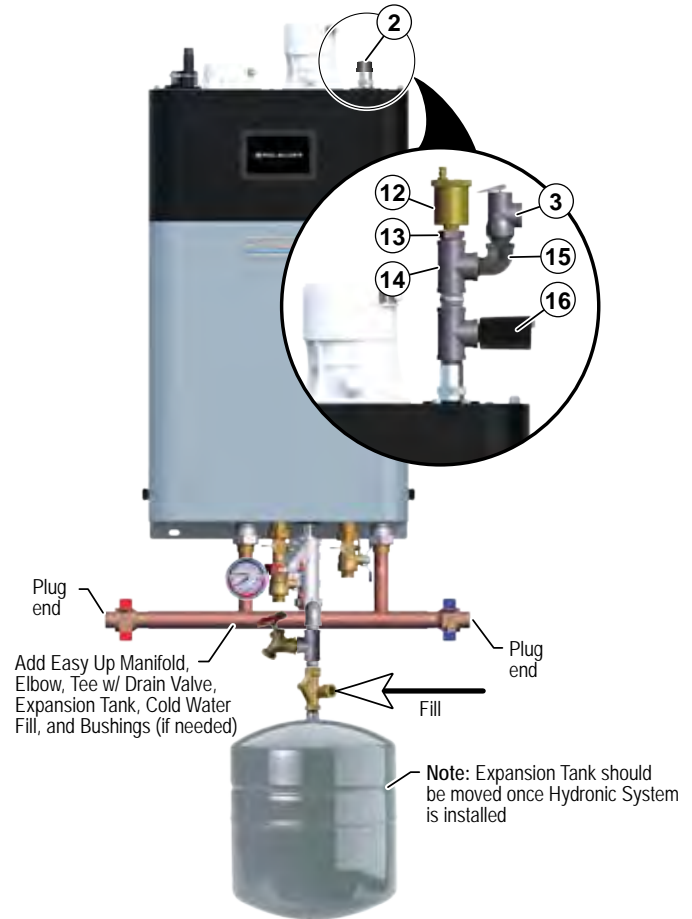
5. Additional Limit Controls may be required, see [page 47](#) for additional details.

6. Refer to [page 49](#) thru [page 51](#) for piping strategies and requirements for DHW.

7. All air must be purged out of the hydronic side of the system. Fill the system with water, then, with the gas valve shut off and the power on, give the boiler a DHW call by turning on a faucet. The circulator will activate, circulating water through the boiler. Shut off faucet when complete. Temporarily add a jumper to the boiler's thermostat input giving the boiler a CH call. This will change the position of the internal 3-way valve and circulator, circulating water through the boiler and also the external primary/secondary piping. Remove the jumper when complete. This process may need to be repeated to remove all air from system. When complete, clear all error codes from control.

1. ECO[®] Tec boiler.
2. Air Elimination/Relief Valve Connection Water Pipe, (male, 3/4" NPT) use for relief valve and air elimination.
3. Boiler relief valve, shipped loose with boiler – DO NOT mount relief valve until AFTER hydrostatic testing.
4. Pressure/temperature gauge, supplied with boiler, field piped.
8. Expansion tank.
11. Purge/drain valves (one drain valve shipped loose with boiler).
12. Auto air vent, by installer. Do not use with Closed-Type expansion tank.
13. Bushing, NPT 3/4", by installer.
14. Tee, NPT 3/4" x 3/4" x 3/4", installer supplied.
15. Street elbow, NPT 3/4" x 3/4", installer supplied.
16. Low water cut-off

Figure 61 Instant DHW piping



Install Boiler Water Piping (Continued)

System Water Piping Methods

Direct Connection Piping to Boiler

NOTICE

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 53](#) and [page 48](#) to determine if the system is eligible for this piping strategy.
2. If eligible, reference suggested piping layouts on [page 54](#) and [page 55](#).
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 [page 57](#) through [page 62](#).

NOTICE

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

Verify the Application Will Work:

NOTICE

- Direct connect will only work with the ECO Tec 80/110/150 Heat Only 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 [Figure 58, page 48](#)). 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 57](#).

Verify that the internal circulator will provide enough head to the system, see [Figure 58, page 48](#).

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 57](#)).

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 [Figure 58, page 48](#) 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.

NOTICE

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.

WARNING

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.

NOTICE

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

Automatic Air Vents (if used — automatic air vents must be used with diaphragm-type expansion tanks only)

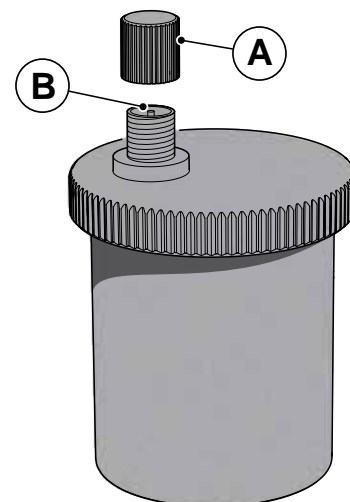
1. Remove the cap from any automatic air vent in the system and check operation by depressing valve “B” slightly with the tip of a screwdriver.

WARNING

Scald hazard — Water from air vent may be very hot. Avoid contact to prevent possible severe personal injury.

2. If the air vent valve appears to be working freely and not leaking, replace cap “A”, twisting all the way on.
3. Loosen cap “A” one turn to allow vent to operate.
4. Have vent replaced if it does not operate correctly.

Figure 62 Automatic air vent



Direct Connect System Piping - Single Boiler System

80/110/150 Boilers only (continued)

Expansion Tank Location

Figure 63, page 54 and **Figure 64, page 55** 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 54** and **page 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 63, page 54** 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.

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.

Closed-Type Expansion Tank:

CAUTION

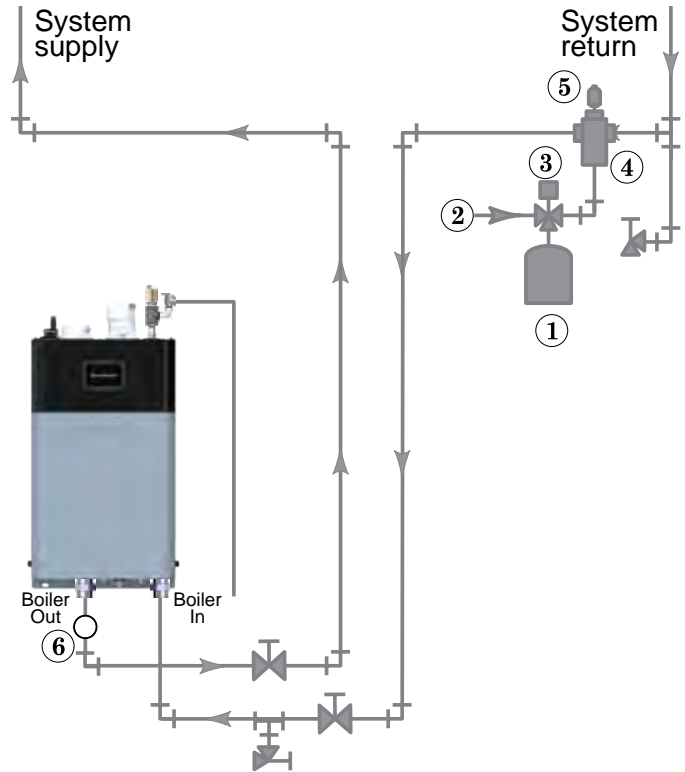
DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic air vent or if an automatic air vent is incorporated into the system piping.

Figure 63 shows suggested piping when using a closed-type expansion tank, in which the air is directly in contact with tank water.

Connect piping ($\frac{1}{2}$ " or $\frac{3}{4}$ ") 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.

Figure 63 Piping to diaphragm- (or bladder-) type expansion tank



- 1) Diaphragm-type expansion tank
- 2) Make-up water supply
- 3) Fill valve, typical
- 4) Air separator
- 5) Automatic air vent
- 6) Press. & Temp. gauge

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.

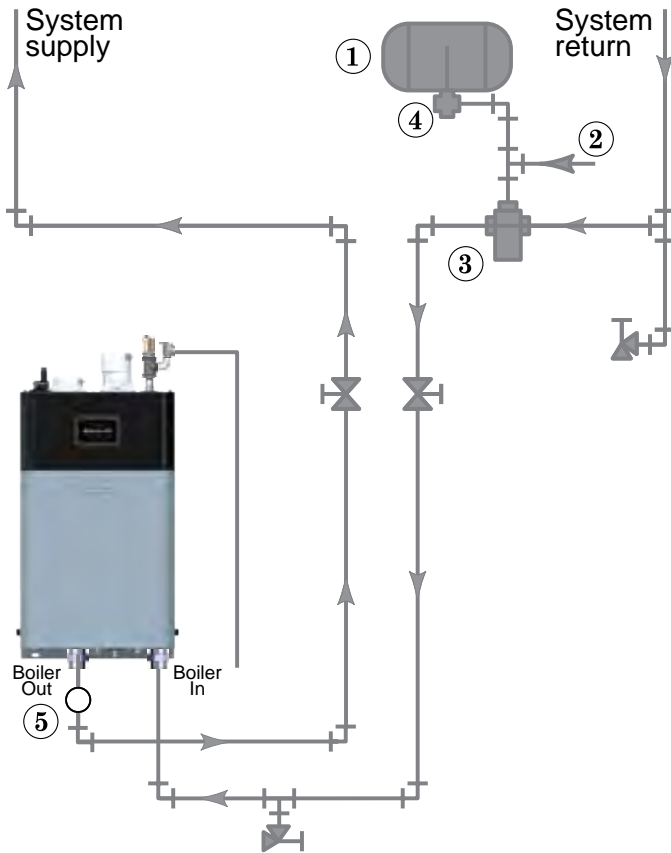
NOTICE

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.

Direct Connect System Piping - Single Boiler System

80/110/150 Boilers only (continued)

Figure 64 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

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 12, page 18.**

⚠ 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.

LEGEND for Figure 65, page 56.

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

<ol style="list-style-type: none"> 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 18 for information 4. Relief valve piping to drain — see page 55 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) 	<ol style="list-style-type: none"> 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 back flow preventers, pressure reducing valves, and fill valves may be required 	<ol style="list-style-type: none"> 21. By-pass pressure regulator, REQUIRED for zone valve systems unless other provision is made 22. High limit temperature control 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 zones or indirect DHW tank. 29. Low water cut-off (not shown - see page 47).
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Direct Connect System Piping - Single Boiler System

80/110/150 Boilers only (continued)

Zone Valve Zoning – Direct Connection

(Shown with optional DHW piping)

See **Figure 65**.

1. This configuration is for zone valve systems that qualify to use direct connection piping based on the criteria on **page 53** only. If system does not qualify, pipe using primary/secondary piping. See **page 58** through **page 62** 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.

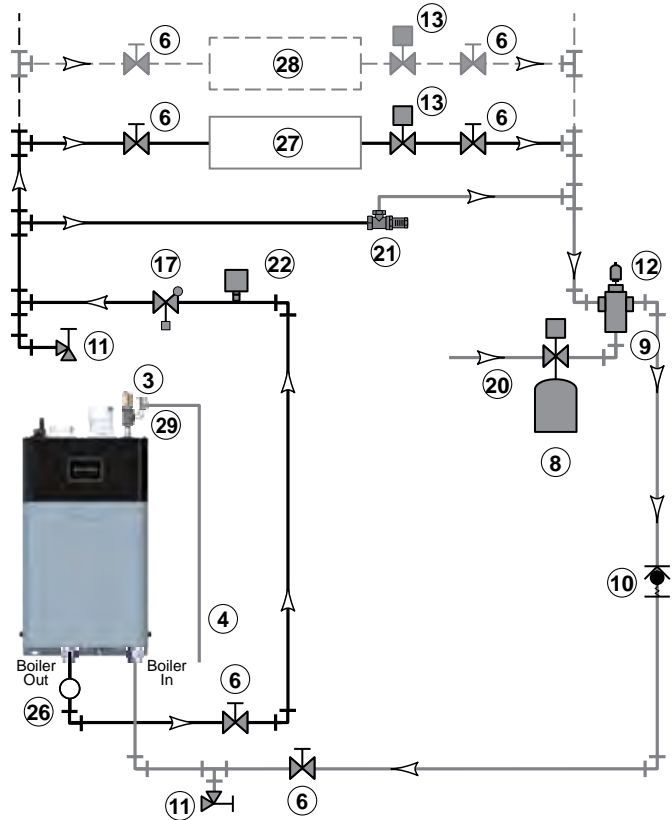
Expansion Tank Required

1. Provide a system expansion tank following the guidelines on **page 54** or **page 57**.
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. For a Direct Connect System a DHW Tank must be piped in as a zone. Zone valves must be utilized to prevent ghost flows. Priority for DHW is accomplished by utilizing the controls Input/Output pairs, powering the corresponding zone valves (120VAC or with an isolation relay for 24VAC) and assigning them to the appropriate priority during control setup. Assure available head and flow will be provided by internal boiler circulator based on criteria in **Figure 58, page 48**. See notices on page 157 to ensure compliance with the 2007 Energy Act. See control settings on **page 123** to change TARGET MODULATION SENSOR to System Supply when system sensors are installed.
2. If means cannot be provided to ensure adequate flow to the indirect and to prevent ghost flows, use primary/secondary piping configurations shown on **page 57** through **page 62** in this manual.
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.

Figure 65 ECO Tec 80/110/150 Zone valve zoning direct connection (internal boiler circulator provides flow for system)



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 184** 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 65 (item 28)**, a zone valve will have to be configured to turn on when the indirect tank input is active.

NOTICE

Controlling the Zone Valves. Connect zone valve end switches to corresponding inputs. Typically, input 1 for indirect tank, assigned to Priority 1 for DHW, Inputs 2, 3 & 4 for heating zones, assigned to Priority 2 or 3

CAUTION

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

Primary/Secondary System Piping - Single Boiler System

Expansion Tank Location

Figure 66 and **Figure 67** 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 60 - page 62**.

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 66** 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

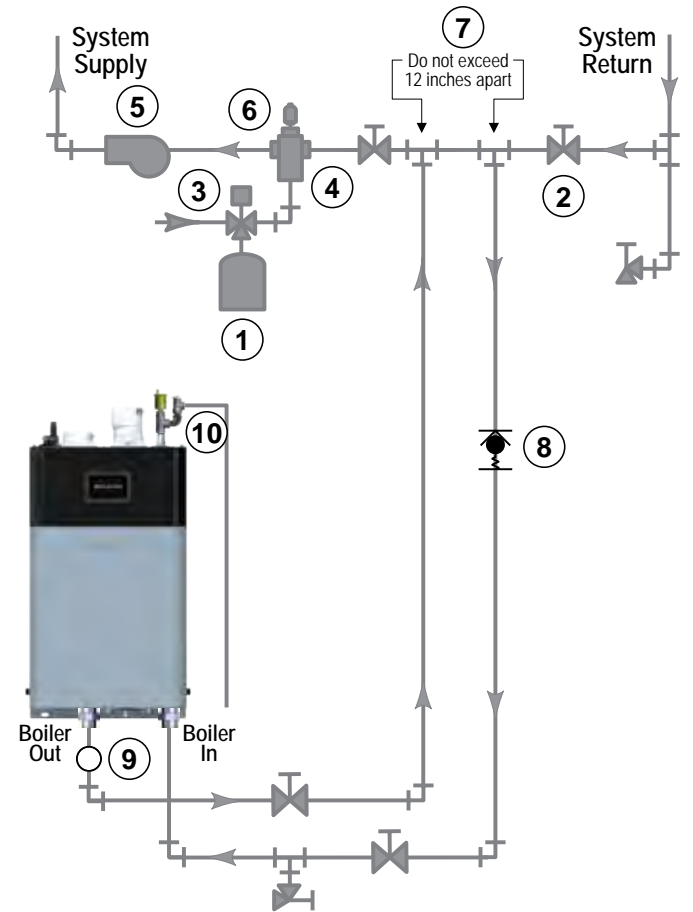
DO NOT use a closed-type tank if connecting to a water heater that is equipped with an automatic air vent or if an automatic air vent is incorporated into the system piping.

Figure 67, page 58 shows suggested piping when using a closed-type expansion tank, in which the air is directly in contact with tank water.

Connect piping ($\frac{1}{2}$ " or $\frac{3}{4}$ ") 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.

Figure 66 Piping to diaphragm (or bladder) expansion tank



- | | |
|----------------------------------|---|
| 1) Diaphragm-type Expansion Tank | 7) Primary/Secondary Connection |
| 2) Make-up Water Supply | 8) Spring Check Valve |
| 3) Fill Valve, Typical | 9) Press. & Temp. Gauge |
| 4) Air Separator | 10. Low Water cut-off (not shown - see page 47) |
| 5) System Circulator | |
| 6) Automatic Air Vent | |



Primary/Secondary System Piping - Single Boiler System

(continued)

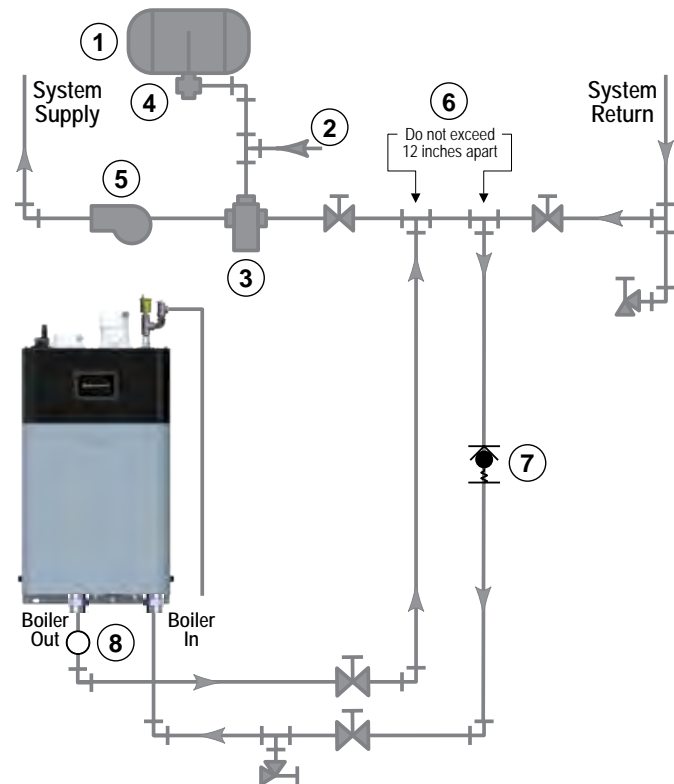
CAUTION

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.

Figure 67 Piping to closed-type expansion tank



- | | |
|-------------------------------|---------------------------------|
| 1) Closed-type Expansion Tank | 5) System Circulator |
| 2) Make-up Water Supply | 6) Primary/Secondary Connection |
| 3) Air Separator | 7) Spring Check Valve |
| 4) Tank Fitting | 8) Press. & Temp. Gauge |

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 12, page 18**).

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 66, page 57** and **Figure 67, page 58**. 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 starting on **page 57**. 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 = 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 68 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 in **Replacement Parts** at the end of this manual for ordering information.
2. See separate instructions for the **ECO Tec** Easy Up Manifold at weil-mclain.com for suggested guidelines to determine how to use and setup.



3. The **ECO Tec** DHW Service Valves comes as a separate kit, as well. See Miscellaneous service parts and kits in **Replacement Parts** at the end of this manual for ordering information.
4. See separate instructions for the **ECO Tec** DHW Service Valves at weil-mclain.com 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 69** .

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 show.
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 57](#) or [page 58](#).
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 184](#) to ensure compliance with the 2007 Energy Act. See Control section in this manual, **Figure 109** 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.

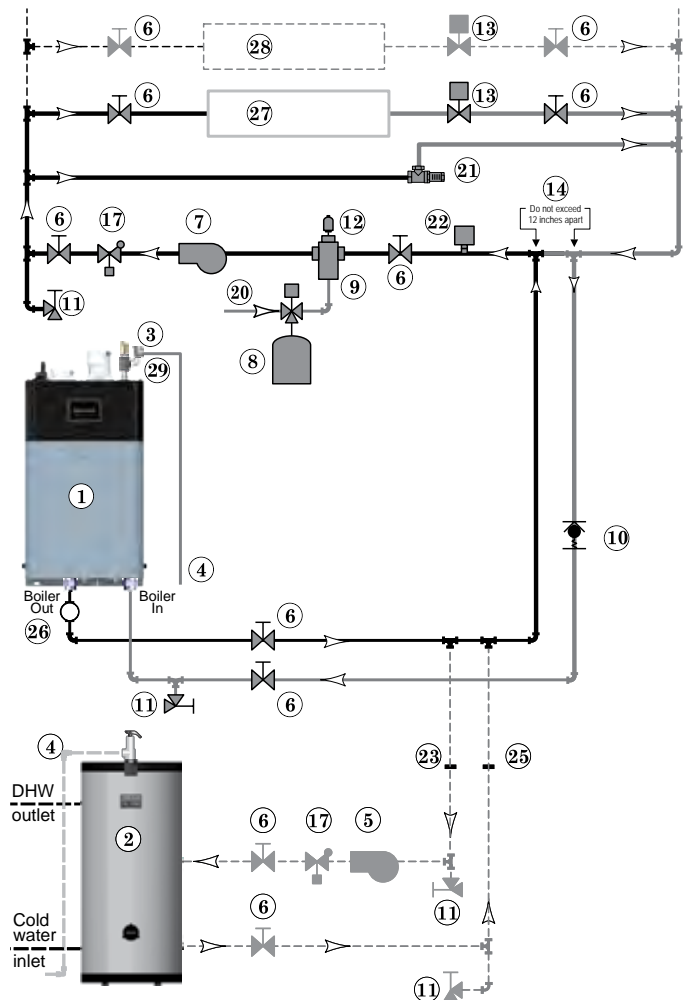
NOTICE

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 184](#) 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 65](#), 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
 1. See Field wiring instructions, beginning on [page 65](#), for details. For Combi models use INPUT2/PRIORITY 2 for the Indirect DHW systems. Use additional, available inputs and priorities for heating zones.

Figure 69 Zone valve zoning — primary/secondary connection — a system circulator is required



3. The boiler and zone valves can also be operated by an external zone valve controller or an equivalent wiring strategy.

NOTICE

Connect zone valve end switches to corresponding inputs assigned to appropriate Priority.

CAUTION

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

LEGEND for Figure 69.

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

1. ECO Tec boiler	12. Auto air vent	21. By-pass pressure regulator, REQUIRED for zone valve systems unless other provision is made
2. Indirect Water Heater, if used	13. Zone valves	22. High limit temperature control
3. Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see page 18 for information	14. Primary/secondary connection (tees no more than 12 inches apart)	23. DHW tank boiler water supply connection, when used
4. Relief valve piping to drain — see page 58	15. Expansion tank, closed type, if used (some chiller systems may use a diaphragm-type expansion tank)	24. Zone circulator
5. DHW circulator	16. Water chiller	25. DHW tank boiler water return connection, when used
6. Isolation valves	17. Check valve	26. Pressure/temperature gauge, supplied with boiler, field piped
7. System circulator	18. Y-strainer	27. Heating circuits
8. Expansion tank, diaphragm type, if used	19. Balancing valve	28. Additional zones or indirect DHW tank.
9. Air separator	20. Make-up water supply – Use applicable codes to determine if back flow preventers, pressure reducing valves, and fill valves may be required	29. Low water cut-off (not shown - see page 47).

Primary/Secondary System Piping - Single Boiler System

(continued)

Circulator Zoning – Primary/Secondary

(Shown with optional DHW piping)

See **Figure 70**.

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 show.
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 57](#) or [page 58](#).
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 184](#) to ensure compliance with the 2007 Energy Act. See Control section in this manual, **Figure 109** 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.

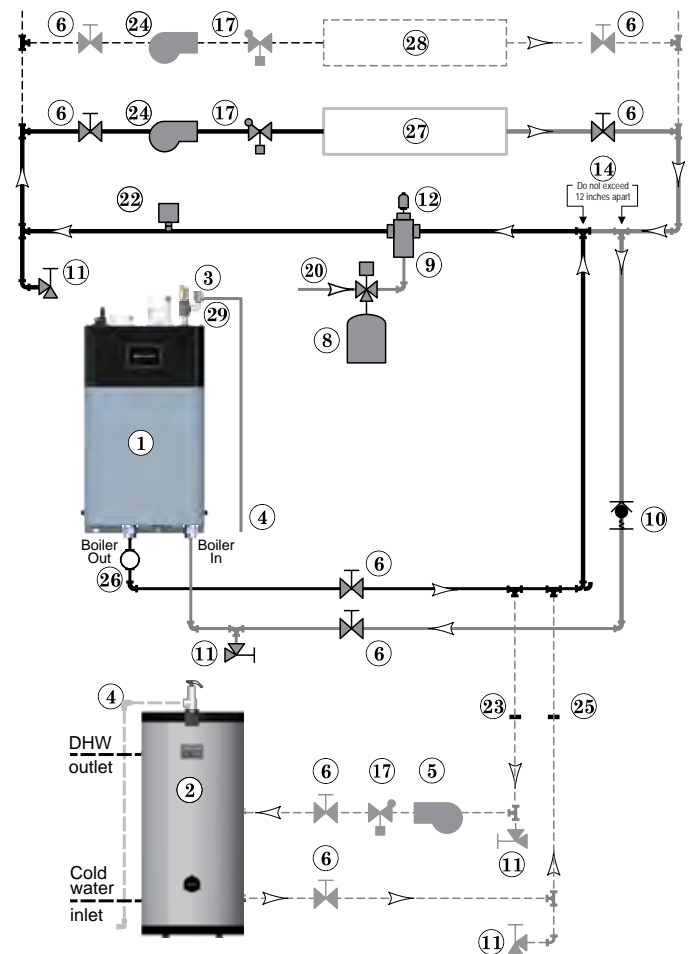
NOTICE

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 184](#) 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 65](#), for instructions on wiring to circulators.

Figure 70 Circulator zoning plus optional DHW piping



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 65](#), 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.

LEGEND for Figure 70 & Figure 71 , page 62		Note: This is a common legend for all piping diagrams. Not all Items listed appear in every figure.
1. ECO Tec boiler	12. Auto air vent	21. By-pass pressure regulator, REQUIRED for zone valve systems unless other provision is made
2. Indirect Water Heater, if used	13. Zone valves	22. High limit temperature control
3. Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see page 18 for information	14. Primary/secondary connection (tees no more than 12 inches apart)	23. DHW tank boiler water supply connection, when used
4. Relief valve piping to drain — see page 58	15. Expansion tank, closed type, if used (some chiller systems may use a diaphragm-type expansion tank)	24. Zone circulator
5. DHW circulator	16. Water chiller	25. DHW tank boiler water return connection, when used
6. Isolation valves	17. Check valve	26. Pressure/temperature gauge, supplied with boiler, field piped
7. System circulator	18. Y-strainer	27. Heating circuits
8. Expansion tank, diaphragm type, if used	19. Balancing valve	28. Additional zones or indirect DHW tank.
9. Air separator	20. Make-up water supply – Use applicable codes to determine if back flow preventers, pressure reducing valves, and fill valves may be required	29. Low water cut-off (not shown - see page 47).
10. Spring check valves		
11. Purge/drain valves (one drain valve shipped loose with boiler)		

Primary/Secondary System Piping - Single Boiler System

(continued)

Circulator Zoning – Multiple Temperature Zones with Primary/Secondary

(Shown with optional DHW piping)

See **Figure 71**.

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 57](#) or [page 58](#).
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 71**, 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.

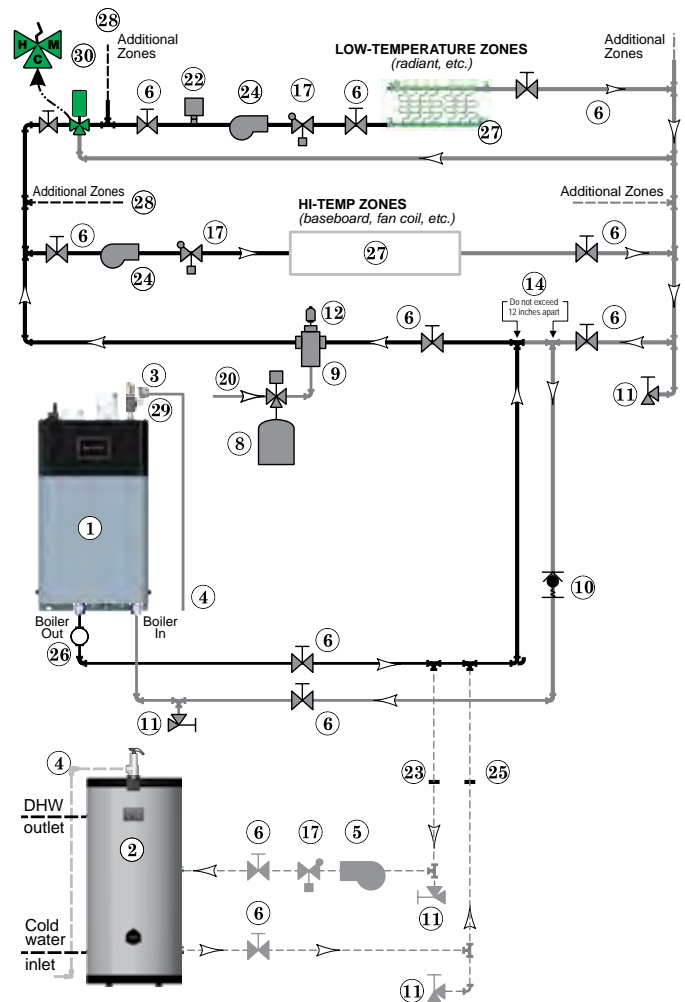
Domestic Hot Water (DHW) Tank, if used

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 184](#) to ensure compliance with the 2007 Energy Act. See the control section in this manual, [page 123](#) 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 184](#) for compliance information and exemptions.

Figure 71 Circulator zoning with high- and low-temperature heating zones



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 65](#), 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 65](#), 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.

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 72**. 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 72**, 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 73**.
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** at the end of this manual for the Weil-McLain kit.

WARNING

The condensate trap, hose clamp, and condensate drain line must be in place during all operation. Make sure condensate trap is securely attached to the condensate tube outlet and that the condensate drain line is securely attached to the condensate trap outlet. Ensure all components are in good conditioned and installed per this manual. Failure to comply could result in server personal injury, death or substantial property damage.

Figure 72 Prepare condensate drain line assembly

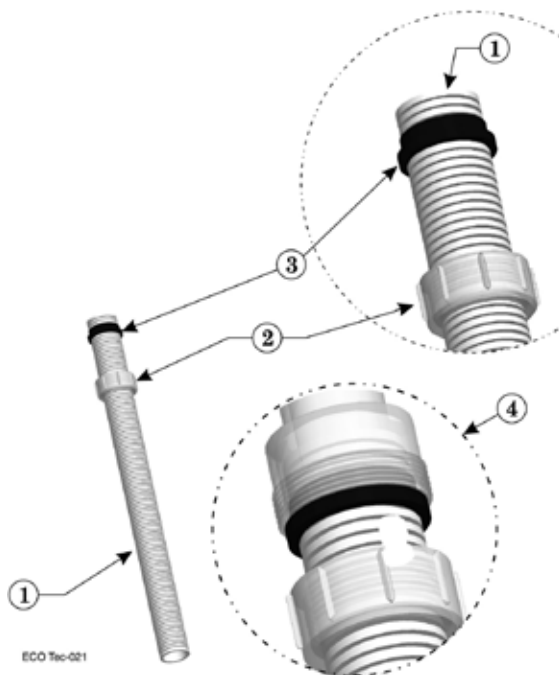


Figure 73 Condensate outlet tube and condensate trap connection (front access panel removed)



Gas Piping

WARNING

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 19](#). Failure to comply could result in severe personal injury, death or substantial property damage.

Connecting Gas Supply Piping

1. Refer to [Figure 74](#) to pipe gas to boiler.
 - a. Place a pipe wrench on the gas line on top of the boiler when tightening the gas line assembly to the boiler gas connection (item 1).
 - b. Install steel pipe fittings as shown in [Figure 74](#). 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.

WARNING

Failure to apply pipe dope as detailed above can result in severe personal injury, death or substantial property damage.

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.
6. Before placing boiler in operation, check boiler and its gas connection for leaks.
 - a. During any pressure testing greater than 14" (355 mm) w.c., disconnect boiler from gas supply piping and cap open end of system gas supply.

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.
- 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. 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.

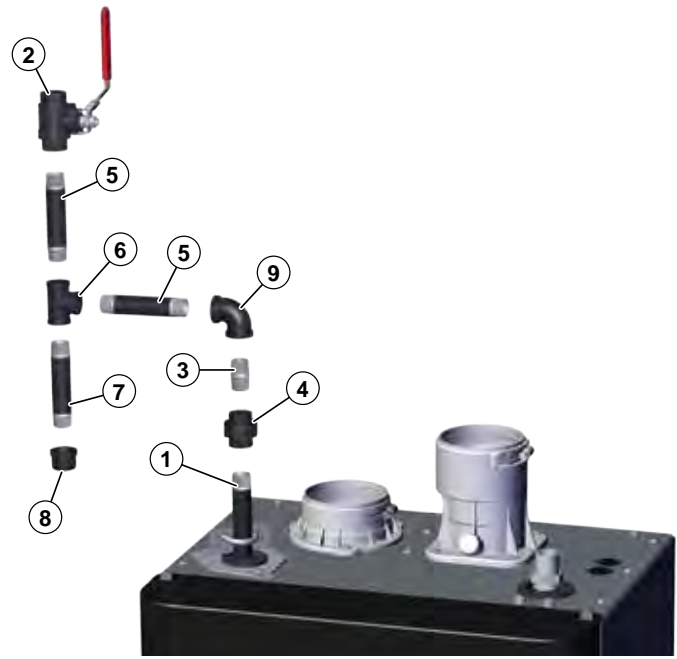
Gas Pipe Sizing

See [page 24](#) for gas line sizing information.

WARNING

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.

Figure 74 Connect gas supply piping



1. Boiler gas supply connection, ½" NPT male

ALL OF THE FOLLOWING ARE SUPPLIED BY THE INSTALLER:

2. Manual gas shut off valve, ½" NPT
3. Nipple, ½" NPT
4. Union, ½" NPT
5. Nipple, ½" NPT
6. Tee, ½" NPT
7. Nipple, ½" NPT x 4", for drip leg
8. Cap, ½" NPT

Check Gas Pressure at Inlet to Boiler

1. See [Figure 120, page 135](#) 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.

SECTION 3

Electrical

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

- 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.
- 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.
- The boiler when installed, must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA 70 – latest edition, and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

Field Wiring (continued)

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.
- 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.
- ODT – The Outdoor sensor must be installed unless specifically exempted in the Energy Act statement on [page 184](#) .

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 front left and the bottom right of the boiler cabinet:

1. Line voltage — five (5) knockouts on the bottom front left 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 two (2) knockouts 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.
- 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)

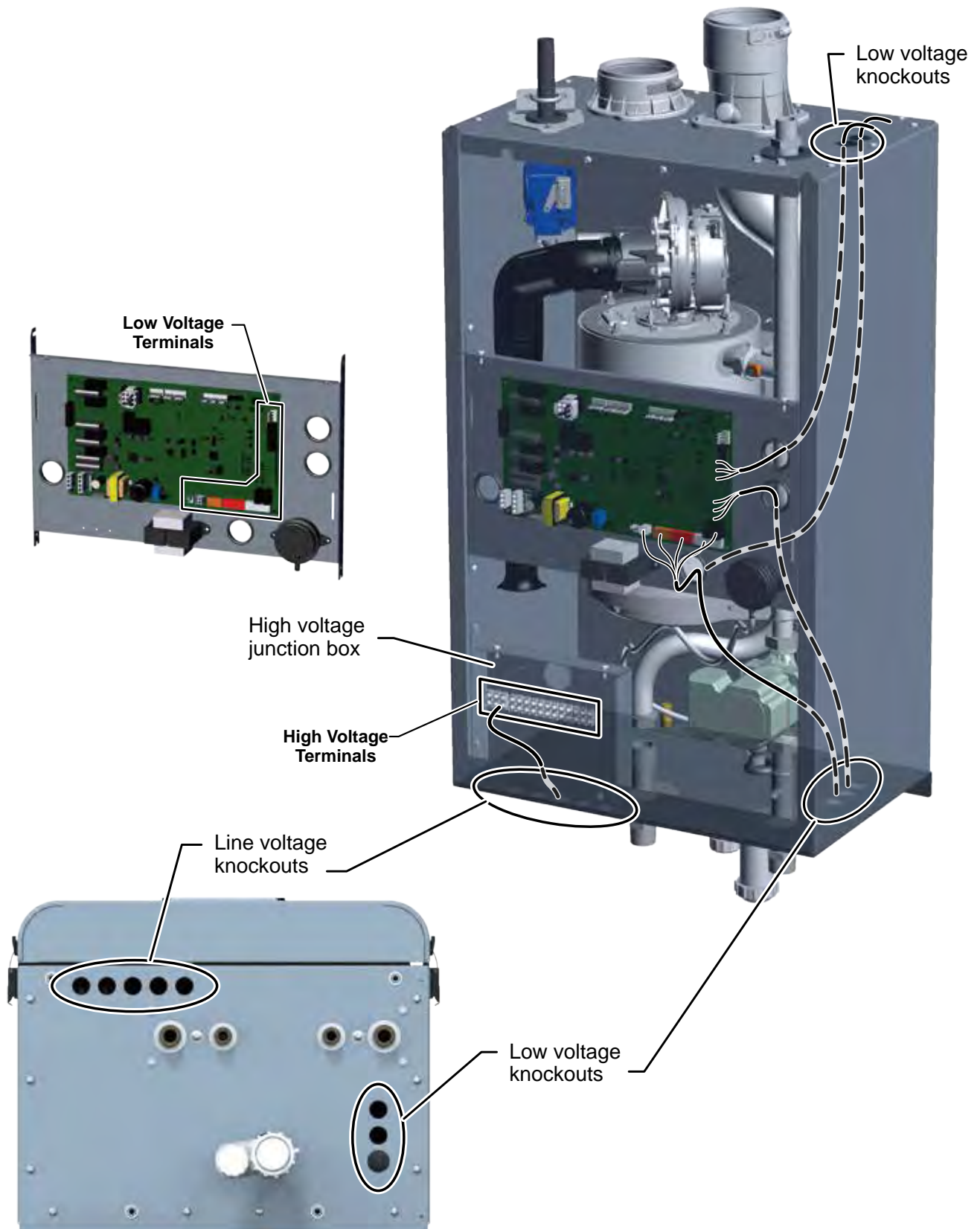
1. Line voltage should be wired from the bottom front left electrical entrances going into the High voltage junction box.
2. Strip end of wire no more than 1/4" to avoid exposing uninsulated wire.
3. It is recommended to install an On/Off service switch in a junction box mounted near the boiler. Installation 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.
4. Low water cutoff harness should be routed from location shown in [Figure 55, page 47](#) to control module connection shown in Section G, [page 71](#). 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 (continued)

Figure 75 Field wiring overview - Line and low voltage entrances



3



Field Wiring (see wiring diagram, [Figure 76, page 78](#)) (continued)

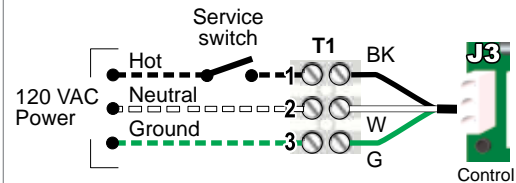
NOTICE

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

- Provide and install a properly-sized, fused disconnect or service switch as required by applicable codes. (15-amp for most cases.)
 - Boiler total amp draw is less than 12A.
- Connect properly sized 120VAC power wiring to **ECO Tec** boiler line voltage terminal block T1 as shown at right.
- If possible, provide a surge suppressor in the supply power line. This will reduce the possibilities of control damage due to line surges.
- Must wire ground to this terminal to provide boiler grounding. Failure to properly ground the boiler can lead to abnormal operation and potential hazards.



See [Figure 76, page 78](#) 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.

- Output 1: (Heat Only) T2: 4, 5, & 6
- Output 2: T2: 7, 8, & 9
- Output 3: T3: 10, 11, & 12
- Output 4: (Heat Only) T3: 13, 14, & 15.
- Maximum load: 2.2 amps (use relay if circulator load is higher). See WARNING below.
- 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 may be energized during an input call, such as an air damper.
- 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:
 - The corresponding input indicates a call for heat/ Indirect DHW (i.e. contact closure).
 - 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

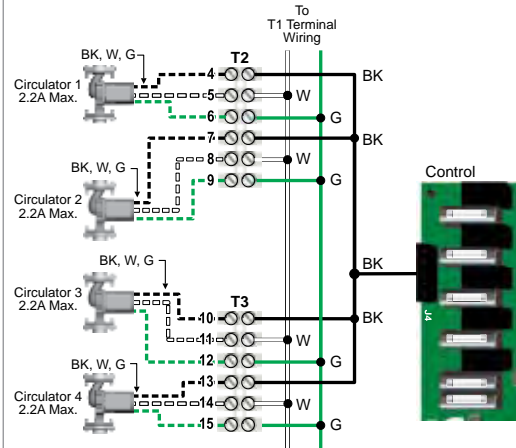
The 3-way valve will operate for Combi models, activating Output 1 for Combi DHW calls, and activating Output 4 for any Space Heating calls.

- When using the inputs/outputs for the AUX PUMP/OUTPUT function, the output is controlled by selectable conditions set up in the control.
 - 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.
 - See [page 117](#) and [page 126](#) for more information on the setup and selection of operating conditions.

NOTICE

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.



See [Figure 76, page 78](#) for details.

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.

WARNING

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 76, page 78](#)) (continued)

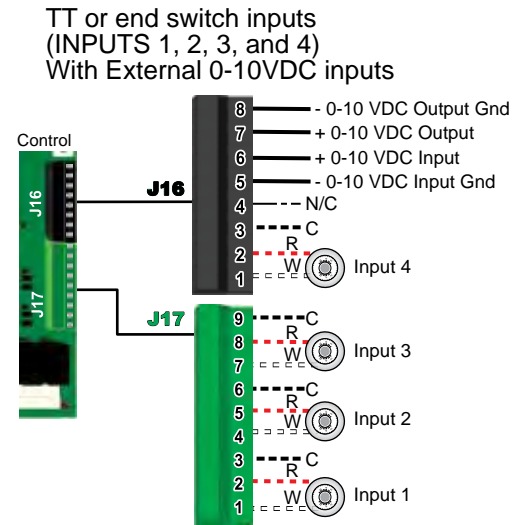
NOTICE

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.

C. Inputs 1, 2, 3 and 4 (demands) – As needed for systems

Connector J17 (Input 1, 2, &3) & Connector J16 (Input 4, 0-10VDC Input)

1. Input 1 – Connector J17 – 1, 2 & 3 (common)
2. Input 2 – Connector J17 – 4, 5 & 6 (common)
3. Input 3 – Connector J17 – 7, 8 & 9 (common)
4. Input 4 – Connector J16 – 1, 2 & 3 (common)
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 76, page 78](#)).
6. The control provides inputs for up to four (4) demands and up to three (3) systems (priorities).
7. **For Priority Indirect DHW Application:**
 - a. **Heat Only models:** The DHW aquastat can be connected to any one of the four (4) input/output pairs for Heating Only models. The selected input should be assigned to PRIORITY 1 during the WIZARD setup or manually in the System Settings menu.
 - b. **Combi models:** The DHW aquastat must be connected to Input 2 or 3. The selected input should be assigned to PRIORITY 2 during WIZARD setup or manually in the System Settings menu. With this setup, the boiler's internal combi DHW will be PRIORITY 1 and the Indirect DHW Tank will be PRIORITY 2.
8. The default control setting uses each input (INPUT 1, INPUT 2, INPUT 3 and INPUT 4) to control its respective 120VAC 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.



See [Figure 76, page 78](#) for details.

NOTICE

Use of 0–10VDC input for modulation disables Input 2 T/T input from creating calls for heat. See [page 73](#) 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 117](#) and [page 126](#) 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 76, page 78](#)) 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 76, page 78](#)). Do NOT exceed 120mA total amp draw at 24VAC 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 76, page 78](#)) (continued)

NOTICE

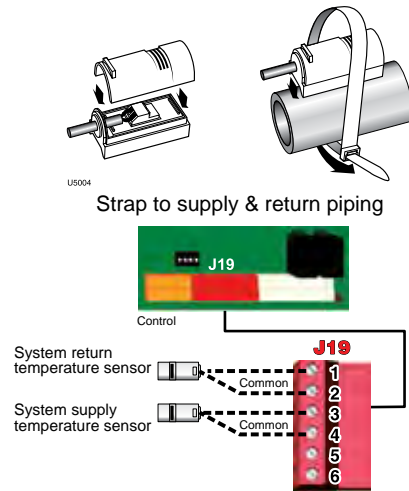
Combi models use Input/Output pairs 1 and 4 for 3-way valve operation and cannot be used for any other purpose. Use Input 2 for Indirect DHW (if needed) and Input 3 for Space Heating applications.

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.
4. Supply sensor – wire between J19 #3 and #4.
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.

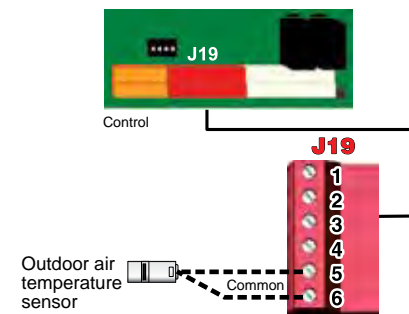


See [Figure 76, page 78](#) for details

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 184](#).**
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 76, page 78](#)). Thermostat wire can be used to connect the sensor.



See [Figure 76, page 78](#) for details

F. External limits – OPTIONAL

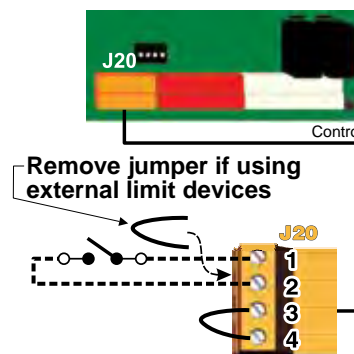
To cause MANUAL reset: Connector J20 #1 & #2

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 must close and the control must be manually reset using the procedure given in this manual. See drawing at right and wiring diagram [Figure 76, page 78](#).

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.



See [Figure 76, page 78](#) for details.

Field Wiring (see wiring diagram, [Figure 76, page 78](#)) (continued)

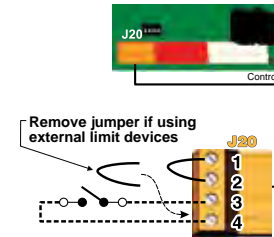
NOTICE

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.

To cause AUTOMATIC reset: Connector J20 #3 & #4

The control will reset automatically after circuit is interrupted.

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.
2. See drawing at right and wiring diagram ([Figure 76, page 78](#)).

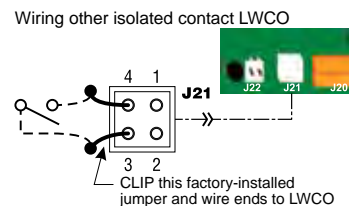
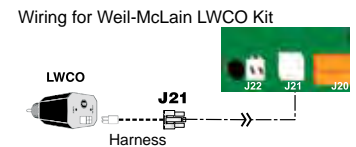


See [Figure 70, page 68](#) for details.

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

Connector J21

1. Install a low water cut-off (required) (see [Figure 55, page 47](#)).
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 76, page 78](#)).
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.

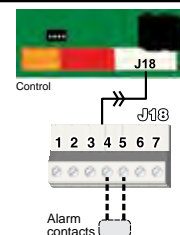


See [Figure 76, page 78](#) for details.

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.

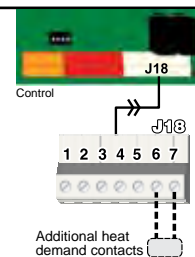


See [Figure 76, page 78](#) for details.

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 the control section on [page 123](#) for more information.



See [Figure 76, page 78](#) for details.

Field Wiring (see wiring diagram, [Figure 76, page 78](#)) (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.

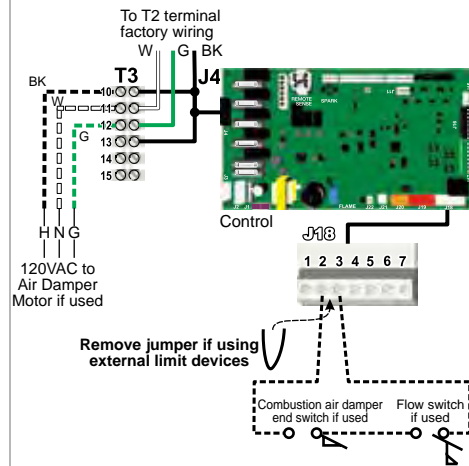
J. Proof of closure (flow switch and/or CAD)

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 76, page 78](#)).
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.
 - d. For multi-boiler wiring of CAD interlock, wire all Proof of Closure inputs in series with the endpoint devices and each boiler's Closure Switch input.

NOTICE

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



See [Figure 70, page 68](#) for details.

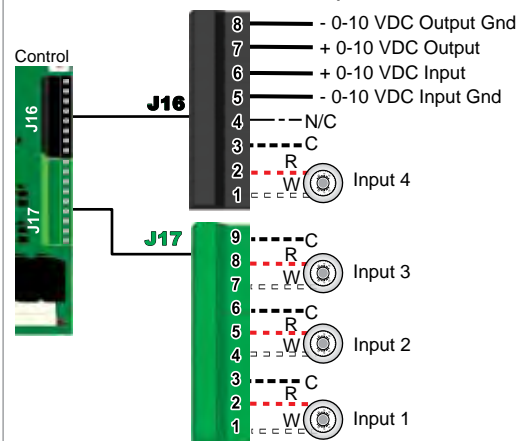
K. 0–10 VDC Remote TARGET input – OPTIONAL

Connector J16 #5 & #6

1. See illustration at right and [Figure 76, page 78](#) (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.

TT or end switch inputs (INPUTS 1, 2, 3 and 4) With External 0-10VDC Inputs



See [Figure 76, page 78](#) for details.

Field Wiring (see wiring diagram, [Figure 76, page 78](#)) (continued)

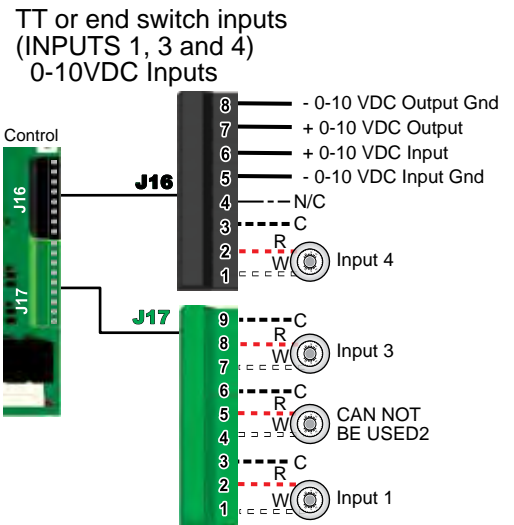
NOTICE

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.

L. 0–10 VDC Remote MODULATION input – *OPTIONAL*

Connector J16 #5 & #6

- See illustration at right and [Figure 76, page 78](#) for details.
 - This illustration also shows how to connect TT or end switch contacts at INPUT 3 and INPUT 4 for other uses.
 - 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.
 - Remote modulation requires a 0–10VDC input signal at J16-5/6 as shown.
 - The 0–10VDC input positive connection must be at terminal 6 and common connection at terminal 5.
 - Control setup:
 - Many options are available for configuring the control. The following is a suggested setup that uses factory default settings as much as possible.
 - If Indirect DHW is required, use PRIORITY 2 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.
 - Use PRIORITY 3 for the system to be remote modulated.
 - 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 117](#) for System Settings menu information.
 - Operation:
 - The boiler comes on at 0.9VDC and turns off at 0.5VDC. 1 VDC = 10% input. 10 VDC = 100% input. These voltage settings are not adjustable.
 - OUTPUT 2 (120VAC) is activated and deactivated as the heat demand is turned on and off.
- NOTE: The control can be configured to use either 0–10VDC for target operation (see previous section) or modulation, **but not both**.

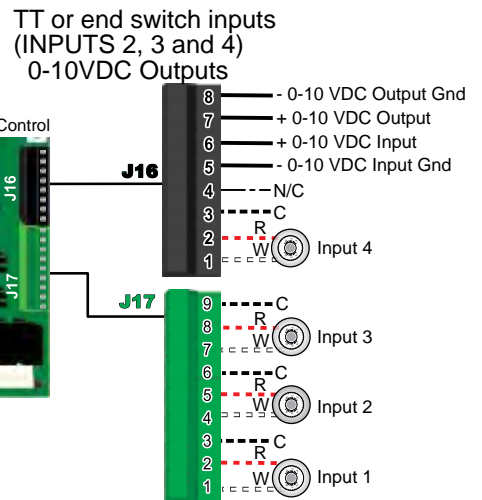


See [Figure 76, page 78](#) for details.

M. 0–10 VDC Output

Connector J16 #7 & #8

- See illustration at right and [Figure 76, page 78](#) for details.
- Control setup:
 - 0-10VDC Output functionality allows classic lead/lag system operation and allows for cooperation with other heat sources that utilize 0-10vDC inputs as a source.
 - Connect on either Master or Shadow and assign Local 1/Local 2 to use AHD. For Single boiler, connect on any Input and assign Priority 1, 2 or 3 to use AHD.
 - Adjust Max Rate Volts to desired maximum voltage output. Adjust Min Rate Volts to desired minimum voltage output.
- Operation:
 - The 0–10VDC Output only activates when Additional Heat Demand is set to be used, a call for heat that uses AHD is active and Temp Dependent is set to Yes. Valid systems sensors must be present.
 - The 0-10VDC Output will follow the requested modulation rate, with 10% = Min Rate Volts, and 100% = Max Rate Volts. Voltages between are scaled accordingly.



See [Figure 76, page 78](#) for details.



Field Wiring (see wiring diagram, **Figure 76, page 78**) (continued)

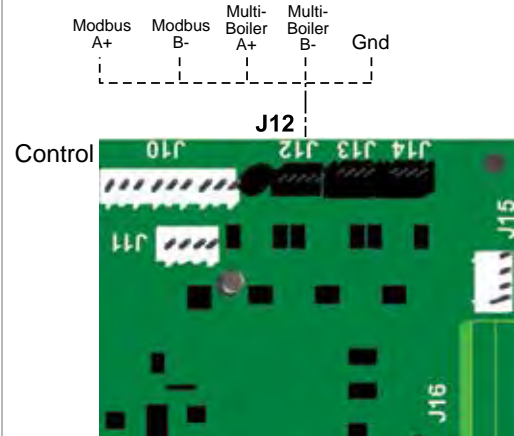
NOTICE

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.

N. Multiple Boiler and the Modbus Connection

Connector J12

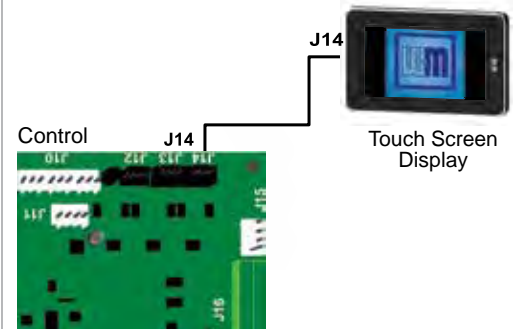
1. The boiler control is capable of multiple boiler communication and can control up to eight (8) ECO Tec or Unity™ boilers in one installation.
2. See Advanced Manual for further details.



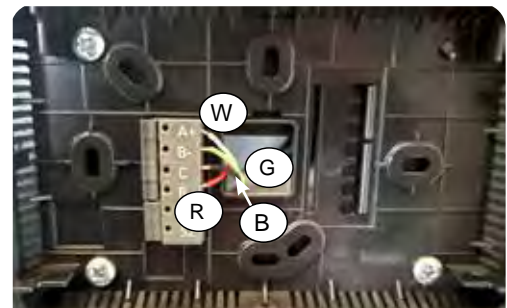
O. Touch screen display connection

Connector J13 or J14

1. The electronic color touch screen display is factory wired to the control and is connected to the J13 or J14 connector.
2. The Display harness is wired to a spring terminal on the mounting bracket. The wires are as follows: J14 is used as the example. J13 uses the same wiring pin out on the control board.
 - a. J14-1 White to A+
 - b. J14-2 Green to B-
 - c. J14-3 Black to C
 - d. J14-4 Red to R



View of inside back of display.



ECO Tec-805



Assembled From tested components Complete system not tested

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Zoning with the ECO Tec Control

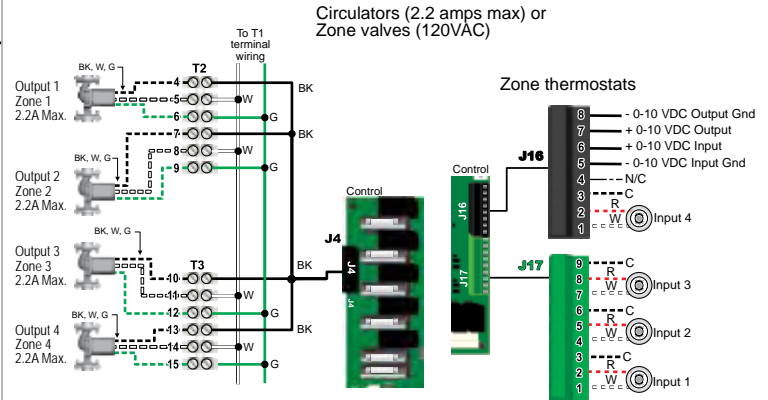
NOTICE

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

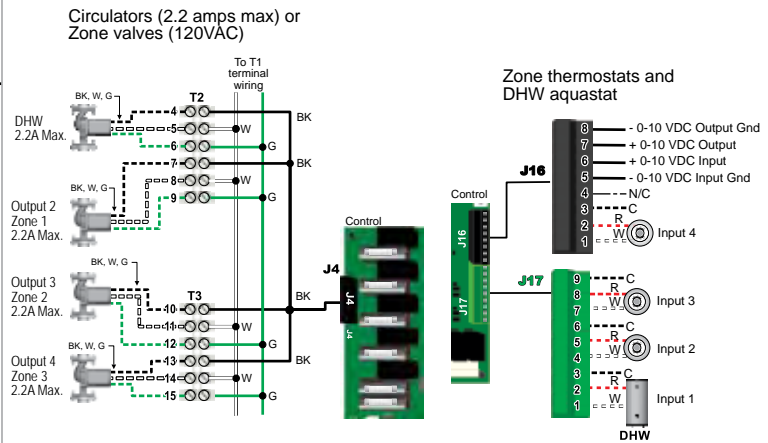
Four space heating zones (no Indirect DHW)
(Heating Only models shown).

1. Review wiring information on **page 68** (120VAC outputs) and **page 69** (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 68** (120VAC outputs) and **page 69** (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.
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.

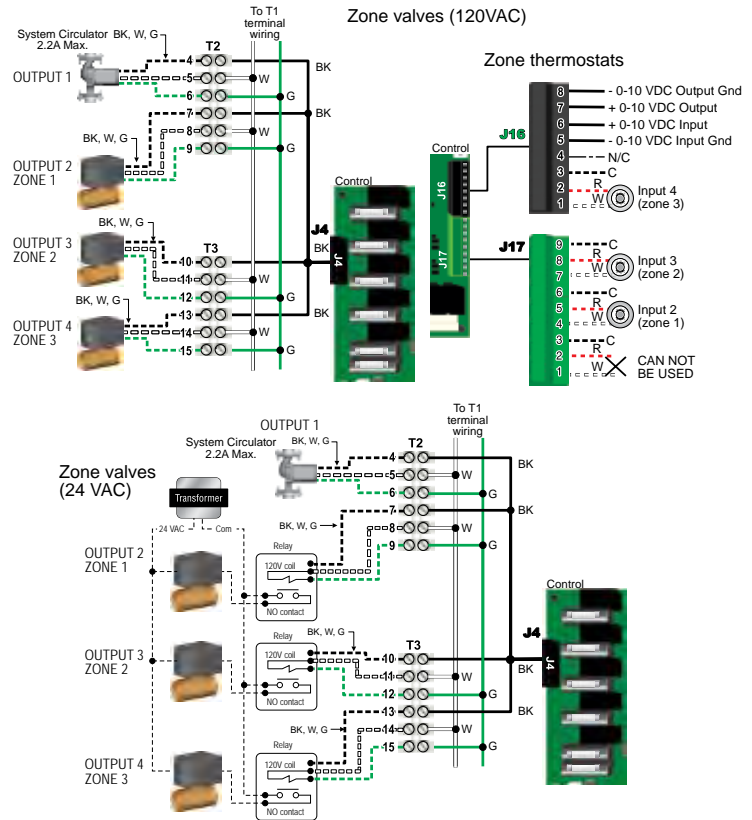
B. Zoning with ZONE VALVES, suggested applications

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

1. Review wiring information on [page 68](#) (120VAC outputs) and [page 69](#) (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.



3

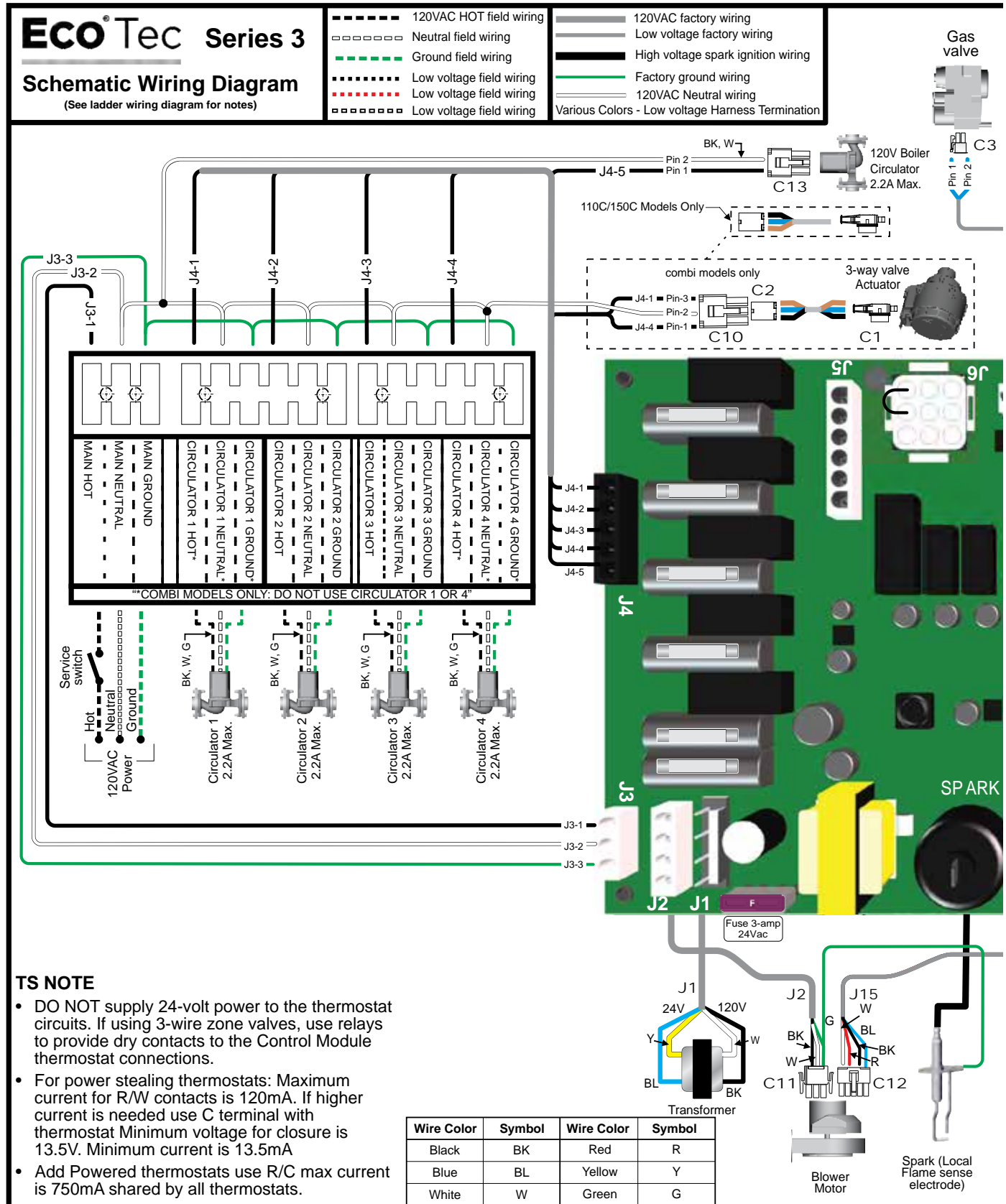


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Wiring Diagram - Schematic

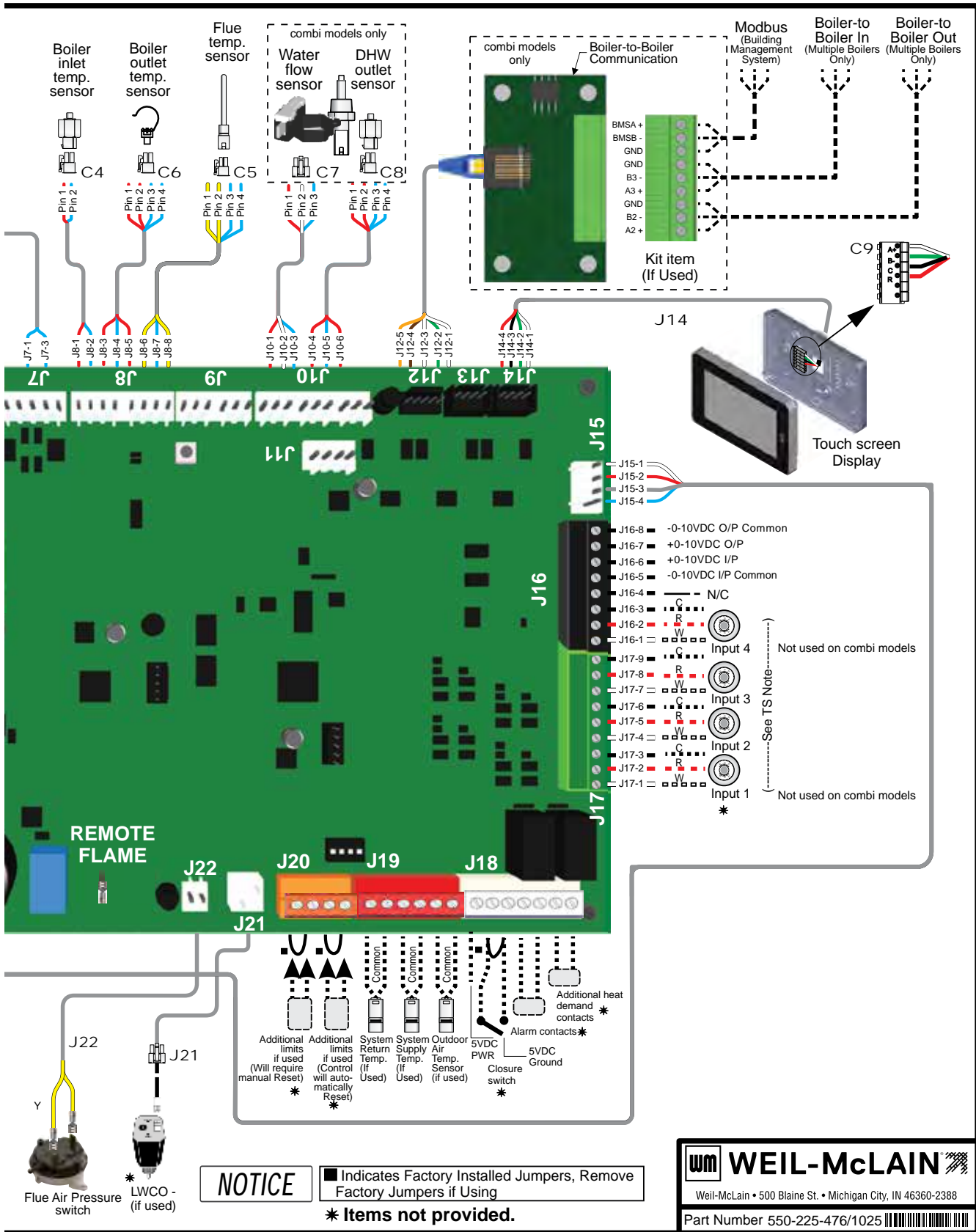
Figure 76 Schematic wiring diagram (see page 79 for legend and notes)



3



Wiring Diagram - Schematic (continued)

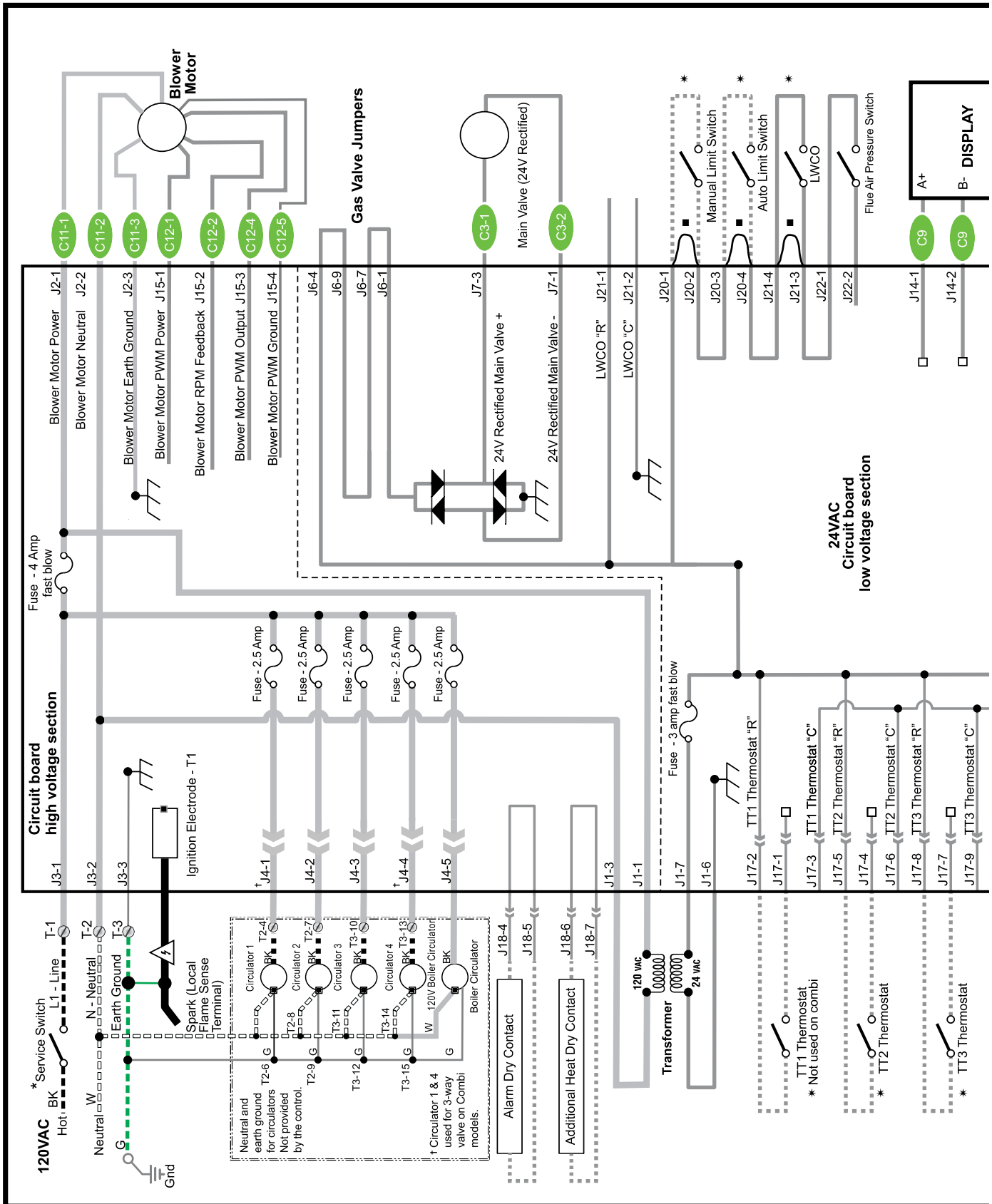


3

WEIL-McLAIN
 Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388
 Part Number 550-225-476/1025

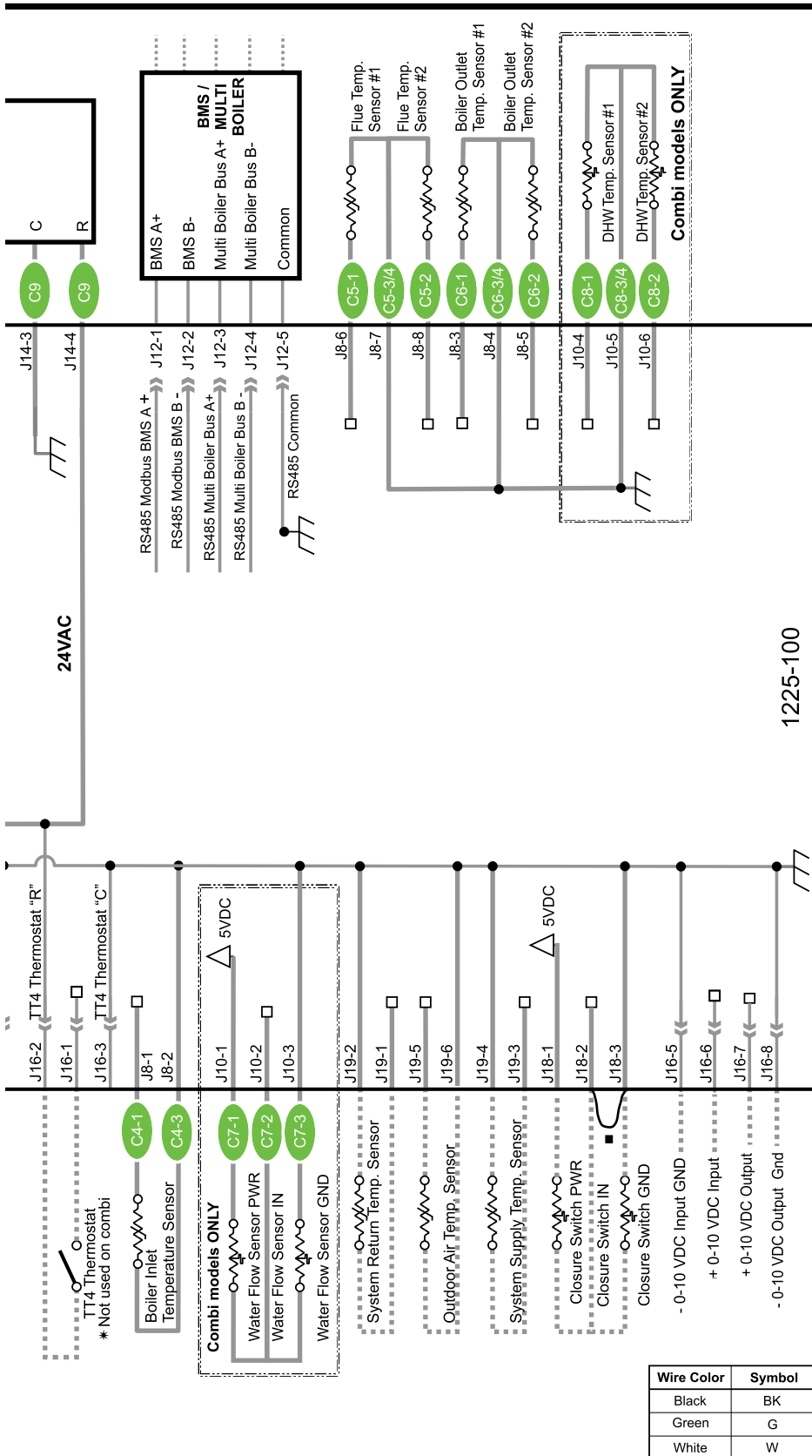
Wiring Diagram - Ladder

Figure 77 Ladder wiring diagram (see page 81 for schematic wiring diagram)





Wiring Diagram - Ladder (continued)



ECO[®] Tec Series 3 Ladder Wiring Diagram

WARNING

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

NOTICE

- All contacts shown without power applied.
- Indicates Factory Installed Jumpers, Remove Factory Jumpers if Using
- * Items not provided.
- † 3 way valve - combi models only

NOTES (for Schematic and Ladder Diagrams)

1. All wiring must be installed in accordance with:
U.S.A. — NEC ANSI/NFPA 70 - latest edition and any other national, state, or local code requirements.
Canada — CSA C22.1 C.E.C. Part 1 and any other national, provincial, or local code requirements.
2. Connect additional limits (if used) between terminals J20-1 and J20-2 if the boiler circuit board is to manual reset on limit action. Connect between terminals J20-3 and J20-4 for automatic reset. Remove jumper across terminals used.
3. If any of the original wire as supplied with the appliance must be replaced, use minimum 105° C wire or equivalent. Exceptions: Ignition lead wire, ignition ground wire, and flame sense wire must be replaced only with Weil-McLain parts.
4. Thermostat anticipator setting (single zone) — set anticipator for 0.1 amps.
5. For multiple zoning, use either zone valves or circulators. Refer to the component manufacturer's instructions and the manual for application and wiring suggestions.
6. Refer to Boiler Manual packed with the boiler for application information.
7. Preferably, use the provided Weil-McLain LWCO Kit, part number 511-100-005, with LWCO, Molex plug and wire harness. Remove the factory Molex, and plug the LWCO harness ends into the low water cutoff receptacle and J21 on the circuit board. To field wire a non-powered (isolated contact) low water cutoff, clip the factory jumper in the factory-installed Molex plug, strip the wires, and connect to the low water cutoff limit terminals.

Legend for ladder wiring diagram only

- ■ ■ ■ ■ 120VAC field wiring
- Low voltage field wiring
- Field ground wiring
- 120VAC factory wiring
- Low voltage factory wiring
- High voltage spark ignition wiring
- Factory ground wiring
- Harness Connector and Pin

Wire Color	Symbol
Black	BK
Green	G
White	W



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

Part Number 550-225-478/1025



3

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SECTION 4

Operation

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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. Combi models will also respond to signals from DHW flow sensor and DHW temperature sensor.
- The control automatically adjusts blower speed 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 100, page 114](#) and following pages for information.)
2. See **Express setup** instructions beginning on [page 108](#) for basic systems and minimum settings required.



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

- Upload, adjust settings, and perform easier diagnostics via wireless communication.
- Color touch-screen display for ease of operation monitoring and troubleshooting.
- Easy configuration with WIZARD step-by-step setup including on-screen help.
- The **ECO Tec** control can communicate to other ECO Tec controls and/or to existing Unity™ controls in a multi-boiler network.
- Three (3) programmable priority assignments for up to four (4) heat inputs.
- Preset operating parameters for typical heating systems, including target temperatures, reset curves and circulator assignments.

Figure 78 Control sequence of operation

Display status text	Control action <i>(Also see Figure 82, page 88)</i>
POWER UP	<ul style="list-style-type: none"> • Check the boiler model listed on the power-up screen. If it is not correct, turn off the boiler. See page 115 for instructions to change setting. • 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.
Standby	<ul style="list-style-type: none"> • Standby - no calls for heat. • Toggles through no dots, 1 dot, 2 dots, then 3 dots while in standby (wrench symbol will show instead if maintenance is needed).
Blower Prepurge	<ul style="list-style-type: none"> • Call for heat detected. • Display on with BLUE banner (space heating) or PURPLE banner (DHW). • Start min/max timers if more than one system is calling - highest priority starts first. • Start circulators for this priority setup based upon settings. • Calculate target temp — If sensor temp is below target temp, begin firing sequence. • Blower to ignition speed for prepurge.
Ignition	<ul style="list-style-type: none"> • After prepurge times out, begin ignition cycle. • Activate gas valve and ignition spark. • Continue ignition spark for ignition period. • Turn off spark and use electrode to check for flame signal.
Space Heating	<ul style="list-style-type: none"> • Flame detected. • Release boiler to modulation. • 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. • If priority timer times out, switch to next priority and start priority timer. • If demand satisfied, go to postpurge.
DHW Heating	<ul style="list-style-type: none"> • Flame detected. • Release boiler to modulation. • 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. • If priority timer times out, switch to next priority and start priority timer. • If demand satisfied, go to postpurge.
Blower Postpurge	<ul style="list-style-type: none"> • Demand satisfied (temperature reaches target temperature or limit setting). • Gas valve off. • Blower to ignition speed for postpurge. • Return to standby after purge.
Blower Interpurge	<ul style="list-style-type: none"> • Occurs between failed ignitions or Ignition Restarts. • Blower runs at purge speeds to clear exhaust gases for a quicker ignition retry.
Maintenance	<ul style="list-style-type: none"> • Display banner turns BLUE, toggling between graphic screen and maintenance screen (occurs if maintenance schedule timer times out). • Will show during standby only. • Boiler operates as normal.
Error/fault	<ul style="list-style-type: none"> • Display banner turns RED due to error or limit event.
WWSD	<ul style="list-style-type: none"> • 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. • DHW operation is not affected by WWSD.



ECO Tec Control Operation (continued)

- ❑ 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) configurable outputs, including one (1) internal boiler circulator output for Heating Only boilers.
- ❑ 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 out, and DHW sensors.
- ❑ 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.
- ❑ Temperature units – Select between using °F or °C.
- ❑ Manual Reset High Temperature Limits – Set High Limit temperature safety value.
- ❑ Daylight Saving Time – Select whether your boiler will obey Daylight Savings Time for your region.

- 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 up to four (4) input/output pairs (INPUT/OUTPUT 1, 2, 3 and 4) for Heating Only boilers, (INPUTS/OUTPUTS 2 and 3) for Combi models. 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.

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. Connect wiring to the control inputs and outputs to accomplish the purposes set in Step 1.
Step 3	Follow instructions in the Boiler Manual to start up and power the boiler.
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. WWSO – 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	Confirm or adjust the combi settings such as DHW temperature, Preheat and ECO Boost modes. Select the usage of Inputs 1, 2, 3 and 4 for Heating Only boilers, 2 and 3 for Combi models. Determine usage of Outputs 1, 2, 3 and 4 (outputs correspond to inputs).
Set Priorities	Assign priorities 1, 2 and 3 to the inputs for Heating Only boilers, 2 and 3 for Combi models.
System Types	Specify what system type is connected to each of the four outputs; each system type causes the control to preset operating temperatures.
System Settings	Set system settings or leave at their defaults.
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 CP number, install date, etc. Choose to activate Maintenance Reminder by selecting and adjusting Interval settings.

Sequence of Operation

Figure 78, page 84 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 82, page 88** 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.





ECO Tec Control Operation (continued)

ECO Tec control operation

The control responds to signals from:

- DHW Flow demand (Combi models only).
- DHW Temperature sensor (Combi models only).
- 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 to match boiler output to space heating and/or DHW heating demand.
- The control provides up to four (4) inputs and four outputs (for circulators or auxiliary devices) plus a fifth (5) boiler circulator output based on selected boiler model.
- Outdoor reset must be used in all applications that are not exempt as described on [page 184](#).
- The outdoor temperature is used for target 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 111, page 124](#).

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 79](#), 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 79](#), 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

1. Set desired temperatures for space heating zones.
2. For an explanation of the target temperatures and associated outdoor temperatures, see [Figure 79](#).
3. The temperature settings discussed below are accessed in the priority menu for the applicable system. For detailed explanations of the priority menus, see [Figure 104, page 118](#).

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. The Min Temp is the setpoint whenever the ODT temp is above the ODT For Min Target and below the WWSD temps.

NOTICE

Setting this value below the Outdoor Temp for Min Target may reduce the performance of the heating system at warmer outdoor temperatures.

Figure 79 Outdoor reset operation

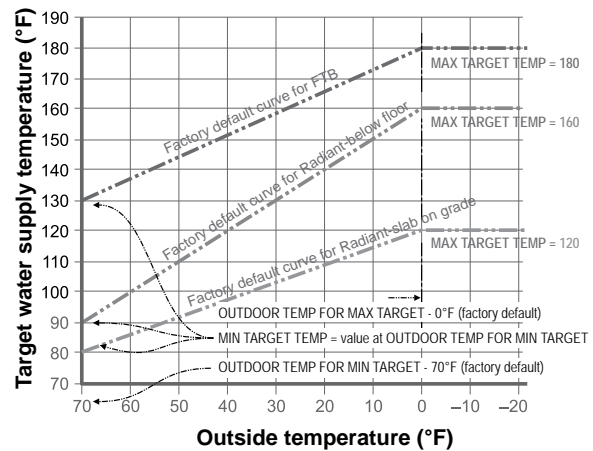
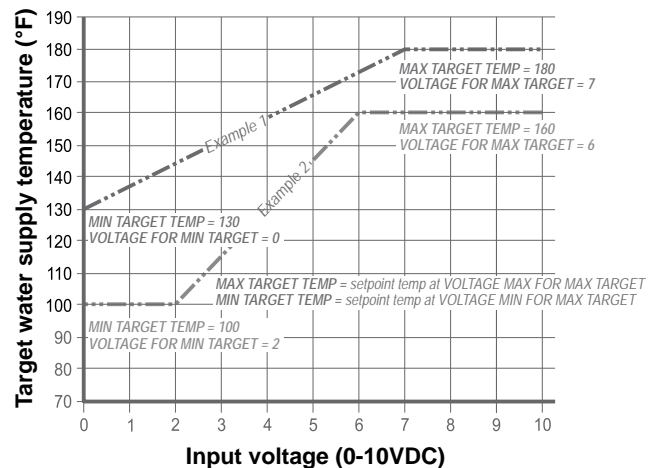


Figure 80 Remote target operation



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 104, page 118](#).
3. See [Figure 80](#) 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.

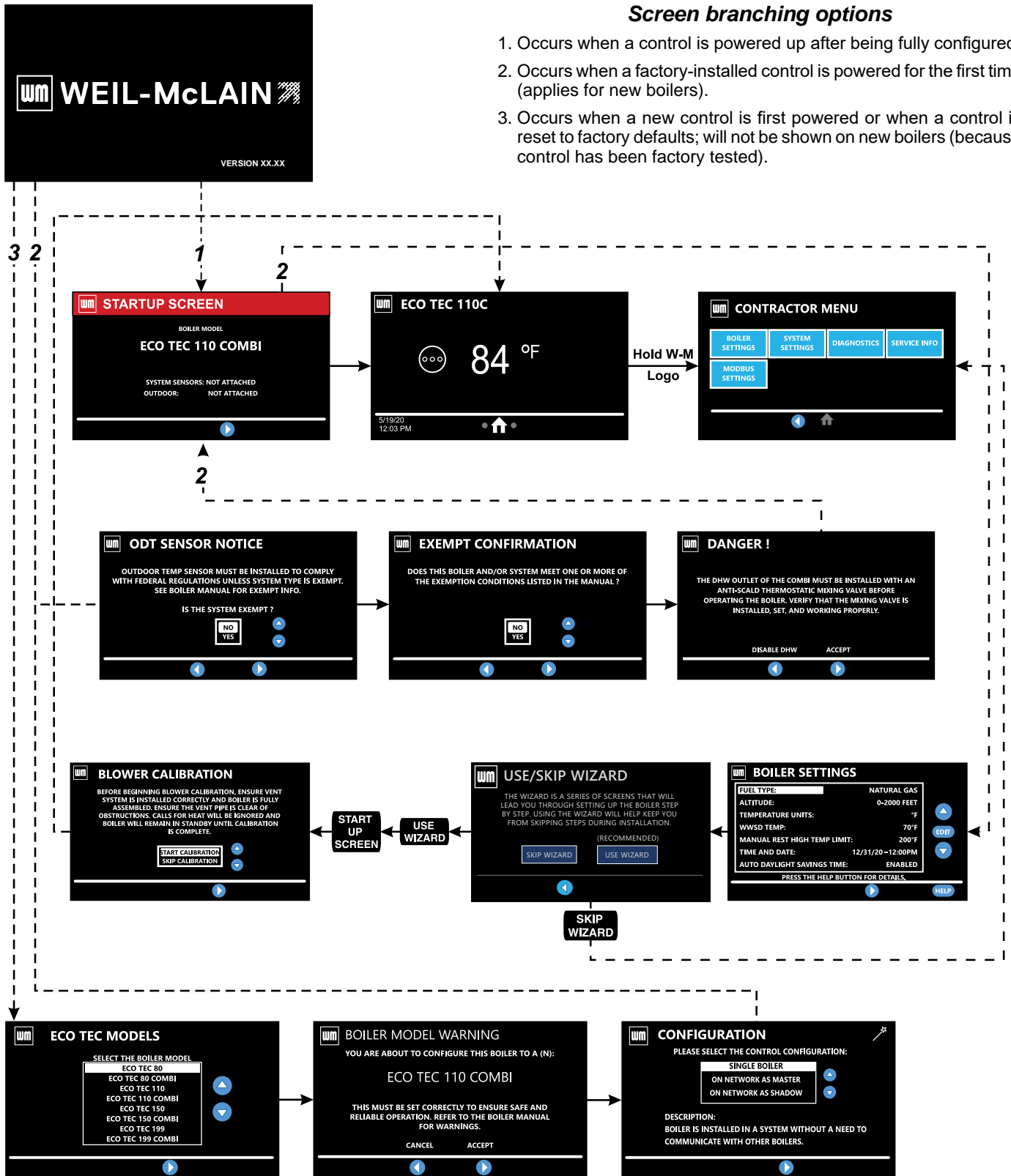
Remote Modulation Operation (0–10VDC input)

1. To use 0-10VDC for remote modulation, go to Contractor Menu -> System Settings -> select the appropriate priority. Select Input 2 from System Setting menu, then change Input 2's source to 0-10V. The priority that is assigned to Input 2 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.



ECO Tec Control Operation (continued)

Figure 81 Boiler essential settings (REQUIRED on initial start-up) — see page 123 for explanation



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).

ECO Tec-001aCO

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



Control Settings Menus

Figure 82 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.

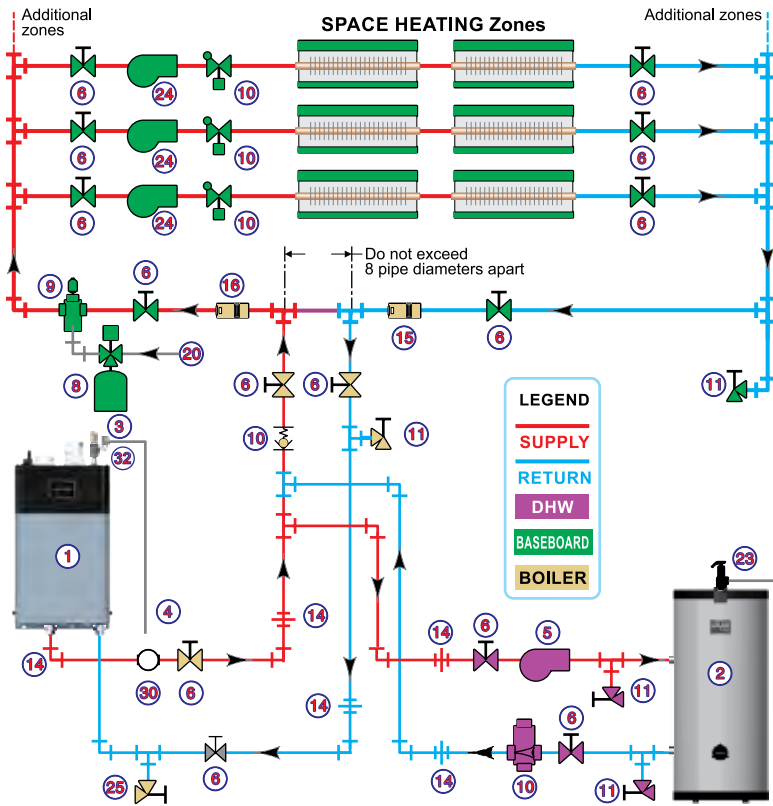
Screens shown above are typical only. Actual screens depend on control settings chosen.



EXPRESS SETUP - Example A

Multi- Zone SPACE HEATING (Circulators without circulator relays) | DHW (Direct-piped)

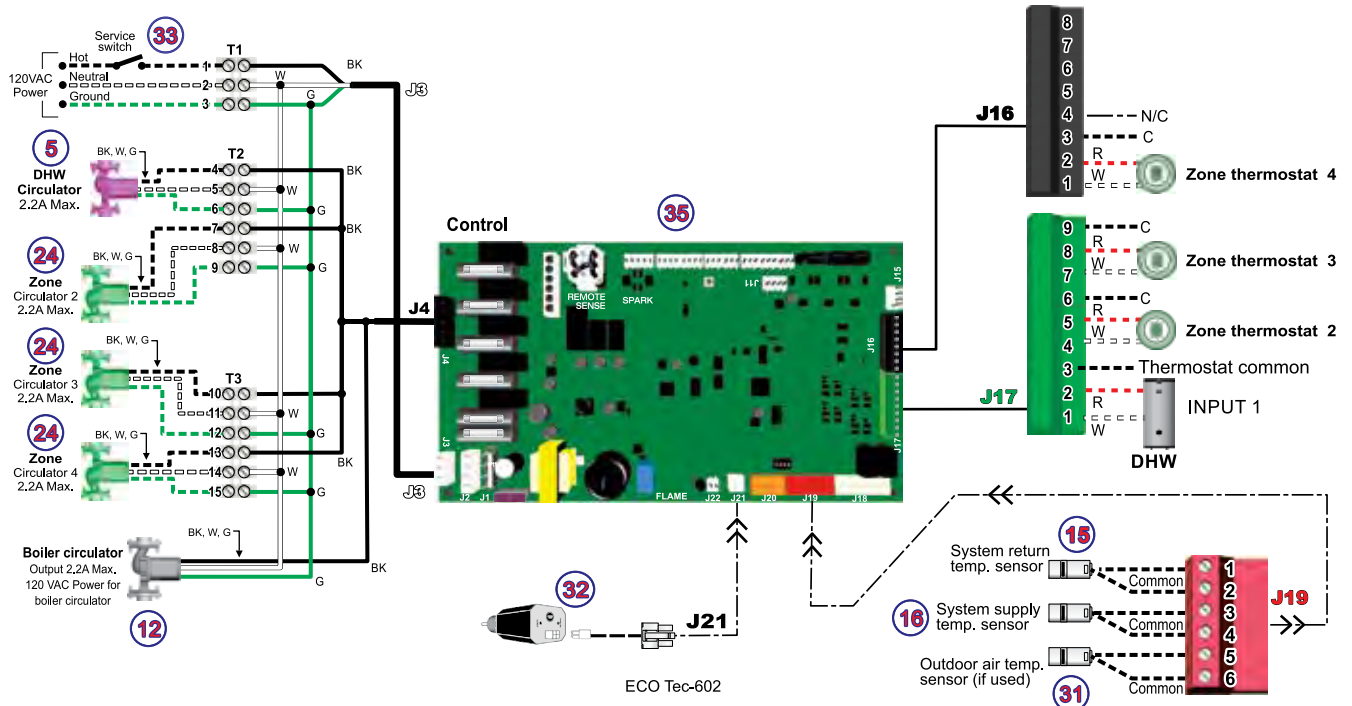
PIPING



LEGEND

- | | |
|---|--|
| 1. ■ ECO Tec boiler. | 15. Return temperature sensor. |
| 2. Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings. | 16. Supply temperature sensor. |
| 3. ■ Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see Figure 12, page 18 for information. | 20. Make-up water supply. |
| 4. Relief valve piping to drain. | 23. DHW Temperature and Pressure relief valve |
| 5. DHW circulator. | 24. Zone circulators. |
| 6. Isolation valves. | 25. ■ Boiler drain valve, supplied with boiler, field piped. |
| 8. Expansion tank. | 30. ■ Pressure/temperature gauge, supplied with boiler, field piped. |
| 9. Air separator. | 31. Outdoor sensor. |
| 10. Flow/check or spring check valves. | 32. Low water cut-off (not shown - see page 47). |
| 11. Purge/drain valves. | 33. 120VAC power to boiler — see page 68 . |
| 14. Unions as needed for service. | 35. Control board |
- = Items supplied with boiler — all other Items supplied by installer.

FIELD WIRING

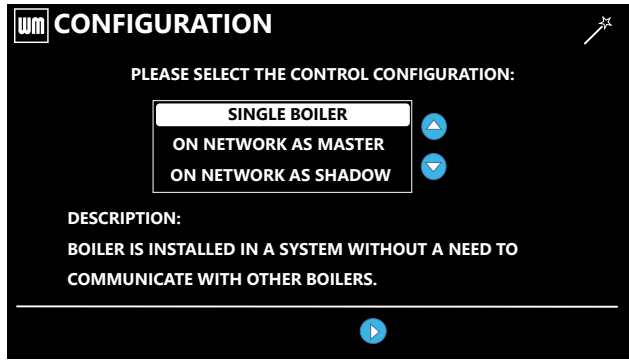




EXPRESS SETUP - EXAMPLE A (continued)

Figure 83 ECO Tec Control menu configuration screens (continued)

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



How - to

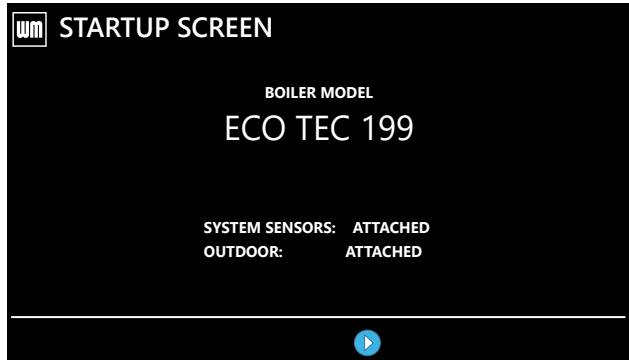
When powering up your boiler for the first time, this is the first screen to appear. Select the configuration of your boiler.

SINGLE BOILER is used for stand-alone boilers that do not need to communicate to other boilers.

ON NETWORK AS MASTER is used when your boiler is part of a multiple boiler network. It will control the Network boilers' firing rate and burner-on commands. Only one Master per multi-boiler system is allowed.

ON NETWORK AS SHADOW is used when your boiler is part of a multiple boiler network. It will be controlled by the Master for Network calls for heat, and will control itself for Local calls for heat.

Choose Single Boiler for this application and press the right arrow.

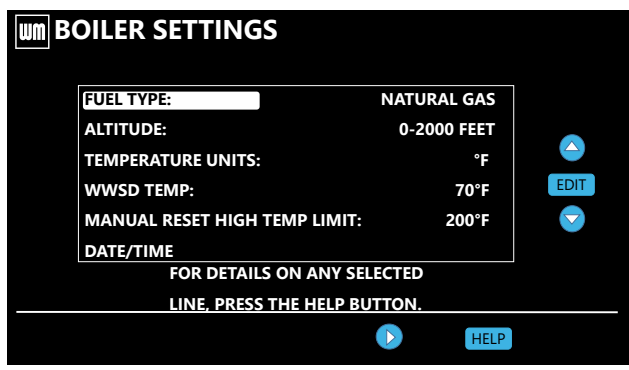


This screen summarizes the boiler model, and shows the state of the System and Outdoor Sensors.

Review the content of this screen. If the boiler model does not match the actual model the control is installed on, see the boiler manual and follow instructions to perform a FACTORY RESET.

See **Figure 101, page 115** for additional information about model selection and warning about 199 & 199c blower types.

If the sensor status does not match the expected result, check the sensors. Once complete, press the right arrow.



This screen lists important boiler application parameters. These must be accurate before proceeding. HELP is available for each item if needed.

Select the fuel type connected to your boiler. If PROPANE GAS, a confirmation screen will appear. Confirm your setting to return to this screen.

Select the altitude your boiler is installed at. Firing rates are adjusted according to installation altitude.

Select Temperature Units, between Fahrenheit and Celsius.

Select WWSD Temp to shut down space heating calls when the outdoor temperature exceeds this temperature.

Manual Reset High Temp Limit will shut down the boiler and will manual lockout if the boiler temperature exceeds this value. This is a safety feature and may be lowered for specific applications.

Select the DATE/TIME and make the appropriate changes. Please ensure this is accurate for Maintenance intervals and troubleshooting. This will take you to the DATE/TIME screen.

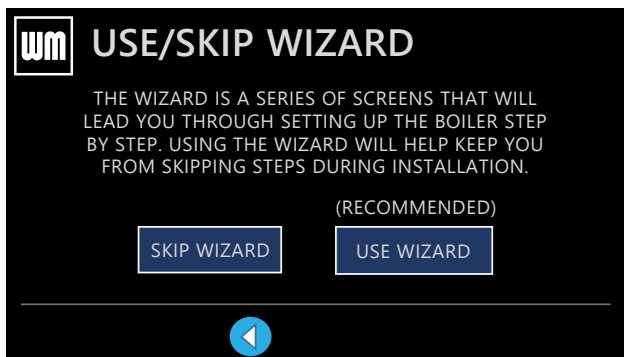
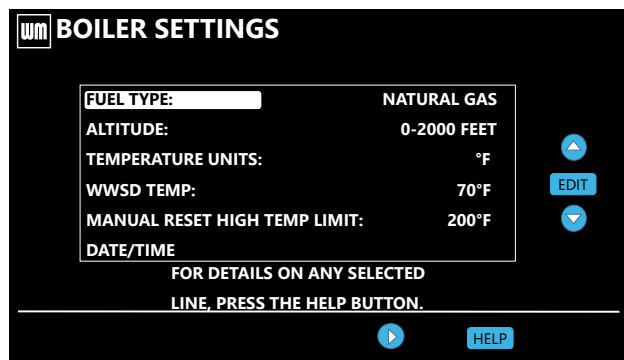
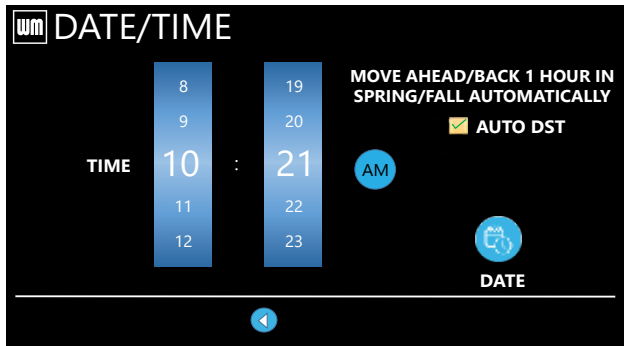
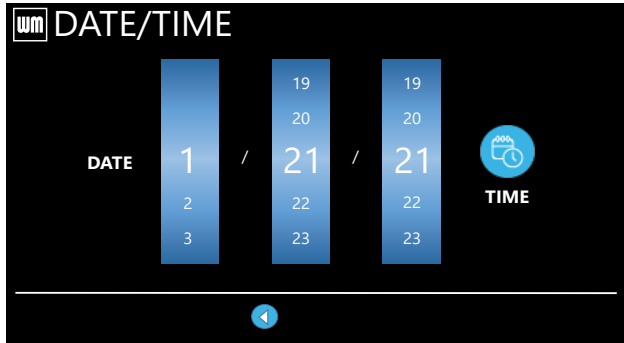
4



EXPRESS SETUP - EXAMPLE A (continued)

Figure 84 ECO Tec Control menu configuration screens (continued)

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



How - to

This screen appears when DATE/TIME is selected on the previous screen. It has slide wheels for selecting the DATE. Please make sure this is accurate and press the blue TIME button to advance to the TIME screen.

This screen appears when selecting the TIME button from the previous screen. This screen uses slide wheels for selection of TIME. Press the blue AM/PM button to change between AM and PM.

Check mark the AUTO DST box to allow the control to automatically adjust the time when Daylight Savings Time changes occur.

Press the back arrow when done.

Finalize all selections and confirm all settings are correct, then press the right arrow.

This screen allows you to set up the boiler using the boiler's SETUP WIZARD.

For this guide, we will walk through the Wizard to simplify installation. Press USE WIZARD.

Pressing USE APP will allow the user to send a settings file from the app to the boiler for faster, less customized setups.

Pressing SKIP WIZARD will skip all setup of the boiler and will require manual setup of all settings. This is NOT recommended. If SKIP WIZARD is selected and using the WIZARD is desired, the user can select RESTART WIZARD from the Reset to Factory Defaults option in the Boiler Settings menu. You can access this via the Contractor menu.

4



EXPRESS SETUP - EXAMPLE A (continued)

Figure 85 ECO Tec Control menu configuration screens (continued)

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

How - to

Select the usage of Input/Output -1.

For this application, select HEAT DEMAND and press the right arrow.

For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.

Select the priority of Input/Output-1.

For this application, select PRIORITY 1 – LOCAL 1 and press the right arrow.

Select the heat emitter type that is to receive heat from Input/Output-1.

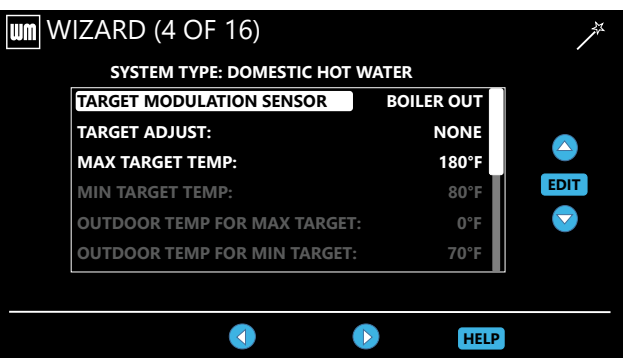
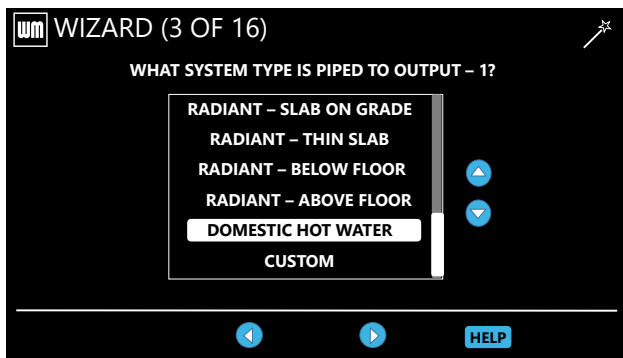
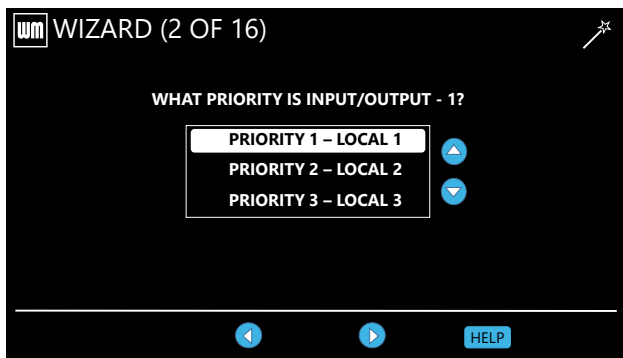
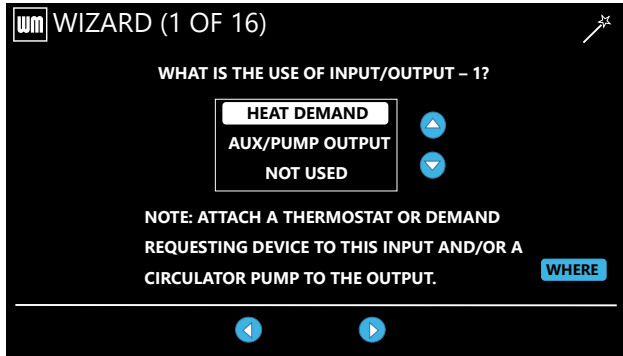
This application assumes DOMESTIC HOT WATER. Select the appropriate type and press the right arrow.

This screen is the detailed settings for the system type chosen on the previous screen.

This application assumes defaults for this screen. Explanations of each parameter are listed in the manual or via the HELP button.

Make any changes necessary.

4

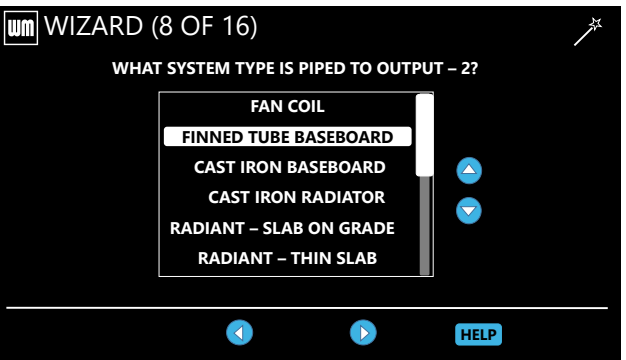
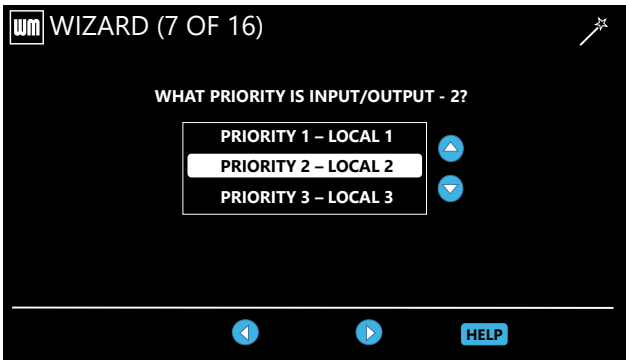
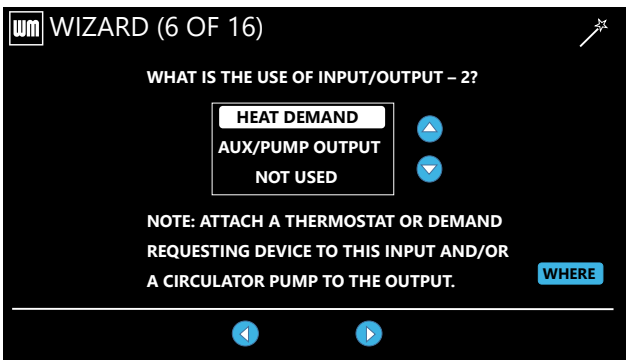
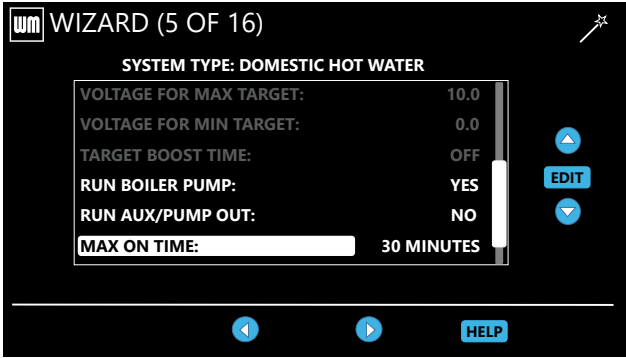




EXPRESS SETUP - EXAMPLE A (continued)

Figure 86 ECO Tec Control menu configuration screens (continued)

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



How - to

Confirm your settings are correct and continue by pressing the right arrow.

Select the usage of Input/Output-2.

For this application, select HEAT DEMAND and press the right arrow.

For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.

Select the priority of Input/Output-2.

For this application, select PRIORITY 2 – LOCAL 2 and press the right arrow.

Select the heat emitter type that is to receive heat from Input/ Output-2.

This application assumes FINNED TUBE BASEBOARD. Select the appropriate type and press the right arrow.

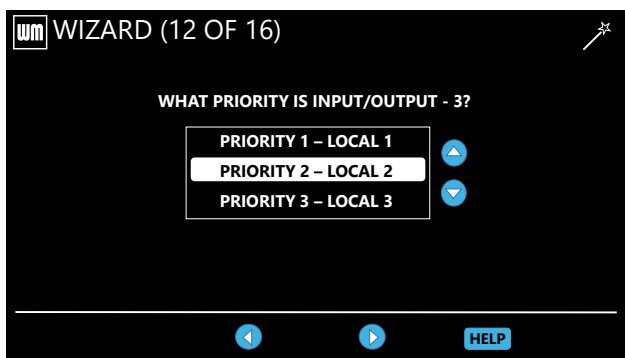
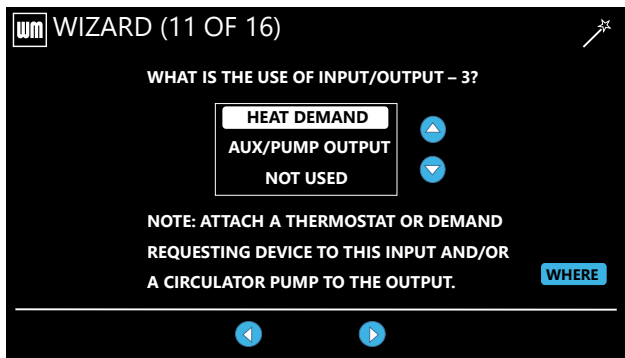
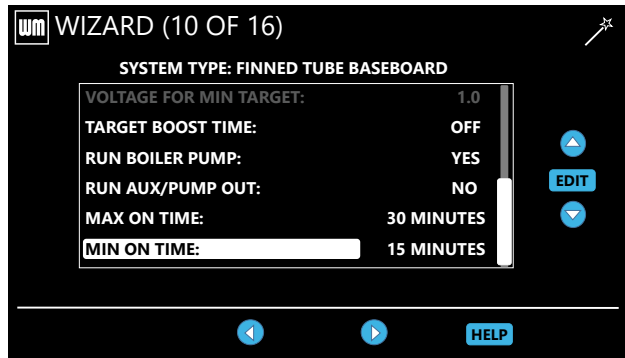
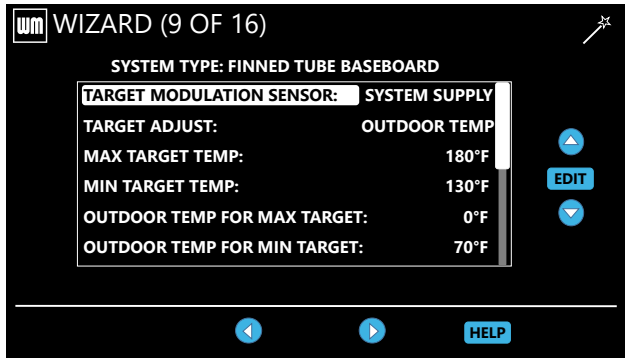
4



EXPRESS SETUP - EXAMPLE A (continued)

Figure 87 ECO Tec Control menu configuration screens (continued)

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



How - to

This screen is the detailed settings for the system type chosen on the previous screen.

This application assumes defaults for this screen. Explanations of each parameter are listed in the manual or via the HELP button.

Make any changes necessary.

Confirm your settings are correct and continue by pressing the right arrow.-

Select the usage of Input/Output-3.

For this application, select HEAT DEMAND and press the right arrow.

For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.

Select the priority of Input/Output-3.

For this application, select PRIORITY 2 – LOCAL 2. Since Priority 2 was already configured in the previous steps, the control will use those previously configured settings and advance to the next steps of setup. Press the right arrow to continue.

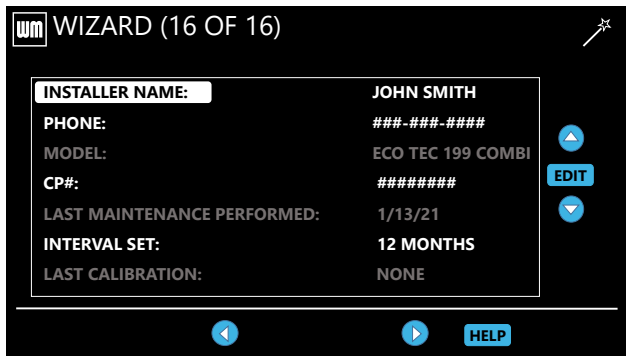
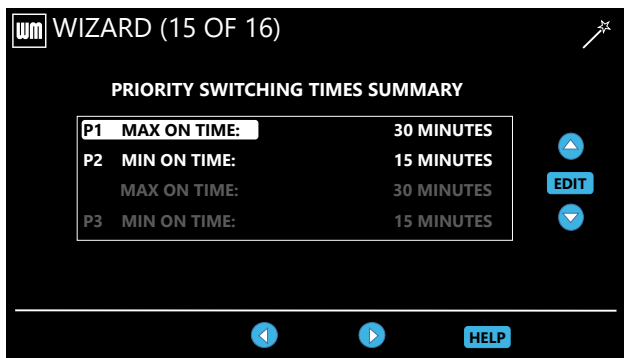
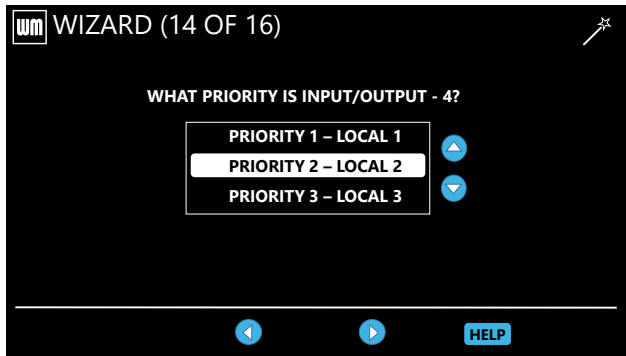
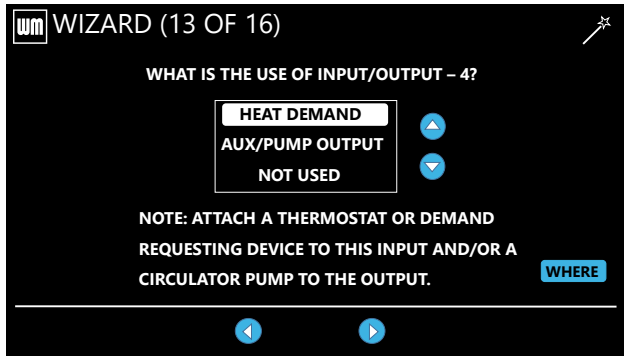
4



EXPRESS SETUP - EXAMPLE A (continued)

Figure 88 ECO Tec Control menu configuration screens (continued)

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



How - to

Select the usage of Input/Output-4.

For this application, select HEAT DEMAND and press the right arrow.

For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.

Select the priority of Input/Output-4.

For this application, select PRIORITY 2 – LOCAL 2. Since Priority 2 was already configured in the previous steps, the control will use those previously configured settings and advance to the next steps of setup. Press the right arrow to continue.

This screen summarizes the maximum and minimum time each priority will operate on a continuous call before switching to a priority in waiting.

Adjust timers as necessary then press the right arrow to continue.

This screen lists Installer and boiler information important to both the home owner and contractors. Fill out the Installer Name and Phone accurately.

Consumer Protection (CP) number is pre-loaded to the boiler and should not need to be altered. Verify the CP number is correct.

Interval Set dictates the next date the Maintenance Reminder will appear. Set according to normal maintenance schedules.

Confirm all information is correct and press the right arrow.

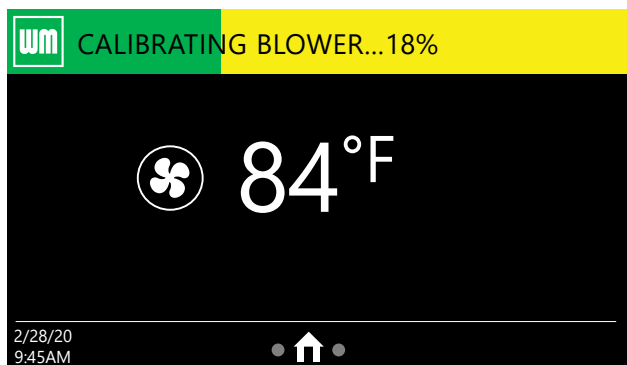
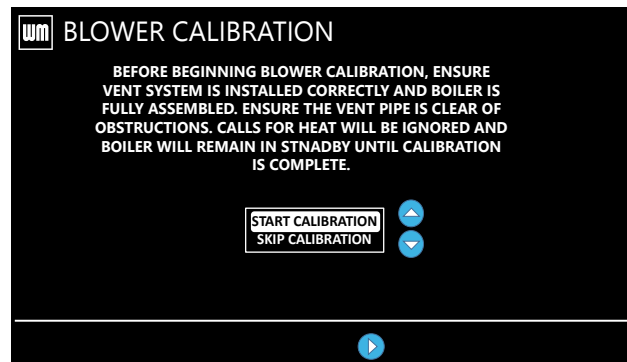
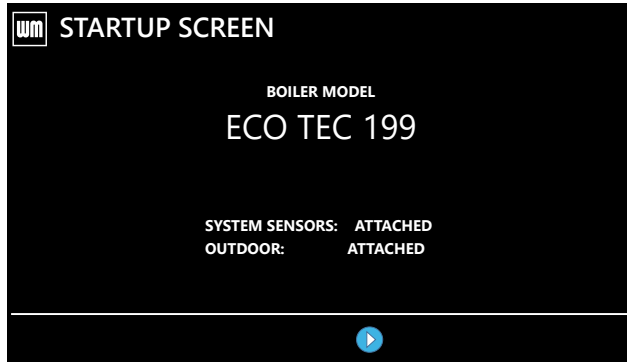
This completes the WIZARD!



EXPRESS SETUP - EXAMPLE A (continued)

Figure 89 ECO Tec Control menu configuration screens (continued)

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



How - to

The STARTUP SCREEN is shown one more time to remind you of the sensor status and model number. Press the right arrow to continue.

The boiler control is capable of calibrating its blower motor to vent lengths and other internal and external factors. This ensures the blower is controlled appropriately throughout operation.

Ensure all vent piping is clear of obstructions and are installed properly. Ensure the boiler jacket door is installed and press START CALIBRATION. Press the right arrow. The blower motor will begin calibrating, starting at its highest range and working its way down.

Selecting SKIP CALIBRATION will allow you to continue but will disallow operation of the boiler until calibration if performed. This can be selected later via the Boiler Settings screen in the Contractor menu.

A red warning message will appear on the homeowner screen indicating the boiler is calibrating. When this message disappears the boiler will begin operating according to the settings chosen in the WIZARD. The boiler is now ready to run.

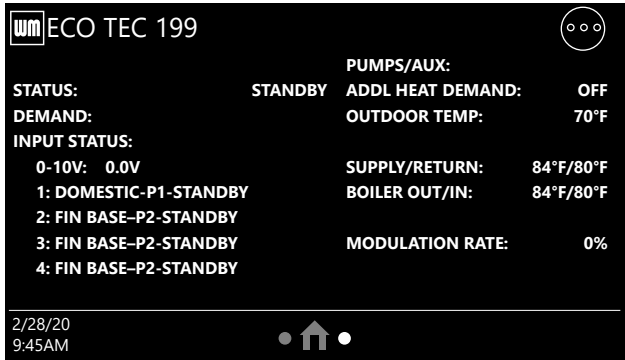
4



EXPRESS SETUP - EXAMPLE A (continued)

Figure 90 ECO Tec Control menu configuration screens (continued)

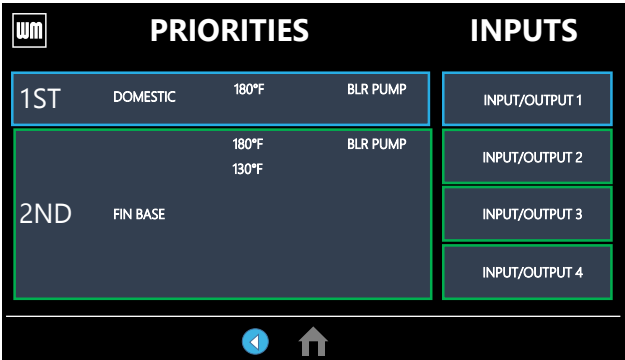
Screens shown are typical only.
Actual screens depend on control settings chosen.



How - to

Swiping left, or pressing the right bubble on the bottom (next to the home symbol) will take you to this screen. This summarizes the current operation of the boiler.

Your System Settings screen should look similar to this. If information here does not match what you had selected previously, press on the button in question and make the appropriate change.



4



EXPRESS SETUP - EXAMPLE A (continued)

Multi-Zone SPACE HEATING (Circulators without circulator relays) | DHW (Direct-piped)

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.

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 53](#).

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 control outputs to operate zone circulators (4 zones if space heating only; or 3 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 76](#).

Boiler

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

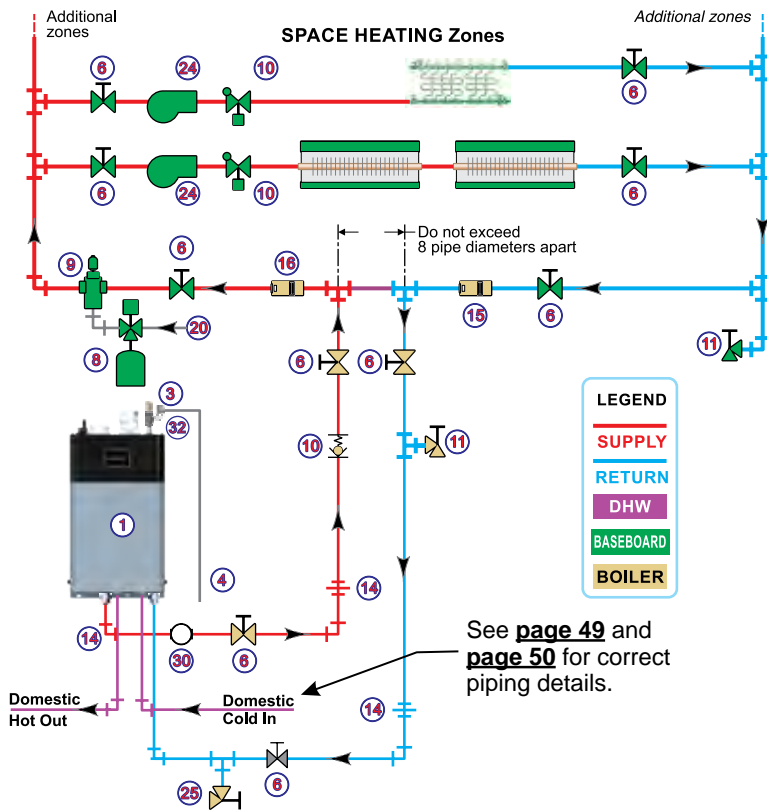
Control settings (in order of WIZARD sequences)	Bold italic - value must be set or verified D — default acceptable; change only if desired
BOILER SETTINGS	
Boiler Model	Verify model number is correct
WWSO Temp	Default (70 °F) or as required
High Altitude	Set to closest altitude if over 2,000 feet
INPUT/OUTPUT 1 (Assign to PRIORITY 1) (Note 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 120v 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 system type is input/output 2?	Select correct system type
TARGET MODULATION SENSOR	* System Supply (recommended)
TARGET ADJUST	ODT (D) <i>(Outdoor Temp sensor must be installed)</i>
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 120v Boiler Pump?	YES (D)
RUN AUX PUMP/OUTPUT?	D (not applicable)
INPUT/OUTPUT 3 (Assign to PRIORITY 2)	
If PRIORITY 2 is assigned, no further steps are required. If PRIORITY 3 is assigned, repeat the steps from INPUT/OUTPUT 2, above.	
INPUT/OUTPUT 4 (Assign to PRIORITY 2)	
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)
Finish the WIZARD	
ENTER TIME, DATE AND MAINTENANCE INFORMATION AS PROMPTED	
* System sensors are optional but recommended. Otherwise, set target modulation sensor to boiler out.	
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

Combi Boiler Model, SPACE HEATING w/DHW (Circulators without circulator relays)

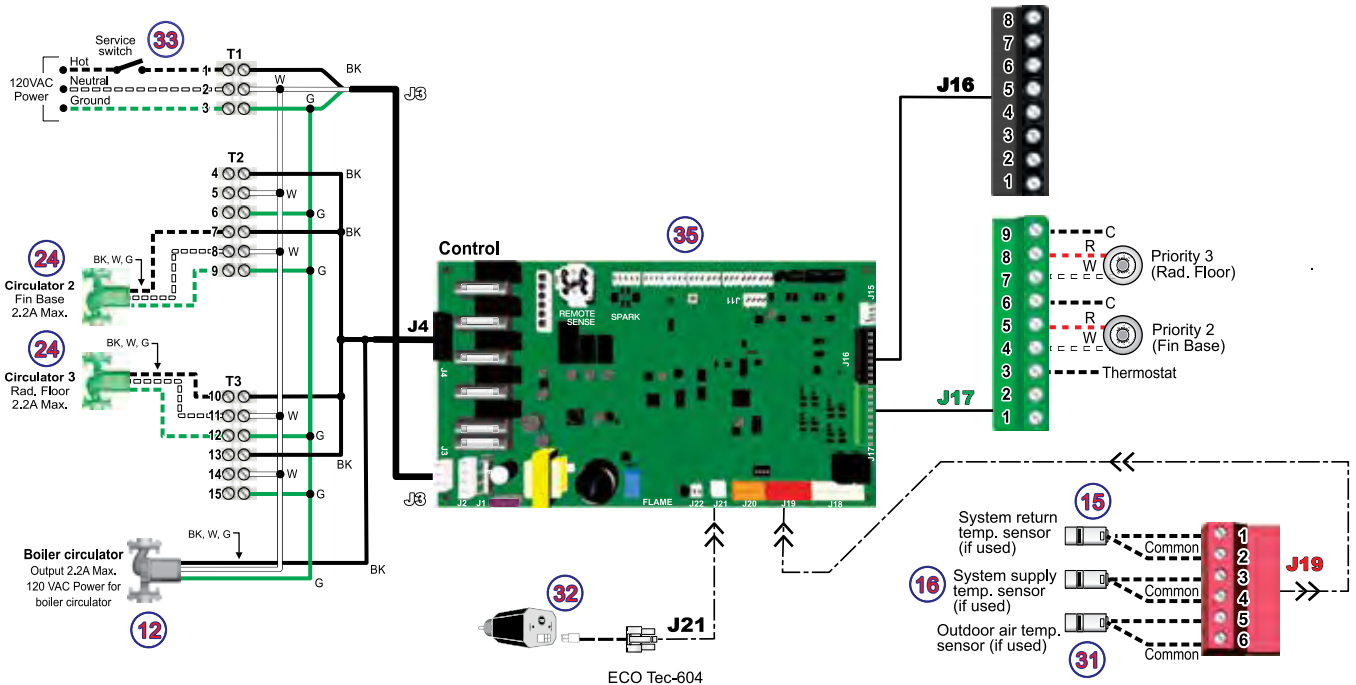
PIPING



LEGEND

- ECO Tec boiler.
 - Indirect water heater, if used (domestic water piping not shown) — MUST be direct piped to boiler to use default control settings.
 - Relief valve, supplied with boiler, field piped — MUST be piped to Boiler In connection — see **Figure 12, page 18** for information.
 - Relief valve piping to drain.
 - DHW circulator.
 - Isolation valves.
 - Expansion tank.
 - Air separator.
 - Flow/check or spring check valves.
 - Purge/drain valves.
 - Unions as needed for service.
 - Return temperature sensor.
 - Supply temperature sensor.
 - Make-up water supply.
 - DHW Temperature and Pressure relief valve
 - Zone circulators.
 - Boiler drain valve, supplied with boiler, field piped.
 - Pressure/temperature gauge, supplied with boiler, field piped.
 - Outdoor sensor.
 - Low water cut-off (not shown - see **page 47**)
 - 120VAC power to boiler — see **page 68**.
 - Control module.
- = Items supplied with boiler — all other Items supplied by installer.

FIELD WIRING

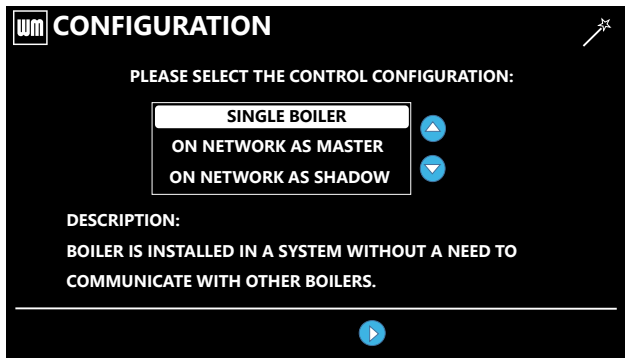




EXPRESS SETUP - EXAMPLE B (continued)

Figure 91 ECO Tec Control menu configuration screens

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



How - to

When powering up your boiler for the first time, this is the first screen to appear. Select the configuration of your boiler.

SINGLE BOILER is used for stand-alone boilers that do not need to communicate to other boilers.

ON NETWORK AS MASTER is used when your boiler is part of a multiple boiler network. It will control the Network boilers' firing rate and burner-on commands. Only one Master per multi-boiler system is allowed.

ON NETWORK AS SHADOW is used when your boiler is part of a multiple boiler network. It will be controlled by the Master for Network calls for heat, and will control itself for Local calls for heat.

Choose Single Boiler for this application and press the right arrow.

The ECO[®] Tec boiler MUST have an anti-scald thermostatic mixing valve installed prior to operating the boiler. If there is not one installed, select DISABLE DHW. This will allow you to continue boiler setup while keeping Combi features off. Combi features can be re-enabled later.

Ensure an anti-scald thermostatic mixing valve is properly installed, then press ACCEPT.

This screen summarizes the boiler model, and shows the state of the System and Outdoor Sensors.

Review the content of this screen. If the boiler model does not match the actual model the control is installed on, see the boiler manual and follow instructions to perform a FACTORY RESET.

See **Figure 101, page 115** for additional information about model selection and warning about 199 & 199c blower types.

If the sensor status does not match the expected result, check the sensors. Once complete, press the right arrow.

This screen lists important boiler application parameters. These must be accurate before proceeding. HELP is available for each item if needed.

Select the fuel type connected to your boiler. If PROPANE GAS, a confirmation screen will appear. Confirm your setting to return to this screen.

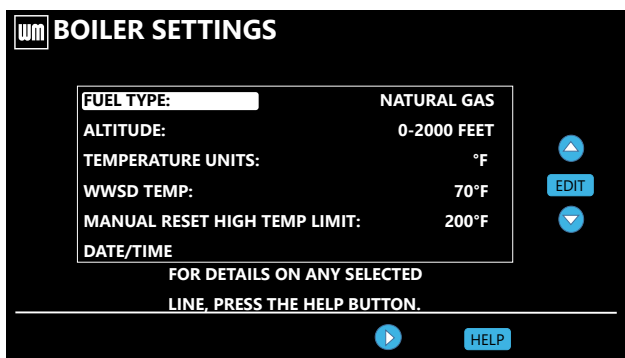
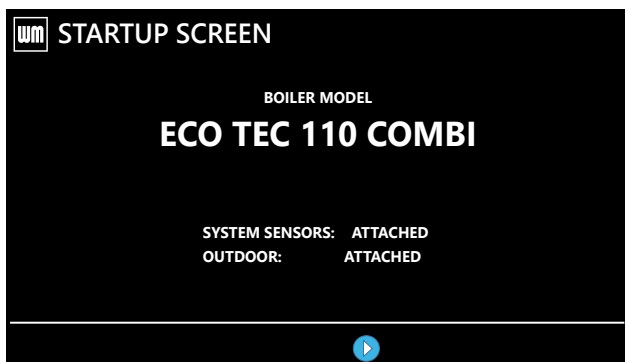
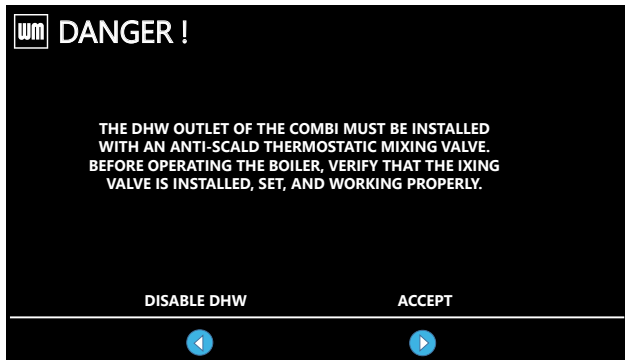
Select the altitude your boiler is installed at. Firing rates are adjusted according to installation altitude.

Select Temperature Units, between Fahrenheit and Celsius.

Select WWSD Temp to shut down space heating calls when the outdoor temperature exceeds this temperature.

Manual Reset High Temp Limit will shut down the boiler and will manual lockout if the boiler temperature exceeds this value. This is a safety feature and may be lowered for specific applications.

Select the DATE/TIME and make the appropriate changes. Please ensure this is accurate for Maintenance intervals and troubleshooting. This will take you to the DATE/TIME screen.



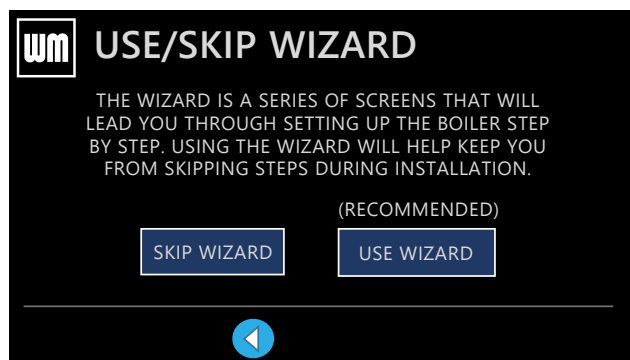
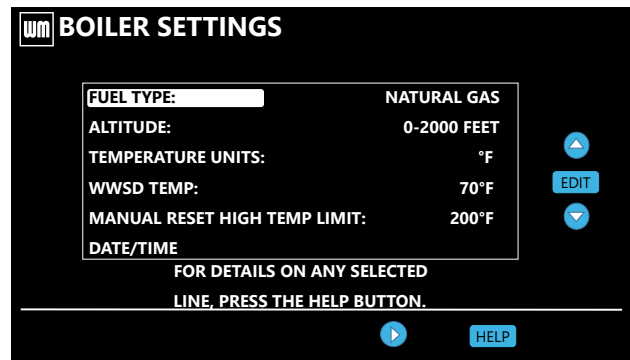
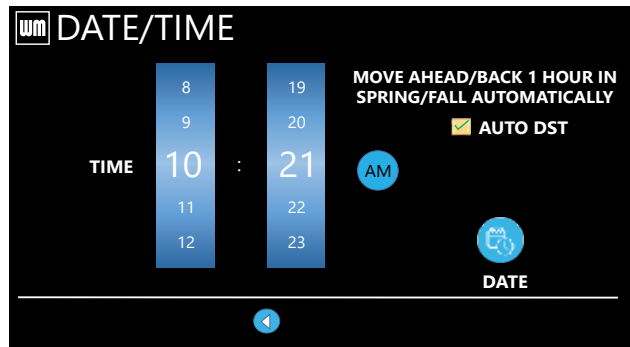
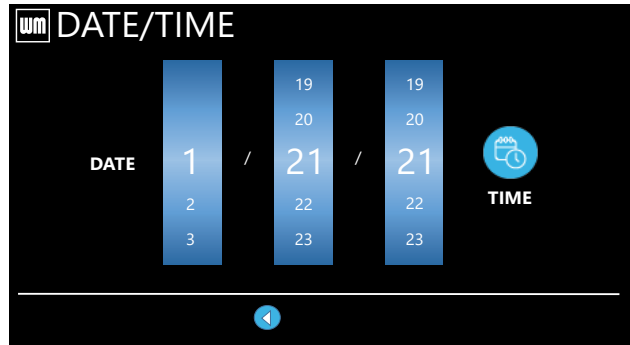
4



EXPRESS SETUP - EXAMPLE B (continued)

Figure 92 ECO Tec Control menu configuration screens (continued)

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



How - to

This screen appears when DATE/TIME is selected on the previous screen. It has slide wheels for selecting the DATE. Please make sure this is accurate and press the blue TIME button to advance to the TIME screen.

This screen appears when selecting the TIME button from the previous screen. This screen uses slide wheels for selection of TIME. Press the blue AM/PM button to change between AM and PM.

Check mark the AUTO DST box to allow the control to automatically adjust the time when Daylight Savings Time changes occur.

Press the back arrow when done.

Finalize all selections and confirm all settings are correct, then press the right arrow.

This screen allows you to set up the boiler using the boiler's SETUP WIZARD.

For this guide, we will walk through the Wizard to simplify installation. Press USE WIZARD.

Pressing USE APP will allow the user to send a settings file from the app to the boiler for faster, less customized setups.

Pressing SKIP WIZARD will skip all setup of the boiler and will require manual setup of all settings. This is NOT recommended. If SKIP WIZARD is selected and using the WIZARD is desired, the user can select RESTART WIZARD from the Reset to Factory Defaults option in the Boiler Settings menu. You can access this via the Contractor menu.

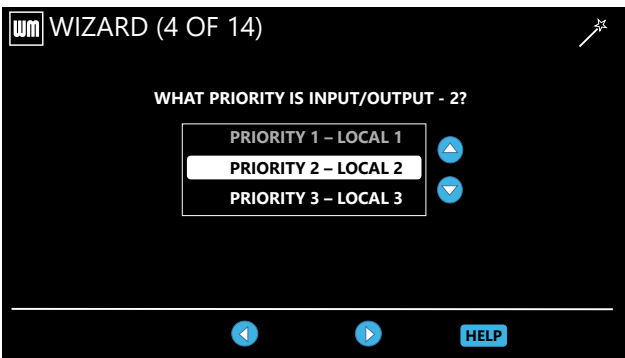
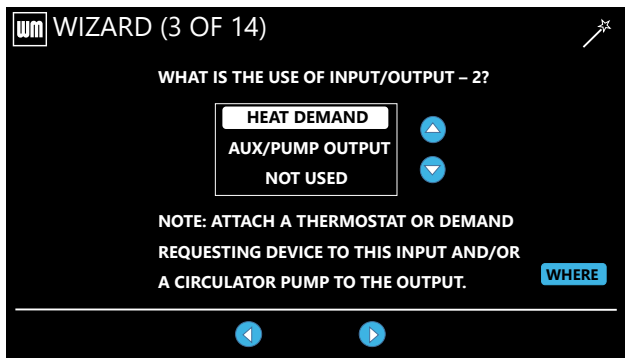
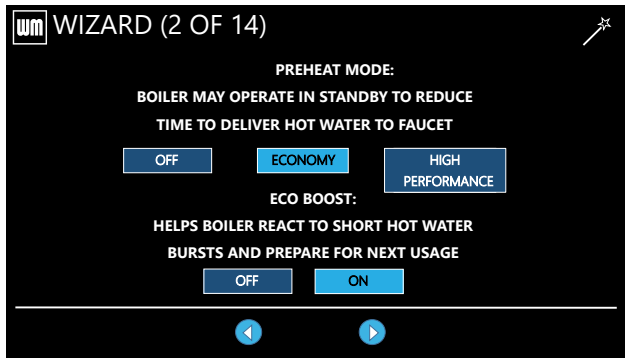
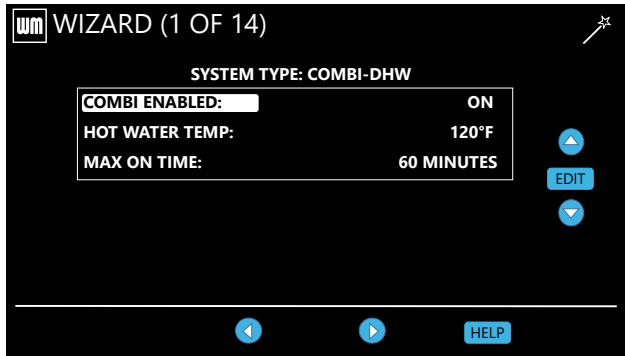




EXPRESS SETUP - EXAMPLE B (continued)

Figure 93 ECO Tec Control menu configuration screens (continued)

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



How - to

Now begins the WIZARD. HELP is available throughout to offer further explanation if needed.

The top banner will show you how many potential screens are remaining in the WIZARD. The total remaining screens can change depending on selections made.

COMBI ENABLED allows you to turn off all Combi features if the installer is not yet ready to run hot water. This can be re-enabled in the System Settings menu after the WIZARD.

Select the HOT WATER TEMP of the Combi priority. You can select up to 140°F.

Select the duration of the MAX ON TIME to determine how long a continuous Combi demand will be given heat before switching to satisfy another priority.

Confirm your settings and press the right arrow.

This screen offers you the ability to activate PREHEAT and ECO BOOST modes for the Combi priority.

PREHEAT mode attempts to maintain a heat exchanger temperature according to the setting selected in order to help reduce time to hot water. Economy has a lower set point but fires the boiler less often, while High Performance tries to maintain closer to target and will fire the boiler more often. NOTE: once calibration is complete, if PREHEAT is selected as Economy or High Performance the boiler will immediately start running according to the PREHEAT setting if no active heat demands are present.

ECO BOOST mode attempts to reduce hot-cold sandwiches from turning demand on and off repeatedly by keeping the burner on for a short time after hot water demand has ended.

Select your preferences, or turn them OFF. These can be changed later in the System Settings menu.

To make changes to the previous screen, press the back arrow. Otherwise, confirm your settings and press the right arrow.

Select the usage of Input/Output -2.

For this application, select HEAT DEMAND and press the right arrow.

For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.

Select the priority of Input/Output-2.

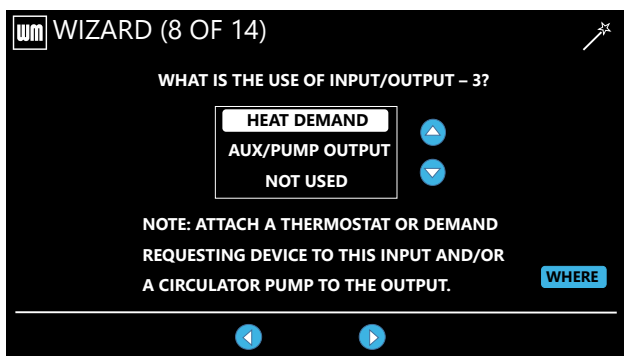
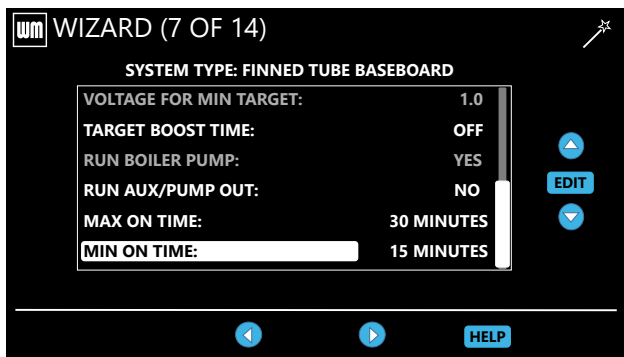
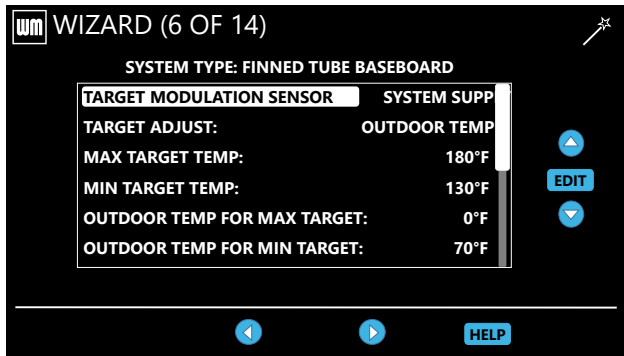
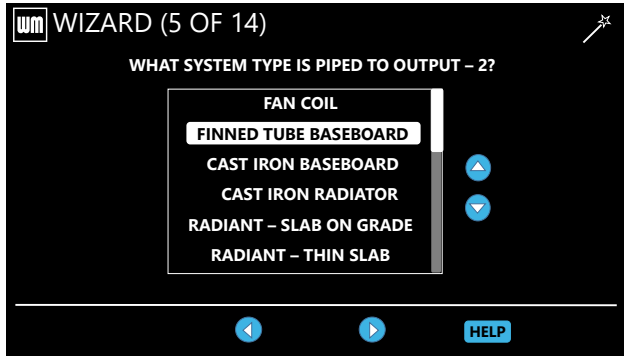
For this application, select PRIORITY 2 – LOCAL 2 and press the right arrow.

4

EXPRESS SETUP - EXAMPLE B (continued)

Figure 94 ECO Tec Control menu configuration screens (continued)

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



How - to

Select the heat emitter type that is to receive heat from Input/Output-2.

This application assumes FINNED TUBE BASEBOARD. Select the appropriate type and press the right arrow.

This screen is the detailed settings for the system type chosen on the previous screen.

This application assumes defaults for this screen. Explanations of each parameter are listed in the manual or via the HELP button.

Make any changes necessary.

Confirm your settings are correct and continue by pressing the right arrow.

Select the usage of Input/Output-3.

For this application, select HEAT DEMAND and press the right arrow.

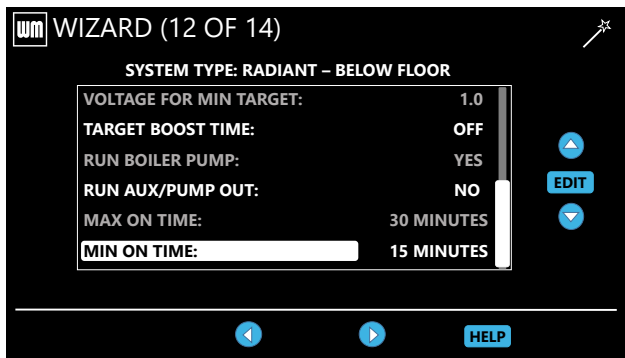
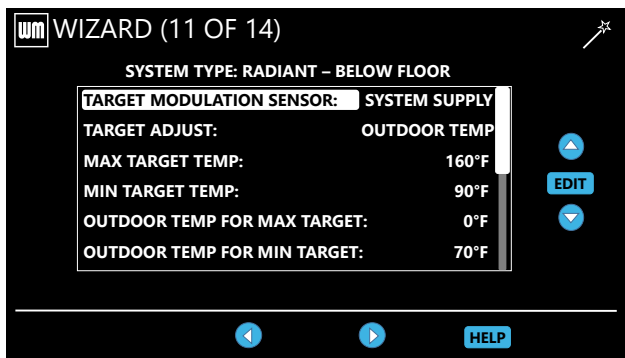
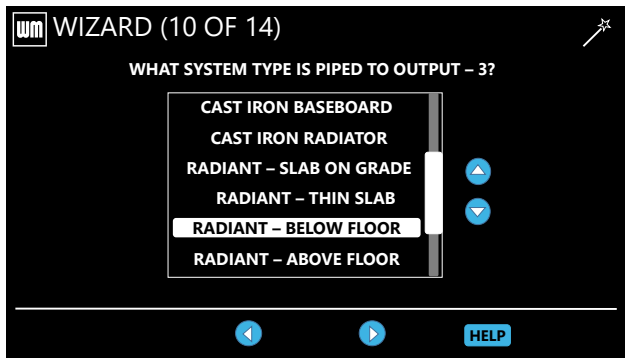
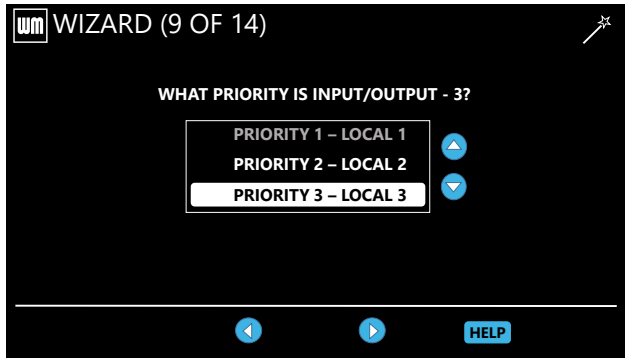
For assistance in locating the input/output pairs, press the WHERE button. This will show a diagram of the control and tell you the location of the inputs and the outputs in question. This is available on all Input/Output usage screens in the WIZARD.



EXPRESS SETUP - EXAMPLE B (continued)

Figure 95 ECO Tec Control menu configuration screens (continued)

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



How - to

Select the priority of Input/Output-3.

For this application, select PRIORITY 3 – LOCAL 3 and press the right arrow.

Select the heat emitter type that is to receive heat from Input/Output-3.

This application assumes RADIANT – BELOW FLOOR. Select the appropriate type and press the right arrow.

This screen is the detailed settings for the system type chosen on the previous screen.

This application assumes defaults for this screen. Explanations of each parameter are listed in the manual or via the HELP button.

Make any changes necessary.

Confirm your settings are correct and continue by pressing the right arrow.

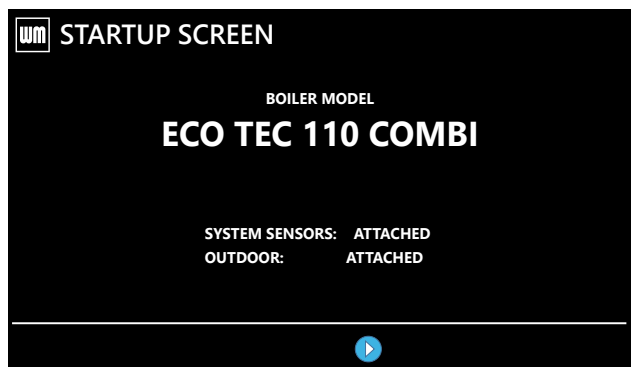
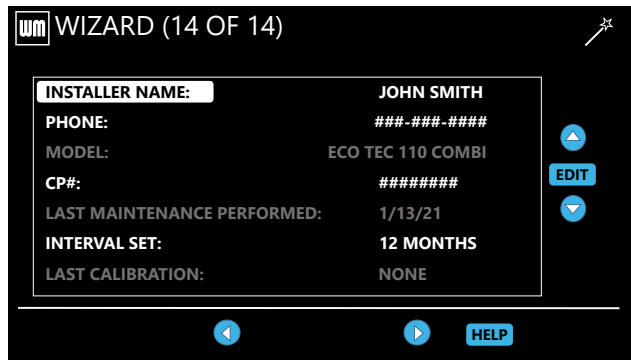
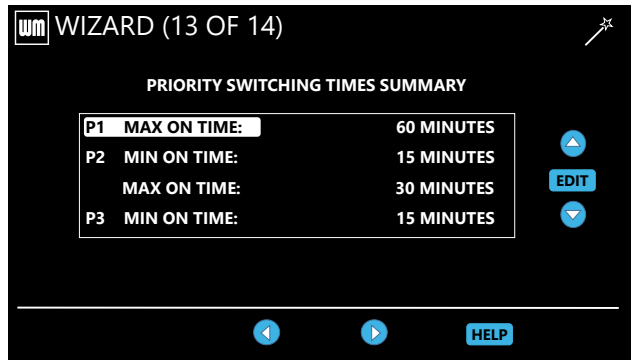
4



EXPRESS SETUP - EXAMPLE B (continued)

Figure 96 ECO Tec Control menu configuration screens (continued)

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



How - to

This screen summarizes the maximum and minimum time each priority will operate on a continuous call before switching to a priority in waiting.

Adjust timers as necessary then press the right arrow to continue.

This screen lists Installer and boiler information important to both the home owner and contractors. Fill out the Installer Name and Phone accurately.

CP# is pre-loaded to the boiler and should not need to be altered. Verify the CP # is correct.

Interval Set dictates the next date the Maintenance Reminder will appear. Set according to normal maintenance schedules.

Confirm all information is correct and press the right arrow.

This completes the WIZARD!

The STARTUP SCREEN is shown one more time to remind you of the sensor status and model number. Press the right arrow to continue.

4



EXPRESS SETUP - EXAMPLE B (continued)

Figure 97 ECO Tec Control menu configuration screens (continued)

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

How - to

The boiler control is capable of calibrating its blower motor to vent lengths and other internal and external factors. This ensures the blower is controlled appropriately throughout operation.

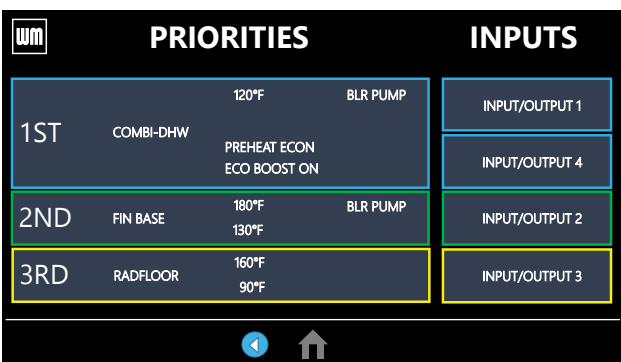
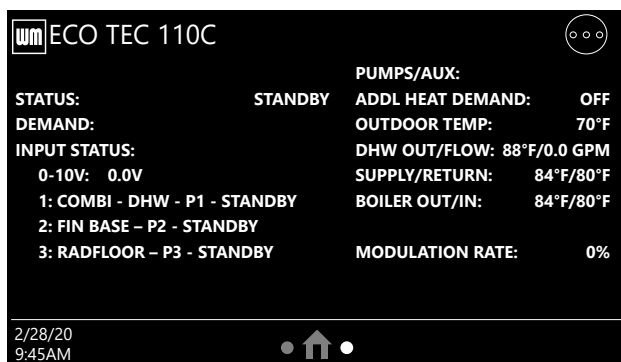
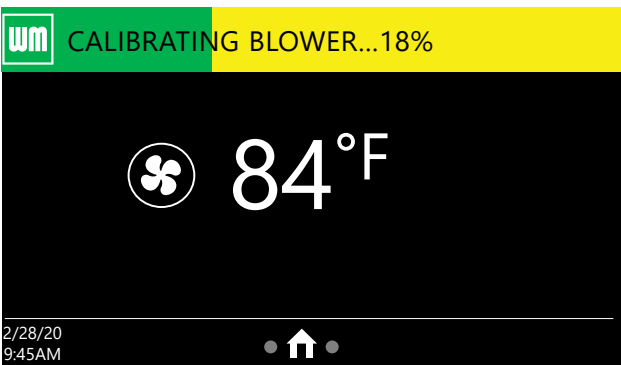
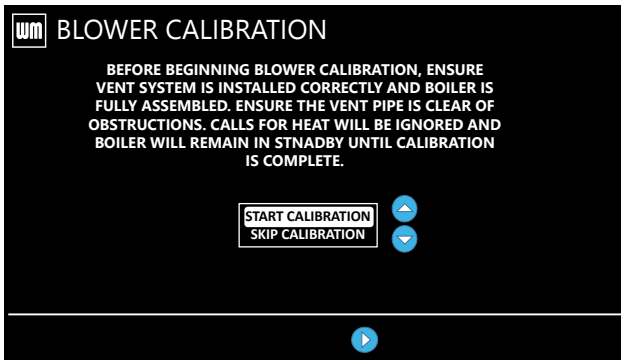
Ensure all vent piping is clear of obstructions and are installed properly. Ensure the boiler jacket door is installed and press START CALIBRATION. Press the right arrow. The blower motor will begin calibrating, starting at its highest range and working its way down.

Selecting SKIP CALIBRATION will allow you to continue but will disallow operation of the boiler until calibration is performed. This can be selected later via the Boiler Settings screen in the Contractor menu.

A red warning message will appear on the homeowner screen indicating the boiler is calibrating. When this message disappears the boiler will begin operating according to the settings chosen in the WIZARD. The boiler is now ready to run.

Swiping left, or pressing the right bubble on the bottom (next to the home symbol) will take you to this screen. This summarizes the current operation of the boiler.

Your System Settings screen should look similar to this. If information here does not match what you had selected previously, press on the button in question and make the appropriate change.



4



EXPRESS SETUP - EXAMPLE B (continued)

Combi Boiler Model, SPACE HEATING w/DHW (Circulators without circulator relays)

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.

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 53](#).

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.
- Combi Enabled for DHW. Disallows use of Input/Outputs 1 & 4.
- DHW priority - space heating is disabled during call for DHW from flow switch.

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.
- 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 76](#).

Boiler

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

NOTE 1: 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.

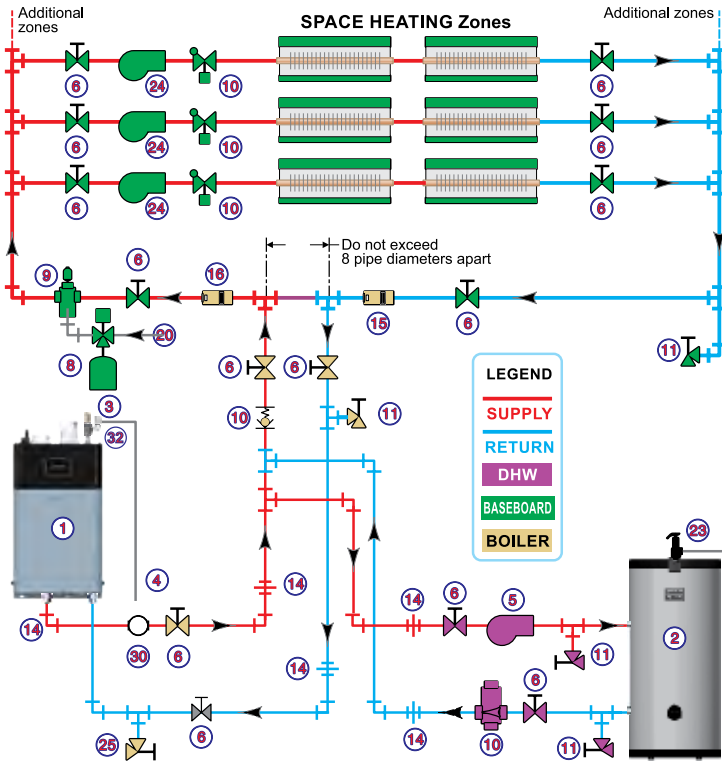
Control settings (in order of WIZARD sequences)	<i>Bold italic</i> - value must be set or verified D — default acceptable; change only if desired
BOILER SETTINGS	
Boiler Model	Verify model number is correct
WWSD Temp	Default (70 °F) or as required
High Altitude	Set to closest altitude if over 2,000 feet
INPUT/OUTPUT 1 (Not used)	
What is the use of input/output 1?	N/A
INPUT/OUTPUT 2 (Assign to PRIORITY 2)	
What is the use of input/output 2?	HEAT/DHW DEMAND
WHAT PRIORITY IS INPUT #2?	Select PRIORITY 2
What system type is input/output 2?	** Select FINBASE (Example)
TARGET MODULATION SENSOR	* System Supply (Recommended)
TARGET ADJUST	ODT (D) <i>(Outdoor Temp sensor must be installed)</i>
Max Target Temp	D (or change if desired)
Run 120v Boiler Pump?	Yes (D)
RUN AUX PUMP/OUTPUT?	D (not applicable)
INPUT/OUTPUT 3 (Assign to PRIORITY 3)	
What is the use of input/output 3?	HEAT/DHW DEMAND
WHAT PRIORITY IS INPUT #3?	PRIORITY 3
What system type is input/output 3?	** Select RADFLOOR (Example)
TARGET MODULATION SENSOR	* System Supply (Recommended)
TARGET ADJUST	ODT (D) <i>(Outdoor Temp sensor must be installed)</i>
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 120v Boiler Pump?	YES (D)
RUN AUX PUMP/OUTPUT?	D (not applicable)
INPUT/OUTPUT 4 (Not used)	
What is the use of input/output 4?	N/A
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	
* System sensors are optional but recommended. Otherwise, set target modulation sensor to boiler out.	
** Selected System types are shown based on Wizard Walk through sections for Example B. Select correct system types based on actual system.	



EXPRESS SETUP - Example C

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

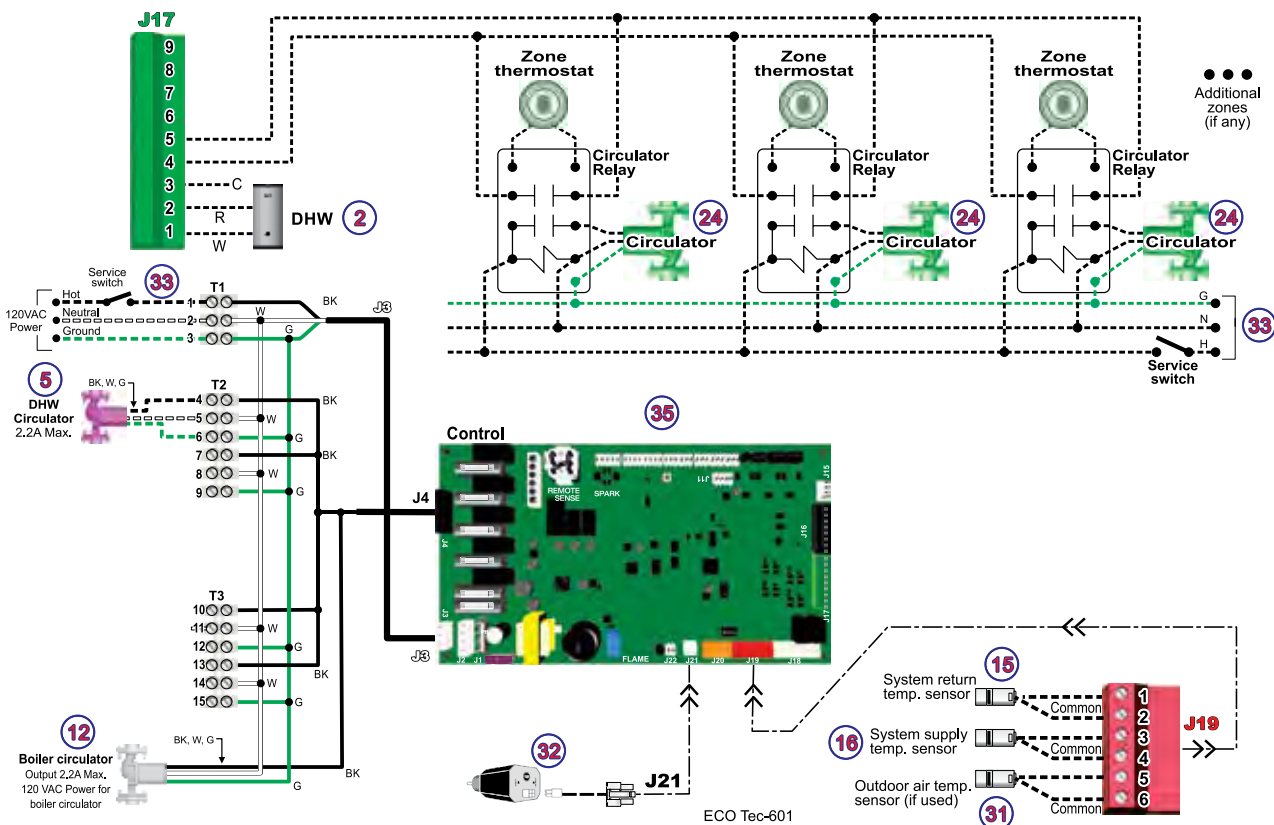
PIPING



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 12, page 18** for information.
 4. Relief valve piping to drain.
 5. DHW circulator.
 6. Isolation valves.
 8. Expansion tank.
 9. Air separator.
 10. Flow/check or spring check valves.
 11. Purge/drain valves.
 14. Unions as needed for service.
 15. Return temperature sensor.
 16. Supply temperature sensor.
 20. Make-up water supply.
 23. DHW Temperature and Pressure relief valve
 24. Zone circulators.
 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 (not shown - see **page 47**)
 33. 120VAC power to boiler — see **page 68**.
 35. Control module.
- = Items supplied with boiler
 — all other Items supplied by installer.

FIELD WIRING





EXPRESS SETUP - Example C (continued)

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

⚠ 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. 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 53](#).

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

⚠ 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 and relays supplied by installer. For alternate zone wiring using a zone controller, see [page 76](#).

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.

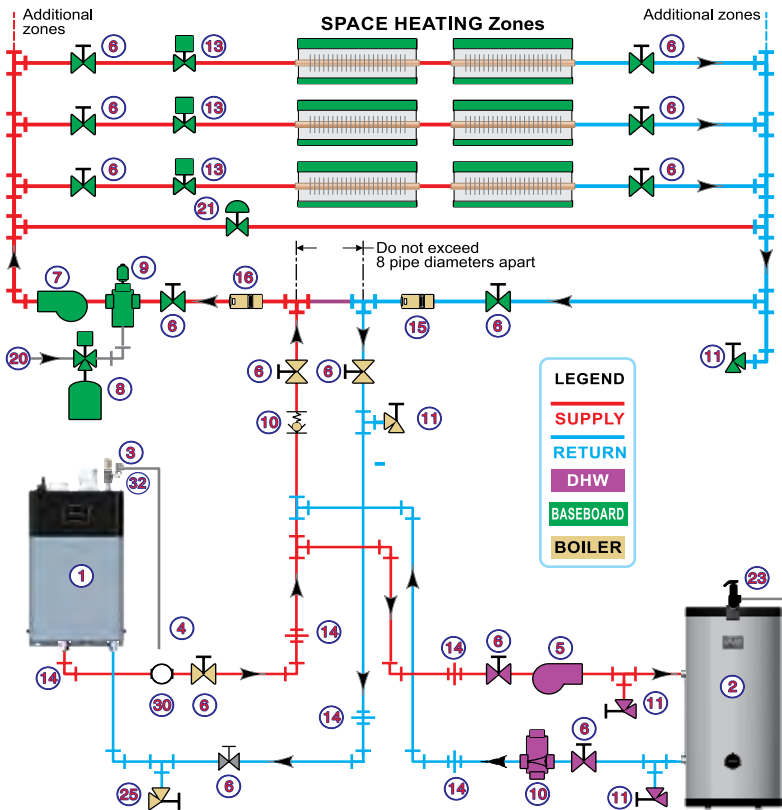
Control settings (in order of WIZARD sequences)	<i>Bold italic</i> - value must be set or verified D — default acceptable; change only if desired
BOILER SETTINGS	
Boiler Model	Verify model number is correct
WWS D Temp	Default (70 °F) or as required
High Altitude	Set to closest altitude if over 2,000 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 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 120v 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 system type is input/output 2?	Select correct system type
TARGET MODULATION SENSOR	* System Supply (Recommended)
TARGET ADJUST	ODT (D) <i>(Outdoor Temp sensor must be installed)</i>
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 120v 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
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	
* System sensors are optional but recommended. Otherwise, set target modulation sensor to boiler out.	



EXPRESS SETUP - Example D

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

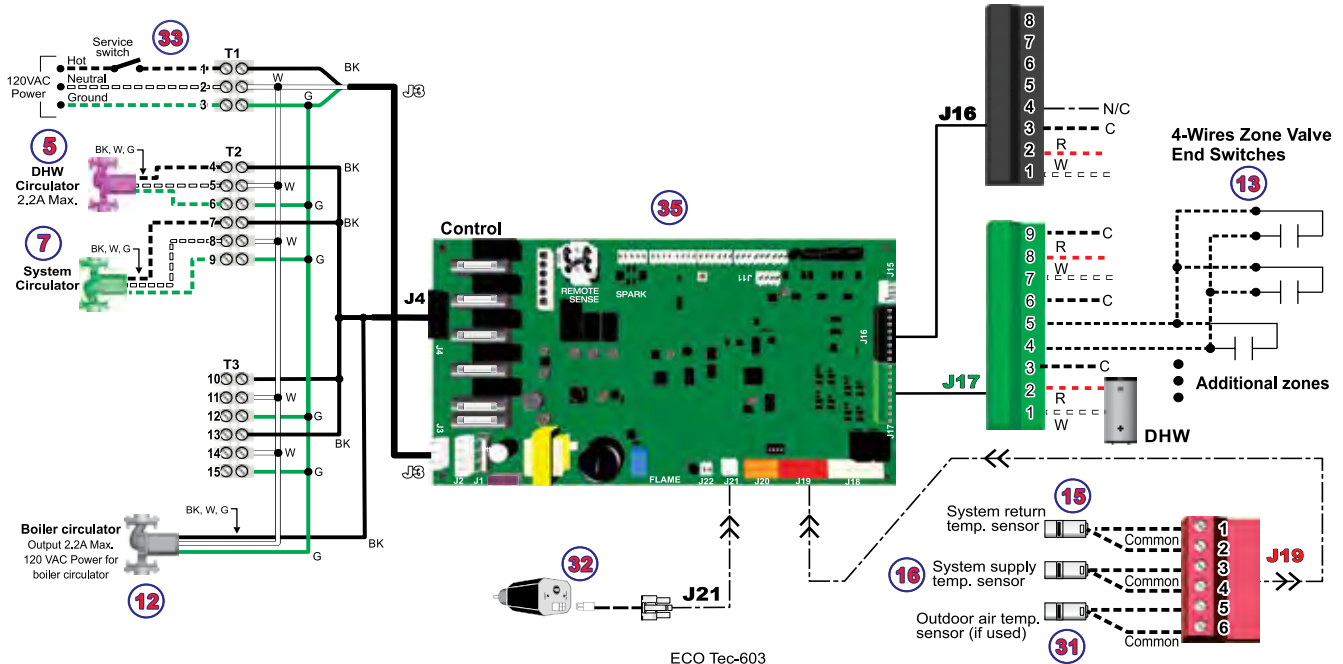
PIPING



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 12, page 18** 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 (not shown - see **page 47**).
 33. 120VAC power to boiler — see **page 68**.
 35. Control module.
- = Items supplied with boiler — all other items supplied by installer.

FIELD WIRING



ECO Tec-603



EXPRESS SETUP - EXAMPLE D (continued)

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

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. 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 53](#).

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 76](#).
- 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 (in order of WIZARD sequences)	<i>Bold italic</i> - 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 closest altitude if over 2,000 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 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 120v 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 system type is input/output 2?	Select correct system type
TARGET MODULATION SENSOR	* System Supply (Recommended)
TARGET ADJUST	ODT (D) <i>(Outdoor Temp sensor must be installed)</i>
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 120v 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
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	
* System sensors are optional but recommended. Otherwise, set target modulation sensor to boiler out.	



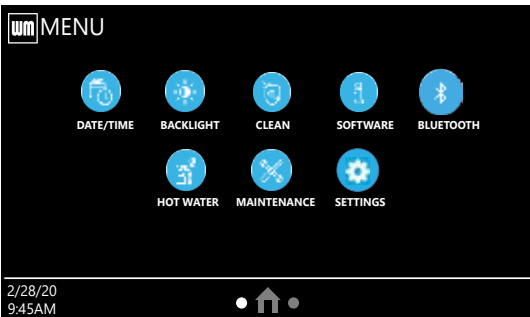
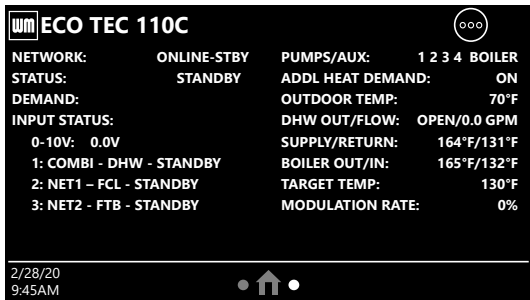
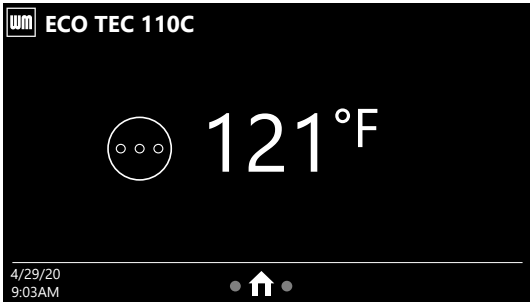
HOMEOWNER NAVIGATION Menus



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 98 ECO Tec HOMEOWNER NAVIGATION menu



MENU Item	PURPOSE
HOMEOWNER SCREEN	<ul style="list-style-type: none"> • 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)
BOILER INFORMATION SCREEN	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Allows user to edit the current date and time.
BACKLIGHT	<ul style="list-style-type: none"> • Allows user to edit how bright the screen is during normal operation and when dormant.
CLEAN	<ul style="list-style-type: none"> • Locks the screen so nothing can be pressed for 10 seconds while the user cleans the screen.
SOFTWARE	<ul style="list-style-type: none"> • Displays the current software revisions of the control and display, log file and fault file size.

4



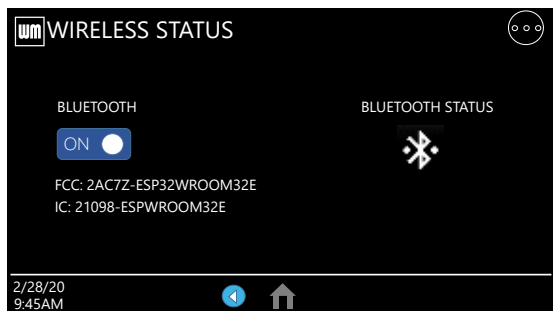
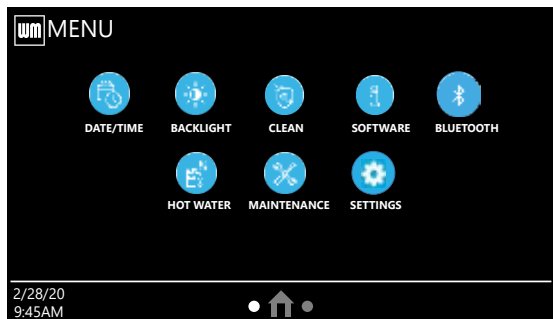
HOMEOWNER NAVIGATION MenuS (continued)



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 99 ECO Tec HOMEOWNER NAVIGATION menu (continued)



MENU Item	PURPOSE
<p>BLUETOOTH</p>	<ul style="list-style-type: none"> Allows the user to turn Bluetooth ON or OFF. Swipe right from HOME and press BLUETOOTH to reach FCC and IC information. Bluetooth allows the user to connect remotely to the WM ProTool app, where the user can wirelessly communicate to the boiler. The app functions include, but are not limited to, allowing the user to install the latest software for their boiler control, display and Bluetooth radio, gives quick access to boiler information, and provides contact information to WM Technical Services.
<p>FCC</p> <p>Assembled From tested components Complete system not tested</p>	<p>FCC: Wireless device unique identifier registered with the U.S. Federal Communications Commission.</p> <p>IC: Wireless certification approval number unique to all devices, required for Canada.</p> <ul style="list-style-type: none"> This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
<p>HOT WATER</p>	<ul style="list-style-type: none"> Allows the user to edit the Hot Water Temp of the Combi demand, as well as enable or disable PRE-HEAT mode or ECO BOOST.
<p>MAINTENANCE</p>	<ul style="list-style-type: none"> Allows the user to view contractor and maintenance information, as well as reset the maintenance reminder when present.
<p>SETTINGS</p>	<ul style="list-style-type: none"> Allows the user to edit temperature units, screen time out, daylight savings time and sound effect of presses.





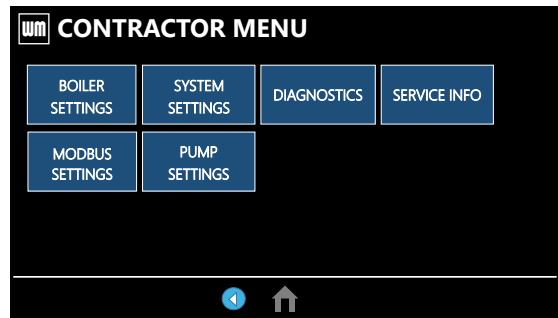
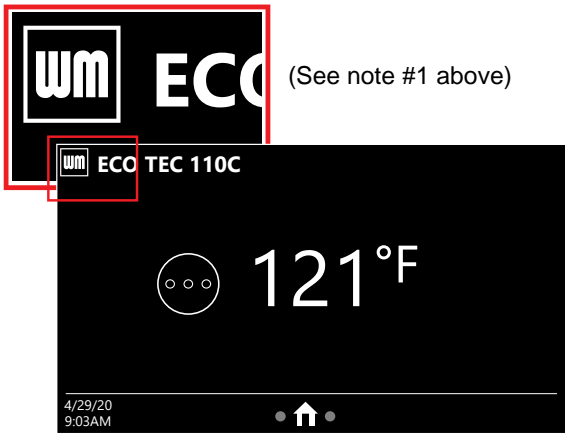
CONTRACTOR Menu

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 100 ECO Tec control menu access — accessing contractor menus



MENU Item	PURPOSE	More information
BOILER SETTINGS	<ul style="list-style-type: none"> 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. 	See page 115
PUMP AND NETWORK SETTINGS	<ul style="list-style-type: none"> Used to adjust settings for Circulator Exercising and Freeze Protect Circs options. 	See page 116
SYSTEM SETTINGS	<ul style="list-style-type: none"> These settings assign Priority 1, 2 or 3 to each of the four inputs to the control and see an overview of assigned priorities. 	See page 117
DIAGNOSTICS	<ul style="list-style-type: none"> Use to review current and historical information including previous lockouts. 	See page 127
SERVICE INFO	<ul style="list-style-type: none"> Used to set contractor contact information, boiler information and maintenance dates. 	See page 129
MODBUS SETTINGS	<ul style="list-style-type: none"> Used to adjust Modbus related settings such as Baud Rate, Parity and Stop Bits, Modbus Address and turning Modbus on/off. 	Refer to Modbus Supplement
NETWORK SETTINGS	<ul style="list-style-type: none"> Used to adjust Max Time for Net, Min Time for Net, Max Rate for Net, Min Rate for Net and select Rotation and Sequence screen. 	Refer to Advanced Manual

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

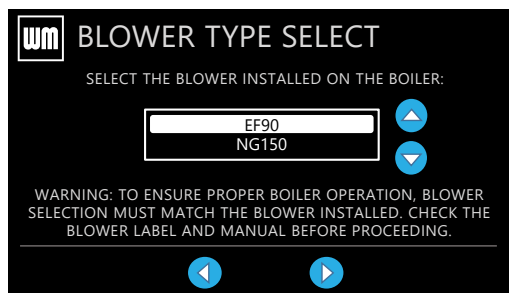
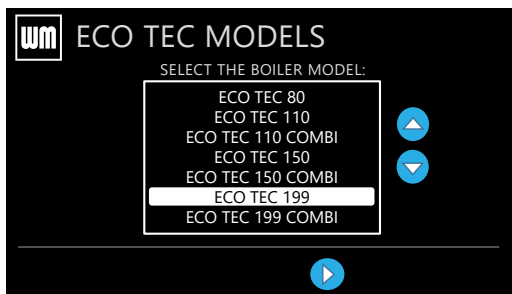
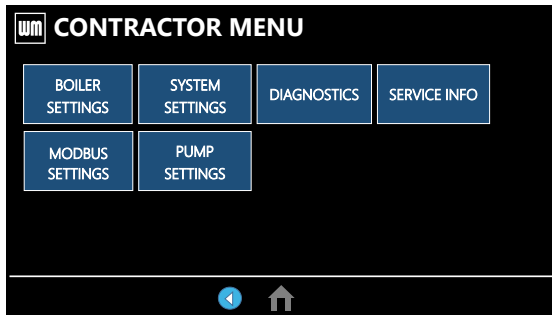
BOILER SETTINGS Menus

⚠ 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 101 ECO Tec BOILER SETTINGS options



MENU Item	DESCRIPTION
BOILER MODEL	<ul style="list-style-type: none"> • ⚠ 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. • Some boiler models (199 & 199C) can utilize more than one blower motor model. When replacing the blower and/or the control ensure that either the same blower model is installed or if switching blower models to another accepted model insure the boiler model in the control has been set to the proper boiler size and blower model (NG150 or EF90). See the screen on the bottom left of this page for selection details. The replacement parts section of this manual, page 169, has more details to identify the blower type. Please note changing the boiler model and blower type will reset all boiler settings. <p>NOTE: If your Eco Tec Series 3 199 does not have an option to select blowers, please update the software via the Pro Tools App.</p>
ALTITUDE	<ul style="list-style-type: none"> • Must be set correctly if altitude is greater than 2,000 feet. Settings in 500 -foot increments. • ⚠ WARNING For 199 & 199C models, two blower motor types are available for selection. Check the label of the blower motor installed to ensure appropriate and safe operation of the boiler. The user will be asked to select first the boiler model, then the blower type. Reference page 157 for physical differences.
FUEL TYPE	<ul style="list-style-type: none"> • ⚠ WARNING MUST be correct — Select between Propane and Natural gas is used. Follow screen instructions to change if necessary.
OUTDOOR TEMP SENSOR EXEMPT	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • If boiler outlet water temperature exceeds this temperature, the ECO Tec control will shut down the boiler and enter lock-out. Changing this setting is NOT recommended.
WWSD TEMP	<ul style="list-style-type: none"> • 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 or CUSTOM priorities. The outdoor sensor must be installed to use this function.
ADJUST OUTDOOR	<ul style="list-style-type: none"> • 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.
BLOWER CALIBRATION	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.



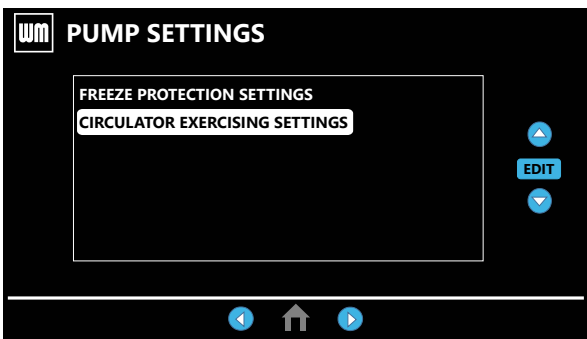
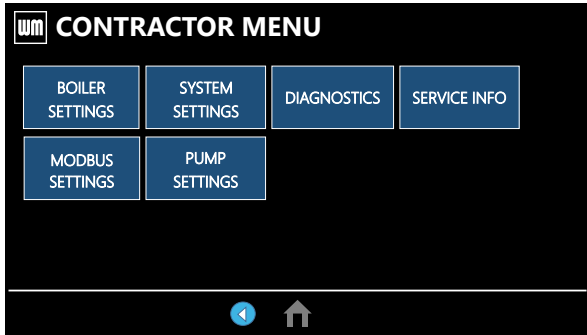
PUMP SETTINGS Menus

⚠ 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 102 ECO Tec PUMP SETTINGS options



MENU Item	DESCRIPTION
FREEZE PROTECT CIRCS	<ul style="list-style-type: none"> 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.
CIRCULATOR EXERCISING	<ul style="list-style-type: none"> 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 PROTEZE CIRCS	<ul style="list-style-type: none"> 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.

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



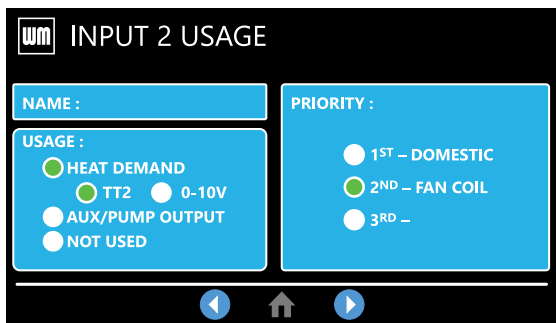
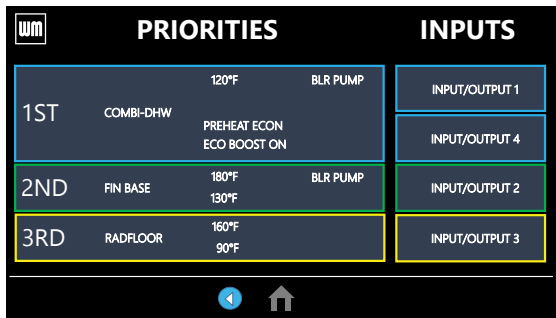
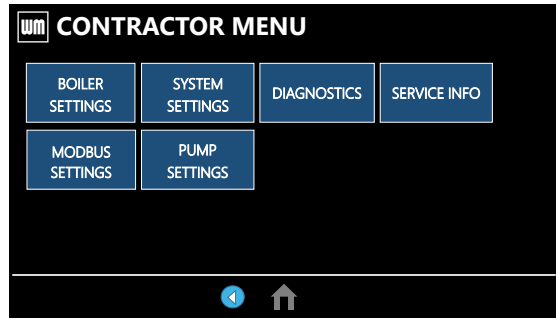
System Settings



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 103 System Settings menu options



MENU Item	DESCRIPTION
INPUTS	<ul style="list-style-type: none"> • Press on any of the Input squares to navigate to the Input assignment screen. Assign priorities to inputs and the Input 2 Source (TT Input or 0-10v). • Custom name will appear above Input/output # when a name is entered. • See page 125 (Configure Inputs and Outputs).
PRIORITIES	<ul style="list-style-type: none"> • 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 #. • See page 118 (Boiler Priority menus).



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



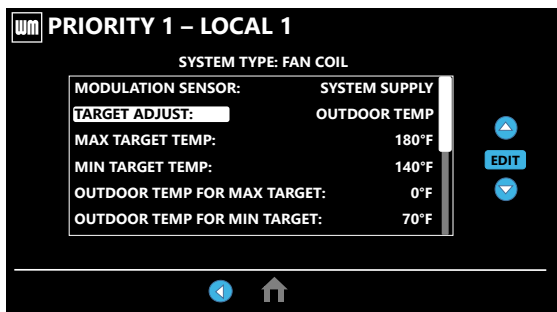
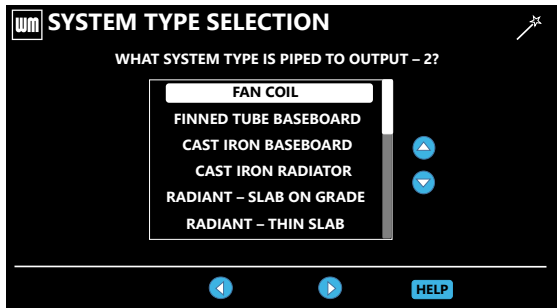
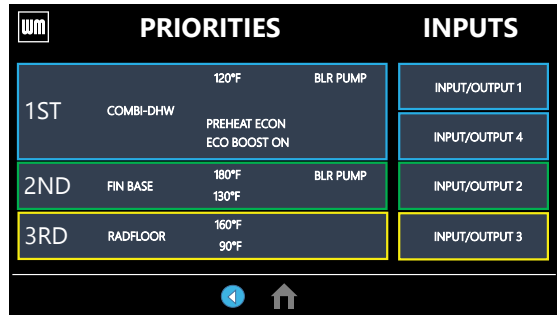
Boiler PRIORITY Menus



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 104 ECO Tec Boiler PRIORITY options



MENU Item	DESCRIPTION
SYSTEM TYPE	<ul style="list-style-type: none"> Select the system type for this PRIORITY, based on the heating terminal units in the system (see Figure 111, page 124). 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.
TARGET MODULATION SENSOR	<ul style="list-style-type: none"> 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 or Network Priorities.
TARGET ADJUST	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.



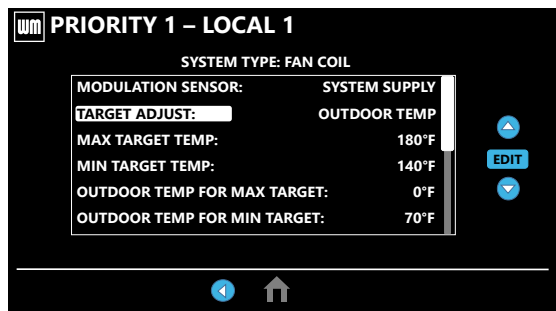
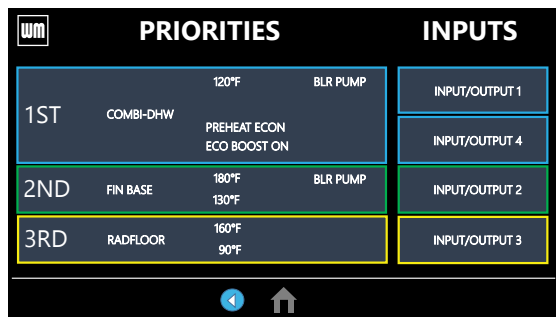
Boiler PRIORITY Menus (continued)



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 105 ECO Tec Boiler PRIORITY options



MENU Item	DESCRIPTION
VOLTAGE FOR MIN TARGET	<ul style="list-style-type: none"> 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.
COLD START ERROR	<ul style="list-style-type: none"> 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. NOTE: Not adjustable on Combi or Network Priorities.
HOT WATER TEMP	<ul style="list-style-type: none"> Set target temperature to the required Combi water temperature for the application according to design with mixing valve.
COMBI ENABLED*	<ul style="list-style-type: none"> 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 & 3 to service calls for heat.
DHW ON DIFF*	<ul style="list-style-type: none"> The DHW Outlet temperature must fall below the Hot Water Temp minus this value in order to proceed to ignition.
DHW OFF DIFF*	<ul style="list-style-type: none"> If the DHW Outlet temperature exceeds the Hot Water Temp plus this value, the burner will shut off.
PREHEAT MODE*	<ul style="list-style-type: none"> Select the mode of PREHEAT, between Off, Economy and High Performance.
PREHEAT TEMP*	<ul style="list-style-type: none"> 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.
PREHEAT CIRC DIFF*	<ul style="list-style-type: none"> 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.
PREHEAT ON DIFF*	<ul style="list-style-type: none"> 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.
PREHEAT OFF DIFF*	<ul style="list-style-type: none"> 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.
ECO BOOST*	<ul style="list-style-type: none"> 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.
ECO BOOST SETPOINT *	<ul style="list-style-type: none"> This setpoint is the temperature that will be driven to by the ECO BOOST.
ECO BOOST ON DIFF*	<ul style="list-style-type: none"> 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.
ECO BOOST OFF DIFF*	<ul style="list-style-type: none"> 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.

* Settings are for combi models only.

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





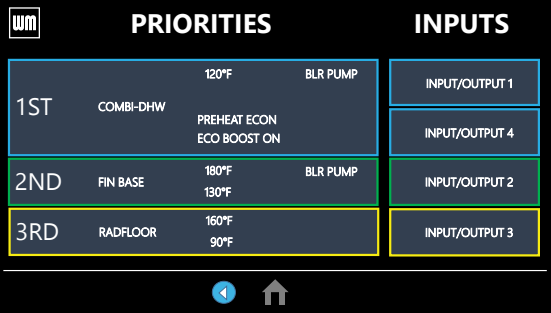
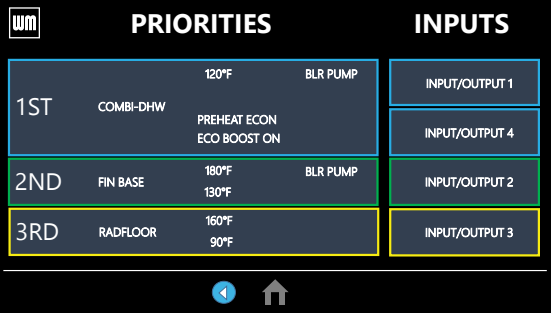
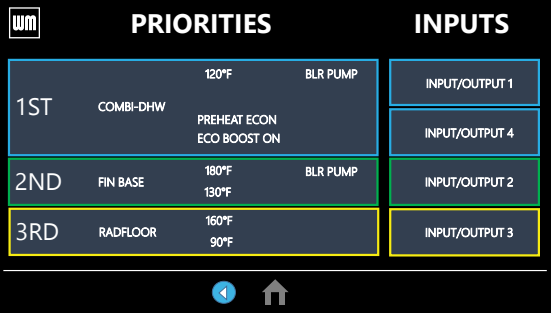
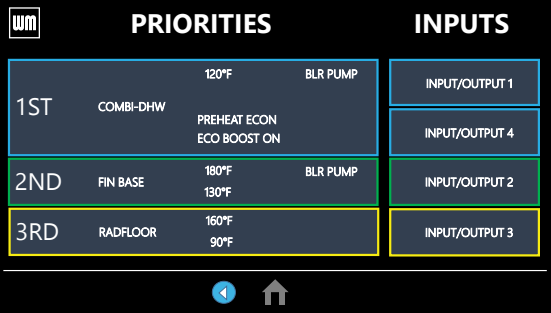
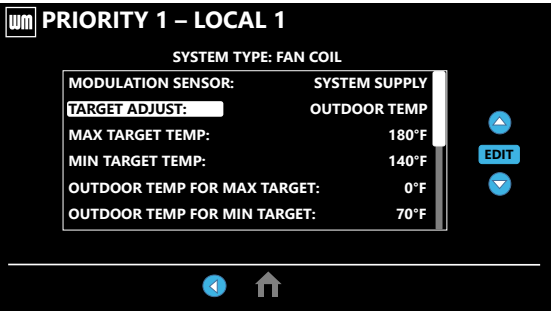
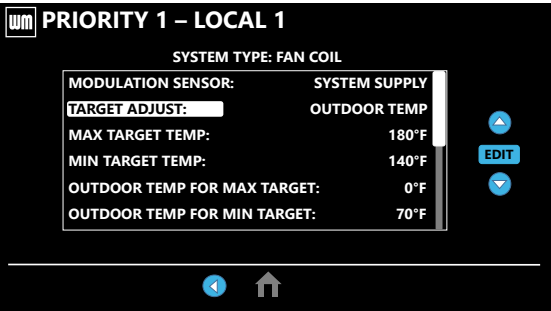
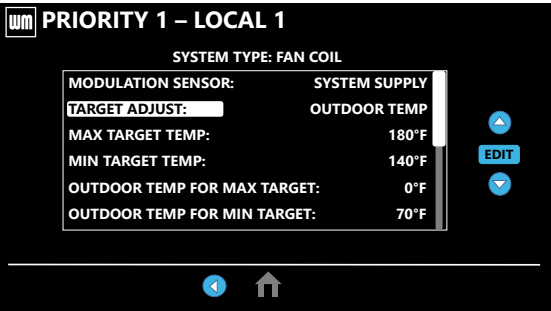
Boiler PRIORITY Menus (continued)



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 106 ECO Tec Boiler Priorities and Inputs

MENU ITEM	DESCRIPTION
	<p>BOOST TIME</p> <ul style="list-style-type: none"> • Every time the call for heat surpasses this duration of time the target temp will increase (boost) up 10°F to a maximum temperature of MAX TARGET TEMP.
	<p>SYSTEM OFF DIFF</p> <ul style="list-style-type: none"> • This is the amount the temperature must rise above system target to turn the boiler(s) OFF.
	<p>SYSTEM ON DIFF</p> <ul style="list-style-type: none"> • This is the amount the temperature must drop below system target to begin network modulation routine. (This line may NOT appear, depending on TARGET ADJUST setting.)
	<p>MAX BLR TEMP</p> <ul style="list-style-type: none"> • If the boiler outlet temperature approaches [MAX BOILER TEMP – BOILER ON DIFF] before the system supply temperature reaches its target, the control will modulate the boiler based on the boiler outlet temperature. The boiler will cycle and modulate based on the boiler ON and OFF differential settings. (This line does NOT appear if Target Mod Sensor is set to Boiler Out).
	<p>BOILER ON DIFF</p> <ul style="list-style-type: none"> • This is the amount the temperature must drop below target (or Boiler Max) to turn the boiler ON.
	<p>BOILER OFF DIFF</p> <ul style="list-style-type: none"> • This is the amount the temperature must rise above target (or Boiler Max) to turn the boiler OFF.
	<p>MAX ON TIME</p> <ul style="list-style-type: none"> • Maximum time boiler will run on this priority if it is being asked to run on another priority. Will rotate among all priorities its being asked to run. Network boilers are also controlled by NET MAX ON TIME . • NETWORK PRIORITY 1 only — Maximum time master will operate the network on NETWORK PRIORITY 1 if NETWORK PRIORITY 2 is calling for heat. • NOTICE When the master boiler detects a local call for heat from any boiler that is currently operating for a network demand, the master control will allow that boiler to switch to its local priority and replace the lost network energy of that boiler appropriately.

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



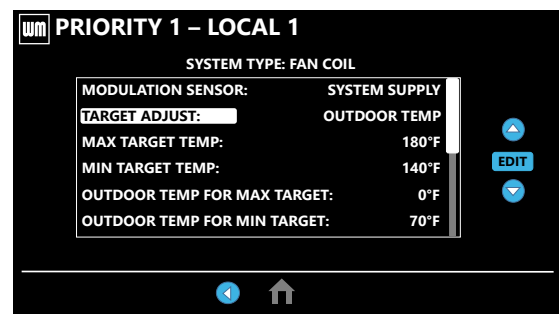
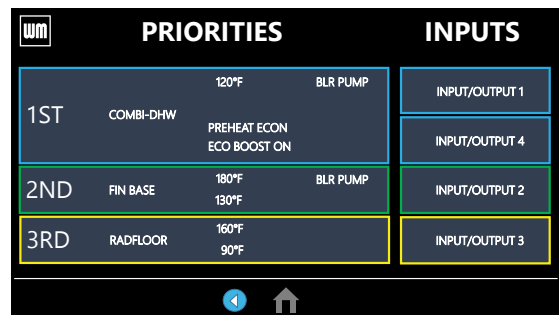
Boiler PRIORITY Menus (continued)



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 107 ECO Tec Boiler PRIORITY options



MENU ITEM	DESCRIPTION
MIN ON TIME	<ul style="list-style-type: none"> • Minimum time the boiler will run on an existing priority before switching to a lower priority, or back to an existing higher priority. If a new higher priority is called during MIN ON TIME, the boiler will immediately switch to actively heat the higher priority. Network boilers are also controlled by NET MIN ON TIME. • NETWORK PRIORITY 2 only — Minimum time master will operate on a network priority 2 if network priority 1 is calling for heat.
RUN 120V BOILER PUMP	<ul style="list-style-type: none"> • Selects whether the Boiler Pump is turned on while running on this priority.
RUN AUX PUMP/OUTPUT	<ul style="list-style-type: none"> • When set to YES, input/output pairs on any network boiler assigned as AUX PUMP/OUTPUT -> ANY TT INPUT BY ITS PRIORITY, will activate. Set this to NO for priorities that do not need this AUX PUMP/OUTPUT to be active.
PRE PUMP	<ul style="list-style-type: none"> • Time associated PUMPS and AUX PUMP/OUTPUT are run before entering prepurge.
POST PUMP	<ul style="list-style-type: none"> • Time associated PUMPS and AUX PUMP/OUTPUT are run after the call for heat has ended and before switching to another call for heat.
MAX RATE	<ul style="list-style-type: none"> • Maximum rate this boiler will modulate up to while running on this priority. • These are only adjustable for single/local priorities, and network boiler rates should be adjusted in the Network Settings menu.
MIN RATE	<ul style="list-style-type: none"> • Minimum rate this boiler will modulate down to while running on this priority. • These are only adjustable for single/local priorities, and network boiler rates should be adjusted in the Network Settings menu.

4

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



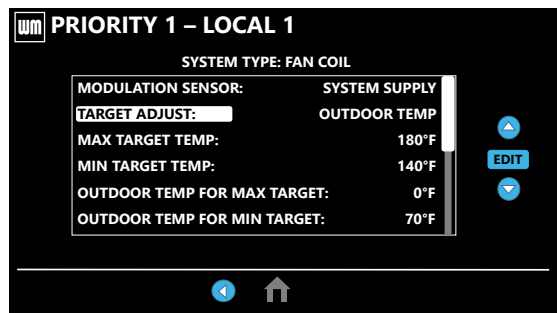
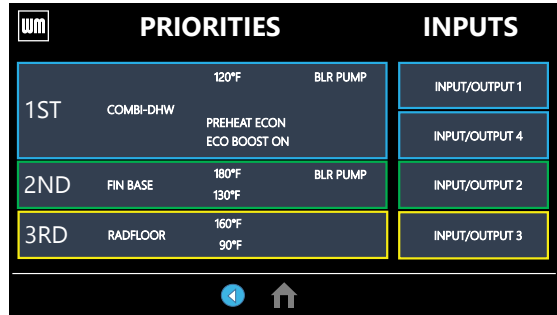
Boiler PRIORITY Menus (continued)



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 108 ECO Tec Boiler Priorities and Inputs



MENU Item	DESCRIPTION
ADD'L HEAT DEMAND ACTIVATE CONTACT	<ul style="list-style-type: none"> • If this is set to 1st: Immediately on a call for heat, the heat demand contacts close and the RESPONSE TIME timer starts. If the call for heat from this demand is still active at the end of the Response Time and the system has not reached [Target Temp - System On Diff], the boiler system will start. If the system temperature is within this range, the boiler system will not start unless the temperature drops below this value. The Add'l Heat Demand contact opens when the heat demand turns off. • If this is set to 2nd: The boiler system starts immediately on a call for heat and starts the RESPONSE TIME timer. If the call for heat is still active when the RESPONSE TIME expires, the boiler will close its additional heat demand contact. • If this set to ODT: The boiler system will start based on the Outdoor Temperature, the activate contact below setpoint and the Outdoor Temp setpoint valve. • Timers reset when priorities are switched. • NETWORK PRIORITY 1 or 2 — The additional heat demand must be wired to the master boiler. • LOCAL PRIORITY 1 or 2 — The additional heat demand must be wired to the individual boiler. A master boiler cannot use additional heat demand on a local priority.
RESPONSE TIME	<ul style="list-style-type: none"> • Time to wait for system to respond before taking the Activate Contact action. If ACTIVATE CONTACT is OFF, this line does not appear.
TEMP DEPENDENT	<ul style="list-style-type: none"> • Selecting YES will require the System Supply Temperature to be below the Target temperature before it will activate the Additional Heat Demand contacts. Selecting YES will also activate the 0-10v output along side the contacts. Selecting NO will disregard System Supply Temperature and activate AHD contacts strictly according to the Activate Contact setting. NOTE: If no valid System Supply and Return sensor pair are detected the Temp Dependent YES setting cannot be used and the contact will be disabled until a valid sensor pair is detected.
OUTDOOR TEMPERATURE SETPOINT	<ul style="list-style-type: none"> • Selecting the outdoor temperature value to be used in conjunction with the Activate Contact Below Setpoint setting. NOTE: A valid outdoor temperature sensor must be detected to use this feature. If one is not detected, this feature will be temporarily disabled until one is found.
ACTIVATE CONTACT BELOW SETPOINT	<ul style="list-style-type: none"> • Select 1st to activate the contact before the boiler when below the Outdoor Temperature Setpoint and after the boiler when above. Select 2nd to activate the contact in reverse order. • Select OFF to disable the output when below the setpoint.
ACTIVATE CONTACT ABOVE SETPOINT	<ul style="list-style-type: none"> • Select 1st to activate the contact before the boiler when above the Outdoor Temperature Setpoint and after the boiler when below. Select 2nd to activate the contact in reverse order. • Select OFF to disable the output when above the setpoint.
MAX RATE VOLTAGE	<ul style="list-style-type: none"> • When blower modulation is at maximum the control will output this voltage from 0-10v output when using Additional Heat Demand.
MIN RATE VOLTAGE	<ul style="list-style-type: none"> • When blower modulation is at minimum the control will output this voltage from 0-10v output when using Additional Heat Demand.

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



Available Control Settings and System Presets

Figure 109 ECO Tec Control / Priority settings

PRIORITY SETTINGS				
PARAMETER NAME	Range/ options	Default setting	COMBI default	UNITS
• ASSIGNED INPUTS	1, 2, 3, 4, 0-10V, FLOW	-	FLOW	-
• SYSTEM TYPE	See System Type Presets	OFF	COMBI DHW	-
• TARGET MODULATION SENSOR	SYSTEM SUPPLY, BOILER OUT, DHW OUT	SYSTEM SUPPLY if detected, Boiler Out if not	DHW OUT	-
• TARGET ADJUST	Outdoor Temp, 0-10V, none	Outdoor Temp (If attached)	None	-
• MAX TARGET TEMP	See System Type Presets	See System Type Presets	N/A	°F
• HOT WATER TEMP (COMBI ONLY)	See System Type Presets	N/A	120	°F
• MIN TARGET TEMP	See System Type Presets	See System Type Presets	N/A	°F
• COMBI ENABLED (COMBI ONLY)	ON, OFF	N/A	ON	-
• OUTDOOR TEMP FOR MIN TARGET	50 - 100	70	N/A	°F
• OUTDOOR TEMP FOR MAX TARGET	-20 to 49	0	N/A	°F
• VOLTAGE FOR MAX TARGET (TARGET ADJUST)	5.0 - 10.0	10.0	N/A	V
• VOLTAGE FOR MIN TARGET (TARGET ADJUST)	0.0 - 4.9	0.0	N/A	V
• TARGET BOOST TIME	OFF, 1 - 240	OFF	N/A	M
• SYSTEM SUPPLY OFF DIFF	5 - 15	10	N/A	°F
• DHW OFF DIFF	1 - 20	N/A	10	°F
• SYSTEM SUPPLY ON DIFF	5 - 30	10	N/A	°F
• DHW ON DIFF	1 - 20	N/A	1	°F
• MAX BOILER TEMP	60-185	Varies with System Type	180	°F
• BOILER OUT OFF DIFF	2 - 15	5	5	°F
• BOILER OUT ON DIFF	2 - 30	5	5	°F
• COLD START ERROR	0 - 150	50	N/A	°F
• MAX ON TIME	OFF, 1 - 240	30	60	M
• MIN ON TIME	OFF, 1 - 240	15	N/A	M
• PREHEAT MODE (COMBI ONLY)	OFF, Economy, High Performance	N/A	Economy	-
• PREHEAT TEMP (COMBI ONLY)	70 - 180	N/A	120 (Econ), 140 (H. Perf)	°F
• PREHEAT CIRC DIFF (COMBI ONLY)	1 - 30	N/A	30 (Econ), 10 (H. Perf)	°F
• PREHEAT ON DIFF (COMBI ONLY)	1 - 30	N/A	10 (Econ), 5 (H. Perf)	°F
• PREHEAT OFF DIFF (COMBI ONLY)	1 - 30	N/A	10	°F
• ECO BOOST (COMBI ONLY)	OFF, ON	N/A	ON	-
• ECO BOOST SETPOINT (COMBI ONLY)	70 - 180	N/A	130	°F
• ECO BOOST ON DIFF (COMBI ONLY)	1 - 30	N/A	10	°F
• ECO BOOST OFF DIFF (COMBI ONLY)	1 - 30	N/A	10	°F
• RUN BOILER PUMP	YES, NO	Yes	Yes (unchangeable)	-
• RUN AUX/PUMP OUT	YES, NO	No	No	-
• PRE PUMP	OFF, 1 - 240	OFF	OFF	S

4



Available Control Settings and System Presets (continued)

Figure 110 ECO Tec Control / Priority settings (continued)

PRIORITY SETTINGS				
PARAMETER NAME	Range/ options	Default setting	COMBI default	UNITS
• POST PUMP	OFF, 1 - 240	30	10	S
• MAXIMUM RATE	11 - 100	100	100	%
• MINIMUM RATE	10 - 99	10	10	%
• ADDITIONAL HEAT DEMAND ACT CONTACT	OFF, 1ST, 2ND, Outdoor Temperature	OFF	N/A	-
• RESPONSE TIME	OFF, 1 - 240	OFF	N/A	M
• TEMP DEPENDENT	YES, NO	NO	N/A	-
• OUTDOOR TEMP SETPOINT	0 - 50	15	N/A	°F
• ACT CONTACT BELOW SETPOINT	1st, 2nd, OFF	1st	N/A	-
• ACT CONTACT ABOVE SETPOINT	1st, 2nd, OFF	OFF	N/A	-

Figure 111 System Type Presets (each option shown with factory settings)

System Type	8-Character Abbreviation	3-Character Abbreviation	Max Target Temp °F	DHW Target °F	OD Reset Min °F	Min Target Temp °F	OD Reset Max °F	Run Boiler Pump	Run AUX PUMP/ OUTPUT
Fan-coil	FAN-COIL	FCL	180	N/A	0	140	70	YES	YES
Finned Tube Baseboard	FIN BASE	FTB	180	N/A	0	130	70	YES	YES
Cast Iron Baseboard	IRONBASE	CIB	180	N/A	0	120	70	YES	YES
Cast Iron Radiators	RADIATOR	CIR	180	N/A	0	120	70	YES	YES
Radiant - slab on grade	RAD SLAB	RSG	120	N/A	0	80	70	YES	YES
Radiant - thin slab	RAD SLAB	RTS	140	N/A	0	80	70	YES	YES
Radiant - below floor (staple up)	RADFLOOR	RSU	160	N/A	0	90	70	YES	YES
Radiant - above floor (sleeper system)	RADFLOOR	RAF	140	N/A	0	90	70	YES	YES
Domestic Hot Water	DOMESTIC	DHW	180	N/A	N/A	N/A	N/A	YES	NO
Combi DHW	COMBI	DHW	N/A	120	N/A	N/A	N/A	YES	NO
Custom (user defined)	XXXXXXXX (user input)	first three of user input	180	N/A	0	70	70	YES	YES



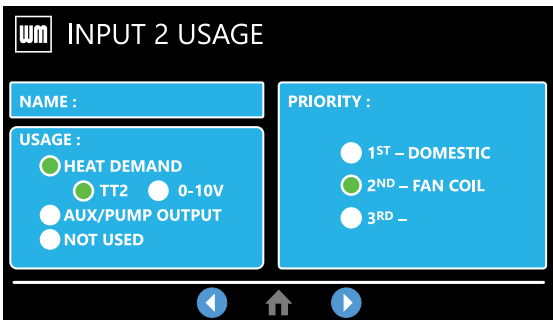
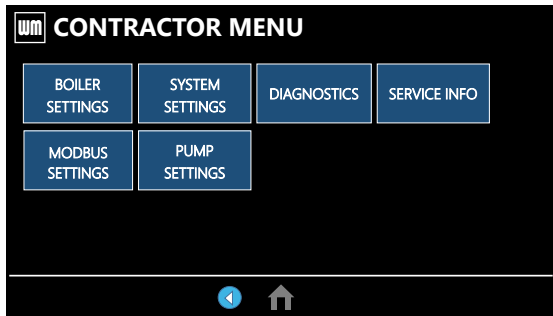
Configure Inputs and Outputs



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.

Figure 112 Usage and Priorities



MENU Item	DESCRIPTION
NAME	<ul style="list-style-type: none"> • Give a name to the input/output you are assigning to help clarify the use of this priority for future reference.
USAGE	<ul style="list-style-type: none"> • Assign whether the input is used for a Heat Demand, Aux/pump output, or not used.
PRIORITIES	<ul style="list-style-type: none"> • Assign which priority this input is linked to.



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 113 AUX PUMP/OUTPUT operation

Option	Activation conditions	Suggested uses
ALWAYS ON	<ul style="list-style-type: none"> Output is always energized whenever the control is powered. 	<ul style="list-style-type: none"> Hot loop for seasonal boilers that are manually shut down at end of season and started up at start of heating season.
EXTERNAL SWITCH	<ul style="list-style-type: none"> The output is energized on closure of an external switch wired to this input and is de-energized when the external switch opens. 	<ul style="list-style-type: none"> 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.).
OUTDOOR BELOW WWSD	<ul style="list-style-type: none"> This output is energized only when outdoor temperature is below the WWSD setting (see BOILER SETTINGS menu). 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. 	<ul style="list-style-type: none"> 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.).
ANY INPUT	<ul style="list-style-type: none"> The assigned output is energized if there is an input closure on this boiler. The assigned output will de-energize once there are; no input on this boiler, post-purge has finished and post-pump time has expired. If the closed input is configured for a heat demand, its output will de-energize after post-purge and post-pump. 	<ul style="list-style-type: none"> Energize a system pump relay if pump must run during all heating calls.
INPUT PRIORITY SETTINGS	<ul style="list-style-type: none"> The assigned output is energized: <ul style="list-style-type: none"> If there is an input closure on this boiler. ... and ... <ul style="list-style-type: none"> RUN AUX PUMP/OUTPUT is set to YES for the priority assigned to the closed input. 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. 	<ul style="list-style-type: none"> Energize a system pump relay if pump must run only on some heat calls (such as systems with locally-connected DHW heating).
SYSTEM DAMPER	<ul style="list-style-type: none"> The assigned output is energized when the boiler receives a call for heat and starts to pre-purge. The assigned output is de-energized once the burner is off and post-purge is complete. Energizes any time any boiler on the network receives a heating demand or AHD is activated. 	<ul style="list-style-type: none"> Use for interlocking with combustion air damper, flow switch, etc.
LOCAL DAMPER	<ul style="list-style-type: none"> The assigned output is de-energized once the burner is off and post-purge is complete. Only activates if this boiler is attempting to fire. 	<ul style="list-style-type: none"> Use for interlocking with combustion air damper, flow switch, etc.

Figure 114 SYSTEM/LOCAL DAMPER operation — start, run and stop, based on boiler status

Option	Standby	TT Closed	Pre-Pump	Pre-Purge	Burner Running	Post-Purge	Post-Pump	Standby	Comments
ANY INPUT OR INPUT PRIORITY SETTINGS	off	ON	→					off	See Figure 113 for explanation of differences between the ANY TT INPUT options.
SYSTEM/LOCAL DAMPER	off	off	off	ON	→		off	off	



DIAGNOSTIC Menu

Figure 115 DIAGNOSTICS menu

Menu/Item	Comment
Temperatures	
Status	Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble
Boiler Out1	Temperature of the first sensing element of the boiler's heat exchanger outlet sensor
Boiler Out2	Temperature of the second sensing element of the boiler's heat exchanger outlet sensor
DHW Out1	Temperature of the first sensing element of the boiler's Combi DHW outlet sensor
DHW Out2	Temperature of the second sensing element of the boiler's Combi DHW outlet sensor
Boiler In	Temperature of the boiler's heat exchanger inlet sensor
System Supply	Temperature of the system water after the boiler loop
System Return	Temperature of the system water returning to the boiler loop
Flue1	Temperature of the first sensing element of the boiler's flue gas sensor
Flue2	Temperature of the second sensing element of the boiler's flue gas sensor
Outdoor	Temperature of the remote outdoor air temperature sensor
Target Temperature	Current target temperature of the active priority.

Inputs	
Status	Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble
Input 1	Call for heat status on Input 1
Input 2	Call for heat status on Input 2 (Input 2 can be TT1 or 0-10VDC input)
Input 3	Call for heat status on Input 3
Input 4	Call for heat status on Input 4
0-10V	Voltage input for target adjust or modulation
Manual Limit	External manual limit on low voltage terminal strip
Auto Limit	External auto limit on low voltage terminal strip
Low Wtr Cutoff	Low water cutoff device (inside boiler jacket)
Air P-Switch	Limit device (inside boiler jacket) that will shut off the boiler if flue pressure becomes too high
Closure Switch	J18 jumper circuit closed or open (flow switch, CAD, etc.)
Blower Speed	Feedback from blower
Flame Signal	Number indicating the presence and quality of the flame used to shut down or boost the boiler
DHW Flow	Approximate gallons per minute water flow passing through the Combi brazed plate.

Outputs	
Status	Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble
Gas Valve	Control's gas valve circuit status
Circulator 1	Control's circulator 1 relay status
Circulator 2	Control's circulator 2 relay status
Circulator 3	Control's circulator 3 relay status
Circulator 4	Control's circulator 4 relay status
Boiler Circ	Boiler's circulator
Blower Signal	Control's signal controlling the blower speed
Additional Heat Demand	Additional heat demand contact status
Alarm	Alarm contact status



DIAGNOSTICS Menu (continued)


Figure 116 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 of the last factory reset performed
Last Power Cycle:	Shows the time/date stamp of the last known power cycle
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.
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

4



DIAGNOSTICS Menu (continued)

<p>Manual Test Mode</p>	
<p>Status</p>	<p>Current operating status of the boiler. Prepurge, Ignition, Name of the system Type being satisfied, post purge, Warm Weather Shut down, Trouble</p>
<p>Inputs</p>	<p>Displays which inputs are presently calling for heat</p>
<p>Target Temp</p>	<p>Calculated target temperature based on outdoor temp or the max target if no ODR</p>
<p>Modulation</p>	<p>Displays what sensor the boiler is using to modulate from. May also indicate reason for boiler rate self-limiting.</p>
<p>Boiler Out</p>	<p>Temperature of the outlet sensor on the boiler heat exchanger</p>
<p>Boiler In</p>	<p>Temperature of the inlet sensor on the boiler heat exchanger</p>
<p>System Supply</p>	<p>Temperature of the system water after the boiler loop</p>
<p>System Return</p>	<p>Temperature of the system water returning to the boiler loop</p>
<p>Flue</p>	<p>Temperature of flue gases</p>
<p>Outdoor</p>	<p>Temperature of outdoor air</p>
<p>Blower Signal</p>	<p>Control's signal controlling the blower speed</p>
<p>Blower Speed</p>	<p>Blower's feedback to the control</p>
<p>Flame Signal</p>	<p>Number indicating the presence and quality of the flame used to shut down or boost the boiler</p>
<p>DHW Out/Flow</p>	<p>Temperature of the boiler's DHW outlet sensor and approximate flow in gallons per minute passing through the Combi brazed plate</p>
<p>Force Rate</p>	<p>Used to manually force a rate during a call for heat. Choose auto for normal operation</p>
<p>Manual Reset</p>	<p>Reset selected condition</p>

SERVICE Menus

Figure 117 SERVICE menus — navigation

Service Info	Comment
Name	Contractor name to appear in maintenance reminders and during lockouts
Phone	Contractor phone number
Model	Displays the boiler model selected in the boiler setup
CP Number	Enter the CP# of the boiler
Installed	Enter the date the boiler was installed
Last Maintenance Performed	Date automatically entered when Reset Reminder is chosen by contractor
Next Maintenance Due	Date automatically calculated when Reset Reminder is selected by contractor
Interval Settings	Contractor selects maintenance reminder frequency based on service history
Reset Reminder	Contractor selects this to update Last maintenance Date and Next Date. Homeowner uses this to ignore the reminder and update only the Next Date.
Last Calibration Date	Displays date of last calibration performed.

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.

Startup - Fill the System

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.

⚠ WARNING

- 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.

⚠ WARNING

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 WM Technologies as suitable for use with **ECO Tec** Gas Boilers. See **Figure 152, page 171** for information to obtain antifreeze through a WM Technologies 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 165, page 184**.
 - 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.
 - c. Operating pressure should be no higher than 80% of the relief valve setting for most systems. Operating pressure must never exceed 50 PSIG, when using as shipped, 30 psig relief valve.
4. For combi models only, purge domestic water up to cold water inlet by flushing water out the drain valve (**Figure 59, page 50, 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 157** 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.

⚠ WARNING

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 56**). 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.

Startup - Fill The System (continued)

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 the **Replacement Parts** section for ordering information.
2. After filling the system as directed in these instructions, fill with the X100 aerosol, following the instructions on the 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.com for suggested guidelines to determine how much inhibitor to use.

Check/Verify Water Chemistry

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.

⚠ WARNING

Test antifreeze concentration at least annually. If concentration is low, add antifreeze or drain system and refill with correct mixture.

6. Follow instructions on antifreeze container to determine the amount of antifreeze needed. **DO NOT** exceed 50% by volume concentration of antifreeze.
7. Follow the instructions on the Sentinel test kit to sample the system water and verify inhibitor concentration.
8. Check inhibitor level after adjustments are made. Check concentration annually.

Part number 550-100-596/1225

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 WM Technologies for use with this boiler. See page 171 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 WM Technologies.

NOTICE

WM Technologies 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 back flow preventer or actual disconnection from city water supply.

Startup - Final Checks

⚠ WARNING

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.**

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.

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 65](#) for low voltage terminal locations and application information). Mark the wires before removing to avoid wiring errors when re-connecting 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 a ground to ensure no voltage is being feed back into the boiler's control module.
3. **There should NEVER be a voltage reading when external devise 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.

Inspect/Fill Condensate System

Inspect/check condensate lines and fittings

Inspect the condensate drain line, condensate PVC fittings and condensate trap. (See [page 63](#) for component locations.)

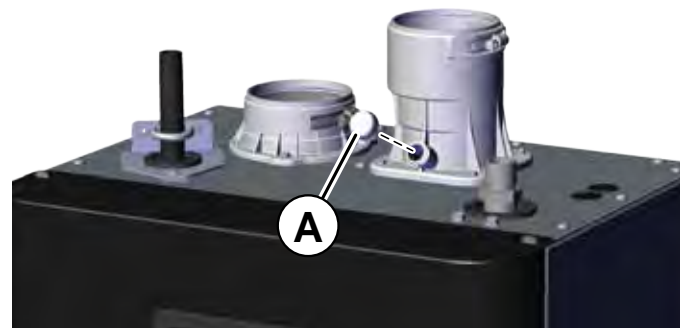
Fill Condensate Trap with Water

1. Remove test port cap (A) on vent adapter (see [Figure 118](#)).
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.

⚠ 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.

Figure 118 Test port cap



Startup - Final Checks (continued)

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 119, page 134](#).
3. If this is the first time powering the boiler, please refer to the Control section of this manual starting on [page 84](#). 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 24](#) ?
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 159](#) .

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 [page 130](#) and [page 131](#) 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

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 64](#) 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 19](#) for ECO Tec 80, 110, 150 or 199. Boilers are shipped ready to operate on natural gas ONLY.

⚠ 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.

Check Blower and Control Setting for Blower for 199 Boiler

Only: Model 199 boilers have an additional setting of Blower Type. Check the blower's label for model information (see [Figure 158, page 177](#) for label location) and confirm that model is selected on the Boiler Settings Blower Model screen. The boiler comes from the factory with the correct boiler model and blower setting. A factory reset, control replacement, and/or blower replacement will require this verification (See 'Model Selection' on [page 115](#) for blower settings on display).

NOTE: If your Eco Tec Series 3 199 does not have an option to select blowers, please update the software via the Pro Tools App.

⚠ WARNING

Ensure appropriate model is selected. Failure to do so can 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 [Figure 125, page 145](#) and [Figure 126, page 146](#). If not, adjust as necessary. Then navigate to DIAGNOSTICS — Manual test mode (see [Figure 116, page 128](#)) 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, for test port location see [Figure 118, page 132](#).
6. Test for CO₂ (or O₂) and for CO. The CO₂ values must comply with [Figure 121, page 136](#). If results are acceptable, proceed to [Step 7](#). **IF NOT**, follow the instructions under the "Gas Valve Adjustment" section on [page 135](#) or [page 136](#) to set the throttle screw and offset regulating screw position. See **WARNING** on [page 135](#) upper left.

CONTINUED AFTER NEXT PAGE



Startup - Final Checks (continued)

Figure 119 Operating instructions (WARNING -Verify that the control is set for the correct boiler model before proceeding.)

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

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

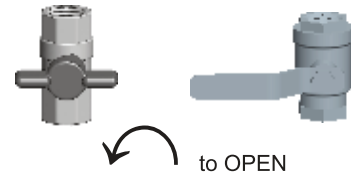
OPERATING INSTRUCTIONS

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. Remove the boiler Door.
6. Locate boiler manual gas valve (in the gas piping connected to the boiler).
7. Turn boiler manual gas valve handle counterclockwise ↺ to OPEN gas supply.
8. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor.
9. 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.
10. Turn ON all electrical power to the appliance including the switch located on Boiler's internal automatic gas valve.
11. Set thermostat(s) to desired setting.
12. 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.
13. 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.
14. Reinstall the boiler door.

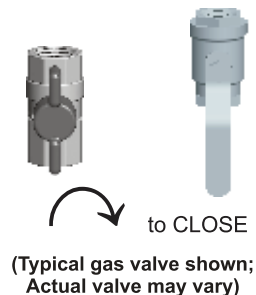


(Off Position Shown)

Gas valve CLOSED



Gas valve OPEN



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. Remove the boiler door.
4. Turn boiler manual gas valve knob clockwise ↻ to close gas supply.
5. Reinstall the boiler door

Startup - Final Checks (continued)

WARNING

If combustion at either high or low fire is outside the range given in **Figure 121, page 136**, follow the procedure starting on this page for adjusting the gas valve. If adjustment does not correct the problem, then shut down the boiler and contact your local WM Technologies 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 116, page 128**) 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 116, page 128**) and force the firing rate to AUTO (normal operation).
12. Reinstall the vent flue cap and ensure its sealed.

WARNING

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.

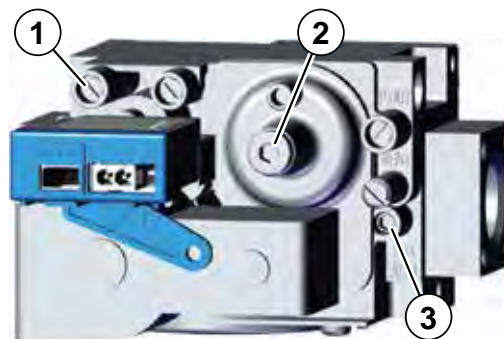
Gas Valve Adjustment

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 121, page 136**. Must confirm correct low fire RPM before making any adjustments to Offset regulating screw.

1. Display bracket will need to be moved to access gas valve. Once the 2 screws are removed from the display bracket, the display bracket can be hung on the control panel cover. Ensure that the display cable wire does not snag or get pulled tight.
2. Boiler behavior that might indicate a need to check combustion values at high fire (as per **page 133**) 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 120** for location of the throttle screw.

Figure 120 Throttle and Offset Regulating screw (ONLY for use by a qualified technician, using calibrated combustion test instruments)



- 1) Gas Inlet Pressure Test Port
- 2) Offset Regulating Screw; Note: Must remove cover.
 - Turn clockwise ↻ to increase CO₂.
 - Turn counter-clockwise ↺ to decrease CO₂.
- 3) Throttle adjustment screw
 - Turn counter-clockwise ↺ to increase CO₂.
 - Turn clockwise ↻ to decrease CO₂.

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 116, page 128**). After forcing the boiler to HIGH FIRE insure the BLOWER SPEED has achieved the RPM listed on **Figure 125, page 145, Figure 126, page 146** or **Figure 127, page 147**. Take CO₂ and CO readings and adjust gas valve accordingly to **Figure 120** and **Figure 121** allowing adequate time for the combustion analyzer to stabilize.



Startup - Final Checks (continued)

Figure 121 Acceptable combustion values — measured values must be within the ranges given below

Boiler model	Fuel	High fire		Low fire	
		% CO ₂	CO ppm	% CO ₂	CO ppm
80	NG	9.25 ± 0.5	< 130	8.75 ± 0.5	< 50
	LP	10.50 ± 0.5	< 150	10.15 ± 0.5	< 50
110	NG	9.25 ± 0.5	< 130	8.75 ± 0.5	< 50
	LP	10.50 ± 0.5	< 150	10.15 ± 0.5	< 50
150	NG	9.25 ± 0.5	< 130	8.80 ± 0.5	< 50
	LP	10.50 ± 0.5	< 150	9.90 ± 0.5	< 50
199	NG	9.25 ± 0.5	< 130	9.00 ± 0.5	< 50
	LP	10.50 ± 0.5	< 150	10.40 ± 0.5	< 50

- 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. See **Figure 128, page 148** for additional CO₂ parameters at High Altitudes
- The low fire CO₂ must be lower than the high fire CO₂ values.

CAUTION

Adjust the throttle adjustment screw in small movements.

- If the CO₂ is HIGH, turn the throttle screw (2.5mm Allen Head) **CLOCKWISE** to lower the input. Allow the boiler to stabilize and take another reading. Continue until the desired CO₂ value is achieved.
- If the CO₂ is LOW, turn the throttle screw (2.5mm Allen Head) **COUNTERCLOCKWISE** to increase the input. Allow the boiler to stabilize and take another reading. Continue until the desired CO₂ value is achieved.
- Confirm that the CO is within limits.

Low Fire

- Adjust the boiler to (LOW) (minimum output) and allow the boiler to stabilize. Confirm the rpm value during operation with the table on **Figure 125, page 145, Figure 126, page 146** or **Figure 127, page 147**.
- Remove the 4mm Allen Head cap, see **Figure 120, page 135**, for Offset screw adjustment.
 - 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.
 - 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.
 - Confirm that the CO is within limits.
 - Reinstall the 4mm Allen Head cap when adjustment is complete.

Re-check the Maximum and Minimum CO₂ and CO rate

- 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.
- 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.
- In the event that the CO₂ and CO cannot be obtained, please contact your WM Technologies representative.
- Replace test port cap (A), see **Figure 118, page 132**.
- Should you require any assistance during the set up procedure contact your WM Technologies Technical Services if the problem cannot be addressed with the information provided in this manual.

Check Ignition System Safety Shutoff Device

- After the boiler has been installed, turn off the boiler.
- Shut off the manual gas valve located on the gas line to stop flow of fuel to the boiler.
- 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.
- Clear the Lockout condition by selecting "Manual Reset" on the Homeowner screen menu.
- 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

- Operate the boiler on HIGH fire.
- 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.
- 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.
- If there is any indication of a leak at any joint, immediately shut down the boiler.
 - If possible, tighten the retaining screws or nuts (without over-tightening).
 - If this does not correct the problem, disassemble the components where the leak appeared. Use the procedures given in **Maintenance**.
 - When disassembling components, inspect gaskets to see if there is damage. Replace any damaged gasket.
 - Contact your WM Technologies Technical Services if the problem cannot be addressed with the information provided in this manual.

Startup - Final Checks (continued)

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 105, page 119**) 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 maybe 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 130**?
- 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 19** 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 119, page 134**?
- Burner flame and combustion verified per **page 133**?
- 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.)

NOTICE

Fill out start-up data on the Installation and Service Certificate, **page 186**.

- 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 135**)
- 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 24**, 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 49** and information in the paragraph at the top of this page, and that the control is adjusted properly according to procedure on **page 119** for Control adjustment procedure.
- All instructions shipped with this boiler reviewed with owner or maintenance person?

Before Leaving:

- Fill in **Installation certificate, page 186**.
- Return instructions to envelope and give to owner or place inside boiler housing.



Annual Startup and General Maintenance



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 122 Service and maintenance schedules

Service technician (see page numbers indicated for details)		Owner maintenance (see User's Information Manual)				
4	ANNUAL START-UP (See First-year special inspection)	• Address Reported Problems	140	Daily	• Check boiler area.	
		• Inspect Boiler Area	140		• Check air openings.	
		• Inspect Boiler Interior & Jacket Door Gaskets	140		• Check pressure/temperature gauge.	
		• Clean Condensate Trap	140	Monthly	• Verify boiler jacket door is securely in place.	
		• Check all Piping for Leaks	140		• Check vent piping.	
		• Check Air Openings	141		• Check air piping.	
		• Flue Vent System and Air Piping	141		• Check relief valve.	
		• Check Water System.	141		• Check condensate drain system.	
		• Check Expansion Tank(s)	141		• Check automatic air vents (if used).	
		• Inspect Ignition Electrode	141		Every 6 months	• Verify that domestic hot water is being supplied to fixtures at the correct temperature.
		• Check Ignition Wiring	142			• Check boiler piping (gas and water)
		• Check All Boiler Wiring.	142			• Operate relief valve.
		• Check Control Settings.	142			
		• Perform Startup And Checks.	142			
		• Check Low Water Cutoff	142			
		• Check Burner Flame	142			
		• Check Flame Signal	142			
		• Check Blower Speeds	142			
		• Natural and propane gas firing rates and corresponding blower. .	145			
		• Propane gas firing rates and corresponding blower speeds. . .	146			
		• 199 NG & Propane firing rates and blower speeds.	147			
		• Check Flue Gas Temperature	143			
		• Manual Test Mode for Boilers	143			
		• 3 Way Valve Test (Combi Model Only).	143			
		• Check Inlet Gas Pressure	143			
		• Check Internal Circulation Pump.	143			
		• High Altitude	143			
		• Check Boiler Relief Valve	144			
		• Review with Owner.	144			
		• Reinstall Jacket Door After Servicing	144			
Combi Models Only:						
• Check Combi 3-way Valve, DHW Function and Brazed Plate . .	144					
• Clean DHW Brazed Plate	144					
• Clean DHW External Filter and Internal Combi Manifold Filters	144					
• Check DHW Temperatures	144					

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**. 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 150**, 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 151**.
 - f. Make sure to follow the inspection procedure given in “Check exchanger and vent seals,” **page 136**.
 - g. Disconnect the condensate trap and drain lines. Inspect, then flush thoroughly. Reinstall and refill the trap per **page 132**.
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 25**, 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)

⚠ WARNING

- The boiler should be inspected and started annually, at the beginning of the heating season, only by a qualified service technician. In addition, the maintenance and care of the boiler designated in **Figure 122, page 138** and explained on the following pages must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.
- Electrical shock hazard — Turn off power to the boiler before any service operation on the boiler except as noted otherwise in this instruction manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury or death.

Address Reported Problems

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 25** 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.

⚠ WARNING

Jacket door gaskets must be intact, and must provide a reliable seal. Replace any damaged gasket.

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.

⚠ WARNING

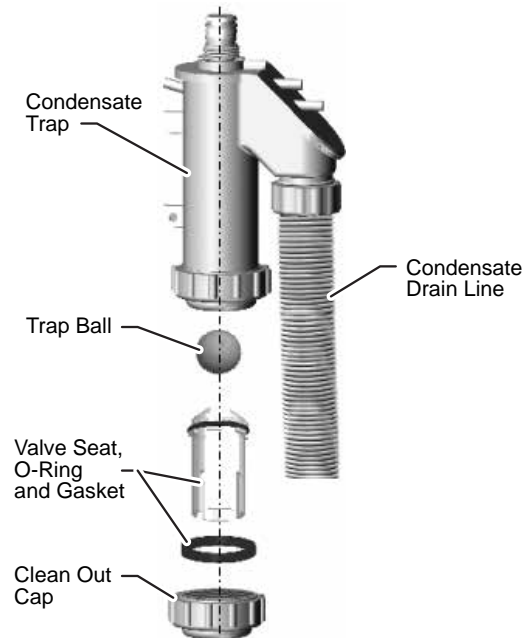
Do not use solvents to clean any of the boiler components. The components could be damaged, resulting in unreliable or unsafe operation.

Clean Condensate Trap

1. For cleaning condensate trap, see **Figure 123**.
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 123**). 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.
6. Re-assemble trap assembly. Re-install all lower gaskets.
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 132** 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.

Figure 123 Condensate trap cleaning



Check all Piping for Leaks

⚠ WARNING

Eliminate all system or boiler 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. Leaking water may also cause severe property damage.

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 64**.

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

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.
4. Inspect automatic air vents and air separators. Remove air vent caps and briefly press push valve to flush vent. Reinstall caps. Make sure vents do not leak. Replace any leaking vents.
5. Check system water chemistry (pH, hardness and inhibitor level). See [page 130](#) and [page 131](#).

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 57](#) 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 153](#)). 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.
- 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 133](#).
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 137](#).

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 139](#) of this manual. Failure to comply could result in severe personal injury.

1. Inspect flame through observation window using the procedure on [page 133](#).
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 151](#).
4. If replacing the burner, ensure the burner gasket is in good condition and correctly positioned. Follow all instructions on [page 151](#) or [page 161](#) 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 WM Technologies.

Check Flame Signal

1. Navigate to Diagnostics/Inputs on the control display (see [Figure 100, page 114](#) for navigation instructions and [Figure 115, page 127](#) for the complete Diagnostics menus).
2. The flame signal value (in micro amps) must be at least the boost value listed in [Figure 124](#). If the flame signal drops below this 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 0.8 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 124 Running flame signal shutdown and boost values

Boiler Model	Flame Signal		Boiler Model	Flame Signal	
	Shut down	Boost		Shut down	Boost
80 NG	1.5	2.0	150 NG	1.5	2.5
80 LP	1.5	2.5	150 LP	1.5	2.5
110 NG	1.5	2.0	199 NG	1.5	2.0
110 LP	1.5	2.5	199 LP	1.5	2.5

3. A low flame signal may indicate a fouled ignition electrode or damaged ignition electrode insulation.
 - a. See Inspect ignition electrode, [page 141](#) 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 reinstallation of the heat exchanger cover plate and other boiler components (see [page 151](#)).
 - 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 100, page 114](#) for navigation instructions and [Figure 116, page 128](#) 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 125, page 145](#) for Natural gas, [Figure 126, page 146](#) for LP propane gas, [Figure 127, page 147](#) for 199 Natural Gas and Propane Gas (LP) 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 125, page 145](#) for Natural gas, [Figure 126, page 146](#) for LP propane gas.
7. Set the firing rate to HIGH (high fire) [Figure 127, page 147](#) for 199 Natural Gas and Propane Gas (LP).

4

Annual Startup (continued)

8. Write down the blower RPM value. It should be within 50 RPM of the value given in **Figure 125, page 145** for Natural gas, **Figure 126, page 146** for LP propane gas, **Figure 127, page 147** for 199 Natural Gas and Propane Gas (LP).
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 151**.
3. If the flue temperature is higher than this, shut down the boiler, allow to cool, and follow the procedure starting on **page 151** to clean the heat exchanger.

Manual Test Mode for Boilers

1. Navigate to Manual Test Mode screen under DIAGNOSTICS menu.
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.

3 Way Valve Test (Combi Model Only)

1. Navigate to Manual Test Mode screen under DIAGNOSTICS menu.
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 138, page 158**. 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 DHW mode (model 199) or Heat mode (models 110/150). The extended position of the shaft is for Heat mode (model 199) or DHW mode (models 110/150). 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 158**, Cleaning & maintenance for Flow Manifold.

Check Inlet Gas Pressure

Check inlet gas pressure to limits on **page 24** and at the gas inlet pressure test port shown in **Figure 120, page 135**.

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

For **Figure 125, page 145** for Natural gas and **Figure 126, page 146** for LP propane gas, **Figure 127, page 147** for 199 Natural Gas and Propane Gas (LP).

HA Note:

For installs at 2500 ft and above, CO2 will have to be manually adjusted. Follow instructions on **page 135** for "Gas valve adjustment" and adjust to CO2 settings based on your GAS and ALTITUDE from **Figure 128, page 148**.

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 WM Technologies 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.

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 55](#) or [page 58](#) 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 143](#).
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 154](#). 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 157](#).

Check DHW Temperatures

Follow the procedure on [page 137](#) 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.



Annual Startup (continued)

Figure 125 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).

Model		110			150		
Fuel Type	Altitude (feet)	%	RPM	BTU/Hr HA Note:	%	RPM	BTU/Hr HA Note:
Low Fire							
NG	0-2,000	10%	1,900	10,200	10%	1,750	15,000
	2,500	10%	2,030	10,200	10%	1,870	15,000
	3,000	10%	2,070	10,200	10%	1,900	15,000
	3,500	10%	2,100	10,200	10%	1,930	15,000
	4,000	10%	2,140	10,200	10%	1,960	15,000
	4,500	10%	2,170	10,200	10%	1,990	15,000
	5,000	10%	2,210	10,200	10%	2,020	15,000
	5,500	10%	2,240	10,200	10%	2,050	15,000
	6,000	10%	2,300	10,200	10%	2,090	15,000
	6,500	10%	2,350	10,200	10%	2,130	15,000
	7,000	10%	2,400	10,200	10%	2,160	15,000
	7,500	10%	2,460	10,200	10%	2,200	15,000
	8,000	10%	2,510	10,200	10%	2,240	15,000
	8,500	10%	2,560	10,200	10%	2,270	15,000
	9,000	10%	2,620	10,200	10%	2,310	15,000
	9,500	10%	2,670	10,200	10%	2,350	15,000
10,000	10%	2,720	10,200	10%	2,390	15,000	
10,500	10%	2,780	10,200	10%	2,420	15,000	
11,000	10%	2,830	10,200	10%	2,460	15,000	
Ignition							
NG	0-2,000	64%	6,100	69,655	48%	4,700	72,302
	2,500	69%	6,570	69,655	52%	5,030	72,302
	3,000	70%	6,690	69,655	53%	5,120	72,302
	3,500	72%	6,810	69,655	54%	5,210	72,302
	4,000	73%	6,940	69,655	54%	5,290	72,302
	4,500	75%	7,060	69,655	55%	5,380	72,302
	5,000	76%	7,190	69,655	56%	5,470	72,302
	5,500	78%	7,310	69,655	58%	5,560	72,302
	6,000	80%	7,410	69,655	58%	5,640	72,302
	6,500	81%	7,520	69,655	59%	5,730	72,302
	7,000	83%	7,630	69,655	60%	5,810	72,302
	7,500	85%	7,730	69,655	61%	5,890	72,302
	8,000	87%	7,840	69,655	62%	5,980	72,302
	8,500	88%	7,940	69,655	63%	6,060	72,302
	9,000	90%	8,050	69,655	64%	6,150	72,302
	9,500	92%	8,150	69,655	65%	6,230	72,302
10,000	94%	8,260	69,655	66%	6,320	72,302	
10,500	96%	8,360	69,655	67%	6,400	72,302	
11,000	98%	8,470	69,655	68%	6,480	72,302	
High Fire							
NG	0-2,000	100%	8,950	110,000	100%	8,700	150,000
	2,500	100%	8,950	102,097	100%	8,700	139,223
	3,000	100%	8,950	99,987	100%	8,700	136,346
	3,500	100%	8,950	97,878	100%	8,700	133,470
	4,000	100%	8,950	95,768	100%	8,700	130,593
	4,500	100%	8,950	93,658	100%	8,700	127,716
	5,000	100%	8,950	91,549	100%	8,700	124,839
	5,500	100%	8,950	89,439	100%	8,700	121,962
	6,000	100%	8,910	87,708	100%	8,700	119,602
	6,500	100%	8,880	85,949	100%	8,700	117,203
	7,000	100%	8,840	84,190	100%	8,700	114,804
	7,500	100%	8,810	82,430	100%	8,700	112,405
	8,000	100%	8,780	80,671	100%	8,700	110,006
	8,500	100%	8,740	78,912	100%	8,700	107,607
	9,000	100%	8,710	77,152	100%	8,700	105,208
	9,500	100%	8,670	75,393	100%	8,700	102,809
10,000	100%	8,640	73,634	100%	8,700	100,410	
10,500	100%	8,600	71,874	100%	8,700	98,011	
11,000	100%	8,570	70,115	100%	8,700	95,611	



Annual Startup (continued)

Figure 126 Propane gas firing rates and corresponding blower speeds (LP - low fire, ignition, and high fire) – for altitudes up to 2,000 feet (default settings) and high altitude (above 2,000 feet).

Model		110			150		
Fuel Type	Altitude (feet)	%	RPM	BTU/Hr HA Note:	%	RPM	BTU/Hr HA Note:
Low Fire							
LP	0-2,000	10%	2,100	10,200	10%	1,700	15,000
	2,500	10%	2,240	10,200	10%	1,840	15,000
	3,000	10%	2,280	10,200	10%	1,880	15,000
	3,500	10%	2,320	10,200	10%	1,910	15,000
	4,000	10%	2,360	10,200	10%	1,950	15,000
	4,500	10%	2,400	10,200	10%	1,990	15,000
	5,000	10%	2,430	10,200	10%	2,030	15,000
	5,500	10%	2,470	10,200	10%	2,060	15,000
	6,000	10%	2,520	10,200	10%	2,090	15,000
	6,500	10%	2,560	10,200	10%	2,120	15,000
	7,000	10%	2,600	10,200	10%	2,150	15,000
	7,500	10%	2,650	10,200	10%	2,180	15,000
	8,000	10%	2,690	10,200	10%	2,220	15,000
	8,500	10%	2,730	10,200	10%	2,250	15,000
	9,000	10%	2,780	10,200	10%	2,280	15,000
	9,500	10%	2,820	10,200	10%	2,310	15,000
	10,000	10%	2,860	10,200	10%	2,340	15,000
10,500	10%	2,910	10,200	10%	2,370	15,000	
11,000	10%	2,950	10,200	10%	2,400	15,000	
Ignition							
LP	0-2,000	60%	6,200	65,871	49%	4,700	74,124
	2,500	65%	6,630	65,871	53%	5,030	74,124
	3,000	66%	6,740	65,871	54%	5,120	74,124
	3,500	67%	6,850	65,871	55%	5,210	74,124
	4,000	69%	6,970	65,871	56%	5,300	74,124
	4,500	70%	7,080	65,871	57%	5,390	74,124
	5,000	71%	7,200	65,871	58%	5,480	74,124
	5,500	73%	7,310	65,871	59%	5,570	74,124
	6,000	75%	7,440	65,871	61%	5,630	74,124
	6,500	78%	7,570	65,871	62%	5,700	74,124
	7,000	80%	7,710	65,871	64%	5,770	74,124
	7,500	83%	7,840	65,871	66%	5,840	74,124
	8,000	86%	7,970	65,871	68%	5,900	74,124
	8,500	89%	8,100	65,871	70%	5,970	74,124
	9,000	92%	8,230	65,871	72%	6,040	74,124
	9,500	95%	8,370	65,871	74%	6,110	74,124
	10,000	99%	8,500	65,871	76%	6,170	74,124
10,500	100%	8,490	65,871	79%	6,240	74,124	
11,000	100%	8,400	65,871	82%	6,310	74,124	
High Fire							
LP	0-2000	100%	9,450	110,000	100%	8,550	150,000
	2,500	100%	9,440	102,097	100%	8,530	137,208
	3,000	100%	9,440	99,987	100%	8,530	133,794
	3,500	100%	9,430	97,878	100%	8,520	130,379
	4,000	100%	9,430	95,768	100%	8,520	126,964
	4,500	100%	9,430	93,658	100%	8,510	123,549
	5,000	100%	9,420	91,549	100%	8,500	120,135
	5,500	100%	9,420	89,439	100%	8,500	116,720
	6,000	100%	9,320	86,918	100%	8,380	113,919
	6,500	100%	9,230	84,427	100%	8,280	111,072
	7,000	100%	9,140	81,937	100%	8,170	108,224
	7,500	100%	9,050	79,447	100%	8,060	105,377
	8,000	100%	8,950	76,957	100%	7,960	102,529
	8,500	100%	8,860	74,467	100%	7,850	99,682
	9,000	100%	8,770	71,976	100%	7,740	96,834
	9,500	100%	8,680	69,486	100%	7,640	93,987
	10,000	100%	8,590	66,996	100%	7,530	91,139
10,500	100%	8,490	64,506	100%	7,420	88,291	
11,000	100%	8,400	62,016	100%	7,320	85,444	



Annual Startup (continued)

Figure 127 Natural gas and Propane gas firing rates and corresponding blower speeds (LP - low fire, ignition, and high fire) – for altitudes up to 2,000 feet (default settings) and high altitude (above 2,000 feet).

Model		199 (EF90 Blower)			199 (NG150 Blower)		
Fuel Type	Altitude (feet)	%	RPM	BTU/Hr HA Note:	%	RPM	BTU/Hr Note 1
Low Fire							
NG	0-2,000	10%	1,425	19,000	10%	1,350	19,000
	2,500	10%	1,450	19,000	10%	1,440	19,000
	3,000	10%	1,480	19,000	10%	1,460	19,000
	3,500	10%	1,500	19,000	10%	1,490	19,000
	4,000	10%	1,530	19,000	10%	1,510	19,000
	4,500	10%	1,550	19,000	10%	1,530	19,000
	5,000	10%	1,580	19,000	10%	1,560	19,000
	5,500	10%	1,600	19,000	10%	1,580	19,000
	6,000	10%	1,640	19,000	10%	1,620	19,000
	6,500	10%	1,670	19,000	10%	1,650	19,000
	7,000	10%	1,710	19,000	10%	1,680	19,000
	7,500	10%	1,750	19,000	10%	1,720	19,000
	8,000	10%	1,780	19,000	10%	1,750	19,000
	8,500	10%	1,820	19,000	10%	1,790	19,000
	9,000	10%	1,860	19,000	10%	1,820	19,000
	9,500	10%	1,890	19,000	10%	1,850	19,000
10,000	10%	1,930	19,000	10%	1,890	19,000	
10,500	10%	1,970	19,000	10%	1,920	19,000	
11,000	10%	2,000	19,000	10%	1,950	19,000	
Ignition							
NG	0-2,000	50%	3,770	99,500	46%	3,530	91,000
	2,500	54%	3,900	99,500	48%	3,680	91,000
	3,000	55%	4,030	99,500	48%	3,730	91,000
	3,500	56%	4,160	99,500	49%	3,770	91,000
	4,000	57%	4,290	99,500	49%	3,810	91,000
	4,500	59%	4,420	99,500	50%	3,850	91,000
	5,000	60%	4,550	99,500	50%	3,890	91,000
	5,500	61%	4,680	99,500	51%	3,930	91,000
	6,000	63%	4,800	99,500	52%	4,010	91,000
	6,500	65%	4,920	99,500	54%	4,080	91,000
	7,000	67%	5,040	99,500	56%	4,160	91,000
	7,500	69%	5,160	99,500	58%	4,230	91,000
	8,000	71%	5,270	99,500	60%	4,300	91,000
	8,500	74%	5,390	99,500	62%	4,380	91,000
	9,000	76%	5,510	99,500	64%	4,450	91,000
	9,500	79%	5,630	99,500	66%	4,530	91,000
10,000	82%	5,750	99,500	69%	4,600	91,000	
10,500	85%	5,870	99,500	71%	4,670	91,000	
11,000	89%	5,990	99,500	74%	4,750	91,000	
High Fire							
NG	0-2000	100%	7,500	199,000	100%	6,800	199,000
	2,500	100%	7,500	184,702	100%	6,800	184,702
	3,000	100%	7,500	180,886	100%	6,800	180,886
	3,500	100%	7,500	177,069	100%	6,800	177,069
	4,000	100%	7,500	173,252	100%	6,800	173,252
	4,500	100%	7,500	169,436	100%	6,800	169,436
	5,000	100%	7,500	165,619	100%	6,800	165,619
	5,500	100%	7,500	161,802	100%	6,800	161,802
	6,000	100%	7,430	157,241	100%	6,710	157,241
	6,500	100%	7,370	152,736	100%	6,620	152,736
	7,000	100%	7,300	148,231	100%	6,540	148,231
	7,500	100%	7,230	143,726	100%	6,460	143,726
	8,000	100%	7,170	139,221	100%	6,370	139,221
	8,500	100%	7,100	134,716	100%	6,290	134,716
	9,000	100%	7,030	130,212	100%	6,200	130,212
	9,500	100%	6,970	125,707	100%	6,120	125,707
10,000	100%	6,900	121,202	100%	6,030	121,202	
10,500	100%	6,830	116,697	100%	5,950	116,697	
11,000	100%	6,770	112,192	100%	5,870	112,192	

Model		199 (EF90 Blower)			199 (NG150 Blower)		
Fuel Type	Altitude (feet)	%	RPM	BTU/Hr HA Note:	%	RPM	BTU/Hr Note 1
Low Fire							
LP	0-2,000	10%	1,330	19,000	10%	1,300	19,000
	2,500	10%	1,370	19,000	10%	1,400	19,000
	3,000	10%	1,410	19,000	10%	1,420	19,000
	3,500	10%	1,450	19,000	10%	1,450	19,000
	4,000	10%	1,480	19,000	10%	1,470	19,000
	4,500	10%	1,520	19,000	10%	1,500	19,000
	5,000	10%	1,560	19,000	10%	1,530	19,000
	5,500	10%	1,600	19,000	10%	1,550	19,000
	6,000	10%	1,620	19,000	10%	1,590	19,000
	6,500	10%	1,640	19,000	10%	1,630	19,000
	7,000	10%	1,670	19,000	10%	1,660	19,000
	7,500	10%	1,690	19,000	10%	1,700	19,000
	8,000	10%	1,710	19,000	10%	1,740	19,000
	8,500	10%	1,730	19,000	10%	1,770	19,000
	9,000	10%	1,760	19,000	10%	1,810	19,000
	9,500	10%	1,780	19,000	10%	1,850	19,000
10,000	10%	1,800	19,000	10%	1,890	19,000	
10,500	10%	1,820	19,000	10%	1,920	19,000	
11,000	10%	1,840	19,000	10%	1,960	19,000	
Ignition							
LP	0-2,000	50%	3,540	99,500	45%	3,400	88,871
	2,500	55%	3,670	99,500	48%	3,640	88,871
	3,000	56%	3,800	99,500	49%	3,700	88,871
	3,500	58%	3,930	99,500	50%	3,760	88,871
	4,000	59%	4,060	99,500	51%	3,830	88,871
	4,500	61%	4,190	99,500	52%	3,890	88,871
	5,000	63%	4,320	99,500	52%	3,950	88,871
	5,500	64%	4,450	99,500	54%	4,020	88,871
	6,000	66%	4,540	99,500	54%	4,060	88,871
	6,500	68%	4,640	99,500	56%	4,110	88,871
	7,000	69%	4,730	99,500	57%	4,160	88,871
	7,500	71%	4,830	99,500	58%	4,210	88,871
	8,000	73%	4,920	99,500	59%	4,260	88,871
	8,500	75%	5,020	99,500	60%	4,310	88,871
	9,000	77%	5,110	99,500	62%	4,360	88,871
	9,500	85%	5,210	99,500	63%	4,410	88,871
10,000	82%	5,300	99,500	65%	4,460	88,871	
10,500	85%	5,390	99,500	66%	4,510	88,871	
11,000	88%	5,490	99,500	68%	4,560	88,871	
High Fire							
LP	0-2000	100%	7,300	199,000	100%	6,710	199,000
	2,500	100%	7,280	181,945	100%	6,690	181,945
	3,000	100%	7,260	177,392	100%	6,680	177,392
	3,500	100%	7,240	172,839	100%	6,670	172,839
	4,000	100%	7,210	168,286	100%	6,670	168,286
	4,500	100%	7,190	163,733	100%	6,660	163,733
	5,000	100%	7,170	159,180	100%	6,660	159,180
	5,500	100%	7,150	154,627	100%	6,650	154,627
	6,000	100%	7,060	150,938	100%	6,590	150,938
	6,500	100%	6,970	147,183	100%	6,530	147,183
	7,000	100%	6,880	143,426	100%	6,470	143,429
	7,500	100%	6,790	139,674	100%	6,410	139,674
	8,000	100%	6,710	135,920	100%	6,360	135,920
	8,500	100%	6,620	132,165	100%	6,300	132,165
	9,000	100%	6,530	128,411	100%	6,240	128,411
	9,500	100%	6,440	117,147	100%	6,180	124,656
10,000	100%	6,350	120,902	100%	6,120	120,902	
10,500	100%	6,260	117,147	100%	6,070	117,147	
11,000	100%	6,170	113,393	100%	6,010	113,393	



Annual Startup (continued)

Figure 128 CO₂ as a percentage of exhaust (low fire and high fire) – for altitudes up to 2,000 feet (default settings) and high altitude (above 2,000 feet). Refer to **Figure 121, page 136** for detailed CO₂ combustion information.

110 (all altitudes)			150 (all altitudes)		
Fuel Type	Low Fire CO ₂	High Fire CO ₂	Fuel Type	Low Fire CO ₂	High Fire CO ₂
NG	8.75	9.25	NG	8.80	9.25
LP	10.15	10.50	LP	9.90	10.5

199 (EF90 blower model)

Fuel Type	Altitude (feet)	Low Fire CO ₂	High Fire CO ₂	Fuel Type	Altitude (feet)	Low Fire CO ₂	High Fire CO ₂
NG	0-2,000	9.00	9.25	LP	0-2,000	10.40	10.50
	2,500	9.00	9.23		2,500	10.40	10.50
	3,000	9.00	9.21		3,000	10.40	10.50
	3,500	9.00	9.19		3,500	10.40	10.50
	4,000	9.00	9.16		4,000	10.40	10.50
	4,500	9.00	9.14		4,500	10.40	10.50
	5,000	9.00	9.12		5,000	10.40	10.50
	5,500	9.00	9.10		5,500	10.40	10.50
	6,000	9.00	9.10		6,000	10.40	10.50
	6,500	9.00	9.10		6,500	10.40	10.50
	7,000	9.00	9.10		7,000	10.40	10.50
	7,500	9.00	9.10		7,500	10.40	10.50
	8,000	9.00	9.10		8,000	10.40	10.50
	8,500	9.00	9.10		8,500	10.40	10.50
	9,000	9.00	9.10		9,000	10.40	10.50
	9,500	9.00	9.10		9,500	10.40	10.50
	10,000	9.00	9.10		10,000	10.40	10.50
10,500	9.00	9.10	10,500	10.40	10.50		
11,000	9.00	9.10	11,000	10.40	10.50		

199 (NG150 blower model)

Fuel Type	Altitude (feet)	Low Fire CO ₂	High Fire CO ₂	Fuel Type	Altitude (feet)	Low Fire CO ₂	High Fire CO ₂
NG	All	9.0	9.25	LP	All	10.4	10.5

NOTICE

For the proper CO₂ tolerances in the above tables listed in Figure 97, **Figure 121, page 136**. Also, all notes below Figure 90 apply to these tables as well.

SECTION 5

Maintenance

Maintenance

⚠ WARNING

DO NOT SERVICE THE BOILER WITHOUT A ECO Tec 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 152, page 171** for part number.

Disconnect 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 130**. 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 139](#) 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
- (1) Flathead Screwdriver

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 unlatching the latches on both sides of door.
4. Lift the jacket door up and away from the boiler to remove.

Remove Components to Access the Heat Exchanger Flue Side

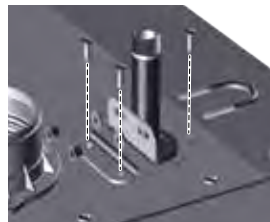
1. Display bracket will need to be moved to access combustion components. Once the 2 screws are removed from the display bracket, the display bracket can be hung on the control panel cover. Ensure that the display cable wire does not snag or get pulled tight.
2. Remove the air silencer and disconnect gas valve and gas line. Removing the gas valve and gas line will allow for better access when removing cover plate but may not be required.
 - a. See [Figure 129, page 152](#) 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 and off of the venturi. Set the air silencer aside.

OPTIONAL: *Gas valve removal not required, only if user wants extra clearance for cover plate removal.*

⚠ CAUTION

Label all wires, if they are not already labeled prior to disconnection, when servicing controls. Wiring errors can cause improper and dangerous operation.

- 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. Loosen and remove U bolt holding the gas line in place. Use a screwdriver to remove 3 screws holding the gas valve brackets in place.



- e. Slide gas valve brackets upwards so you can access 4 screws attaching flange to gas valve, remove 4 screws. Gas valve removal not required, only if user wants extra clearance for cover plate removal.
- f. Disconnect gas valve from venturi by loosening the gas valve swivel nut to disconnect the gas valve from venturi. Set the gas valve 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. Loosen the swivel nut between the gas line and the venturi. Reference [Figure 129b](#).

3. Remove the blower/venturi assembly.
 - a. See [Figure 129, page 152](#), part D.
 - b. Remove the two (2) 5mm locknuts connecting the blower and cover plate with 8mm wrench Remove blower assembly and set aside. Inspect blower gasket, replace if gasket has taken a set or if any signs of wear.
 - c. Remove burner tube (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. Disconnect the ground wire and ignition cable from the ignition electrode (Item 13).
 - f. Remove the ignition electrode (Item 13) by removing the two (2) Socket head 3mm Allen igniter bolts, see [Figure 130, page 153](#) 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.
 - g. 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 130, page 153](#) part F and part G.

⚠ WARNING

Handle the heat exchanger cover plate/ burner assembly carefully to avoid damage to the bottom cover plate insulation with integrated seal. Place the assembly on a clean, flat surface with the assembly upside down, as shown in [Figure 130, page 153](#) 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 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.

5

Cleaning Heat Exchanger Flue Side (continued)

Inspect and Clean the Burner

See **Figure 130, page 153** part G.

- 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.
- Remove the burner and its gasket (Items 14 and 15) by removing the screws with a T20 Torx driver. Discard old burner gasket.
- 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.
- Clean burner flange and cover plate surface where burner gasket sits removing all old gasket material.
- 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.
- Inspect the burner exterior. It must be in good condition, with no visible damage.
- Obtain a new burner gasket before re-installing the burner.

Inspect and Clean the Heat Exchanger

- Access the heat exchanger interior by following the previous instructions.
- See **Figure 130, page 153** part F.
- 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.
- Use a strong light to visually inspect the interior of the heat exchanger. Make sure the flue ways (tubes) are clear and unobstructed.
- 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.

- If the vacuum cleaner is unable to clean completely, wash the heating surfaces with clean, warm water.
 - Place a shallow pan under the boiler condensate tube connection.
 - Loosen the condensate tube hose clamp and slide the trap off of the drain connection. (See **page 63** for reference.)
 - Spray fresh water into the heat exchanger and tubes to remove sediment. Collect water in the pan below.

Reinstall Components

- See **Figure 129, page 152** and **Figure 130, page 153** for reference.

- 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 WM Technologies 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.
- 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.
- 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.

- Reinstall the igniter assembly (Item 13).
 - The ignition electrode gasket must be replaced with a new gasket.
 - Insert the ignition electrode (Item 13) into the cover plate opening, with the gasket in position.
 - 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.
- 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.
- Reinstall the blower / venturi assembly (Items 3 and 7).
 - Reinstall burner tube (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.
 - Install blower gasket (Item 9) between blower and cover plate.
 - Use 8mm wrench to secure blower to cover plate with two (2) locknuts (Item 8).
 - Reconnect the two (2) blower wiring harnesses.
- Reconnect the ignition cable and the igniter ground wire.
- Replace the gas valve-to-venturi fiber washer (Item 6 **Figure 129, page 152** part C) with a new fiber gasket. Slide the gas valve, gas line and swivel nut (Item 5) onto the venturi (Item 7) gas inlet. For LP models, confirm LP Gas Orifice is inserted into venturi gas inlet before making the connection.
- Using two (2) wrenches reconnect gas valve to venturi gas inlet.

Cleaning Heat Exchanger Flue Side (continued)

11. 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 129, page 152**.

Steps 12-14 only if gas valve removed:

12. Reinstall flange and gas nipple to inlet of gas valve with 4 screws. Ensure there is a gasket (item 6) between the gas valve and flange.
13. Slide gas valve brackets downward and attach to top of boiler with 3 screws.
14. Re-Install the U-bolt and tighten to secure gas line in place
15. Place silencer clip (Item 2) back onto the air inlet silencer/venturi.
16. Return the display bracket to its spot by placing the tabs into the slots on the control panel and aligning the screw holes on the top of the display bracket with the holes on the top panel. Reinstall screws.

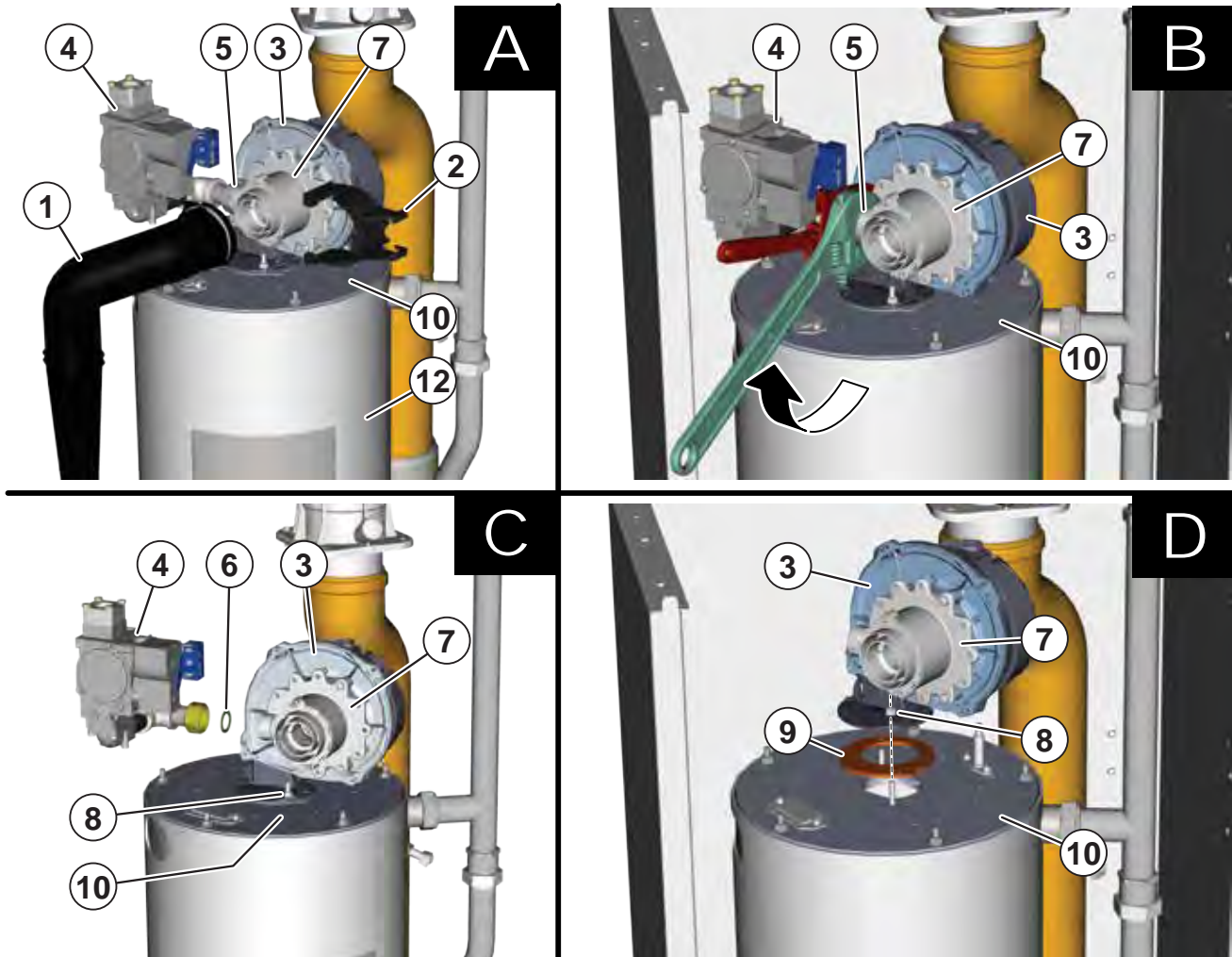
⚠ WARNING

Perform a complete start-up procedure when putting the boiler back into service. See **page 130** 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 Figure 129 and Figure 130, page 153

- | | |
|---|--|
| 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. (Gas valve assembly removed for clarity). | |
| F. Cover Plate disassembled from Heat Exchanger. | |
| G. Heat exchanger cover plate and components. | |
| H. Burner and components | |
-
- | | |
|---|---|
| 1) Air silencer | 12) Heat exchanger insulation |
| 2) Air silencer retainer clip | 13) Ignition electrode assembly |
| 3) Blower assembly | 14) Burner |
| 4) Gas valve | 15) Burner gasket |
| 5) Gas pipe swivel nut | 16) Burner insulation |
| 6) Fiber washer (light green) | 17) Burner retainer screws (3) |
| 7) Venturi assembly | 18) Inspection plate window |
| 8) Blower lock nuts 5mm (8mm box wrench required) (2) | 19) Bottom cover plate insulation w/integrated seal |
| 9) Blower gasket | 20) Burner tube (80/110/199 models only) |
| 10) Cover plate | |
| 11) Combustion chamber cover plate retainer nuts (4) | |

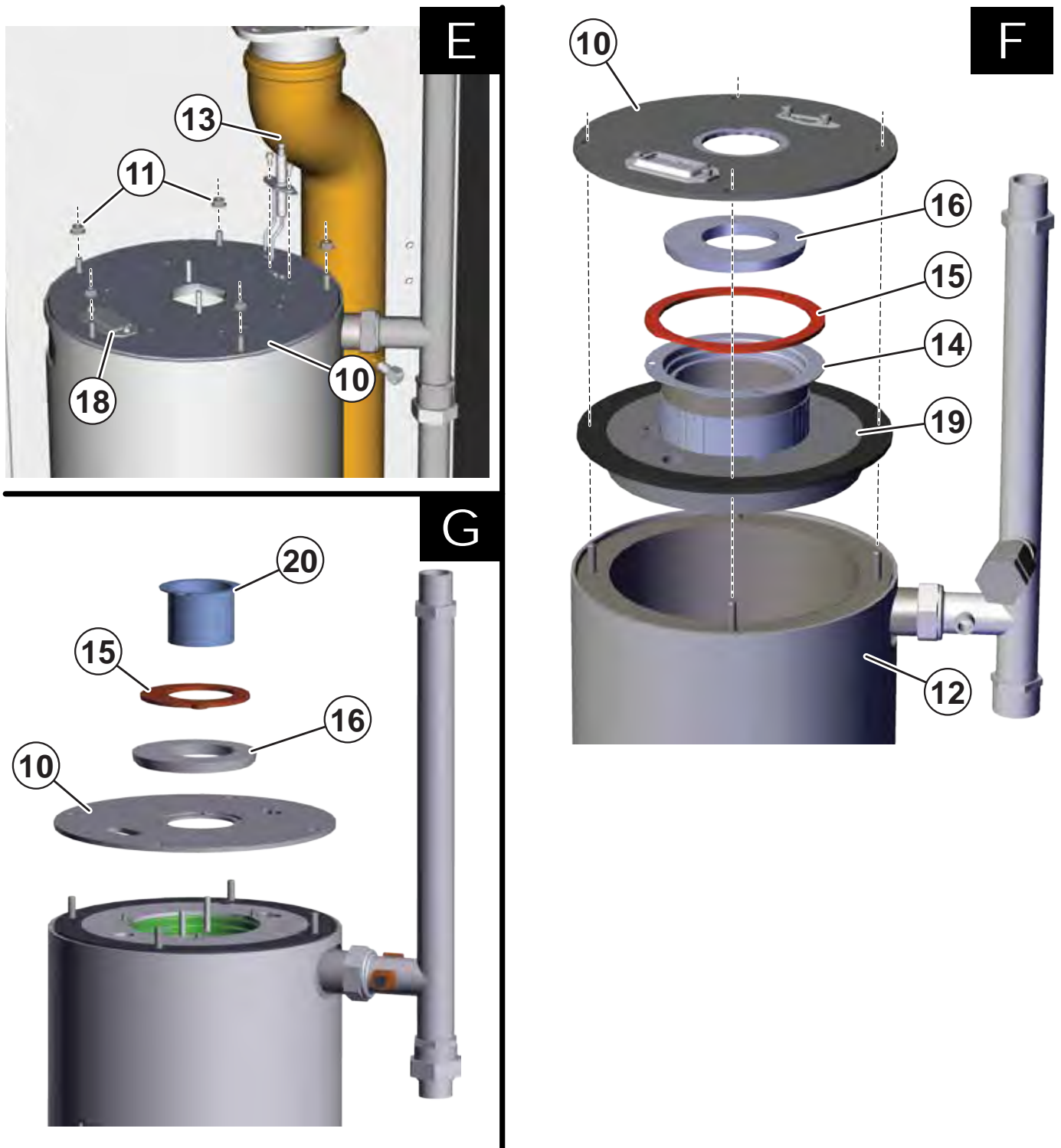
Figure 129 Accessing the burner or heat exchanger, air silencer and gas valve removal. (See Legend above).



5

Cleaning Heat Exchanger Flue Side (continued)

Figure 130 Accessing the burner , heat exchanger, blower assembly and venturi removal. (See Legend [page 152](#)).



5

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.

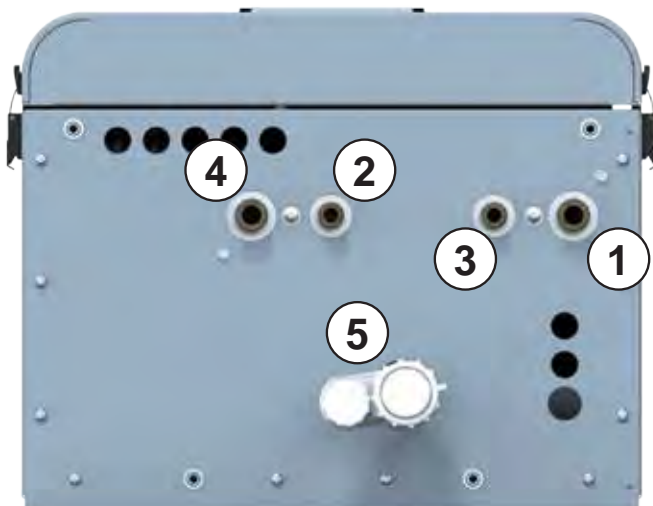
The disposal of chemicals and residues of chemical cleaning should be carried out in an appropriate manner, in accordance with current standards.

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.

Figure 131 Boiler connections for cleaning domestic water circuit



- 1. Boiler In
- 2. Domestic hot water outlet
- 3. Domestic cold water inlet
- 4. Boiler out
- 5. Condensate tube

⚠ 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. 50 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.

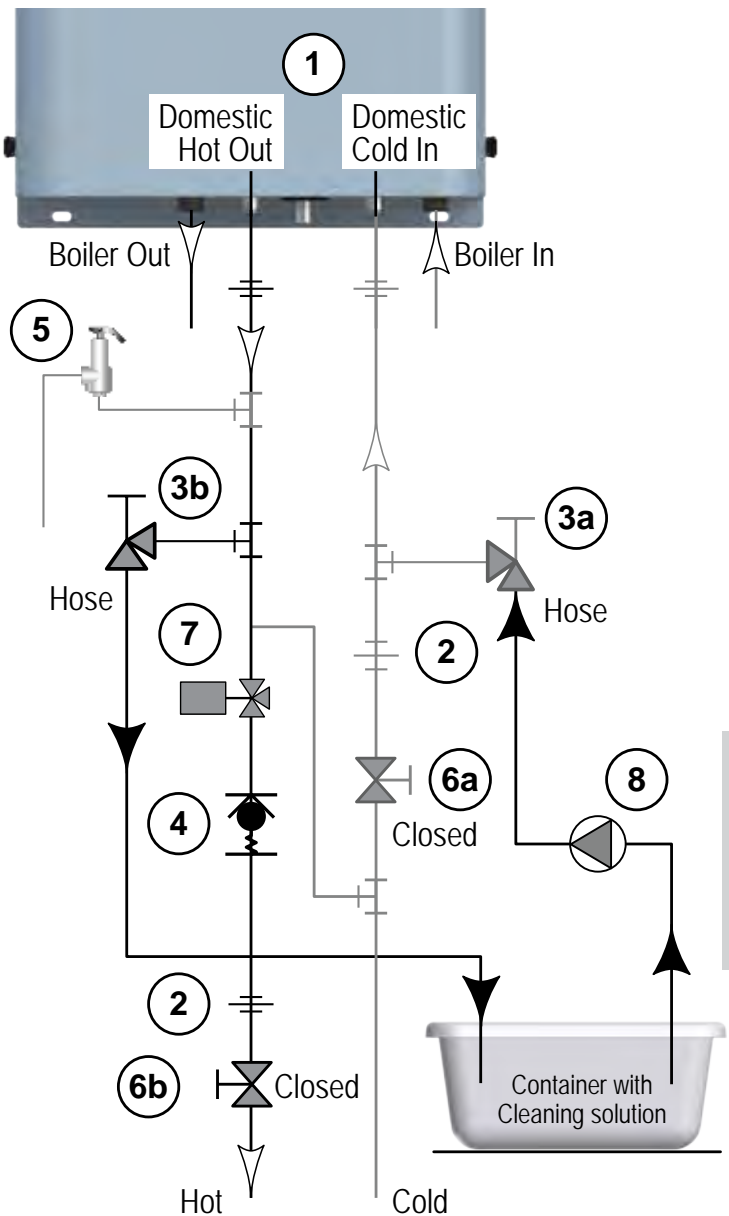
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Cleaning DHW and Brazed Plate Heat Exchanger (continued)

Actions for Chemical Cleaning of Domestic Hot Water Circuit (Refer to [Figure 132](#))

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 disposable 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.

Figure 132 Domestic water circuit cleaning diagram instructions



- | | |
|-----------------------|----------------------------|
| 1) Combi Boiler | 5) Relief Valve (150 PSIG) |
| 2) Union | 6) Isolation Valve |
| 3) Drain/Purge Valve | 7) Three Way Mixing Valve |
| 4) Spring Check Valve | 8) Circulating Pump |

Cleaning DHW and Brazed Plate Heat Exchanger (continued)

Before Servicing Brazed Plate Heat Exchanger Assembly

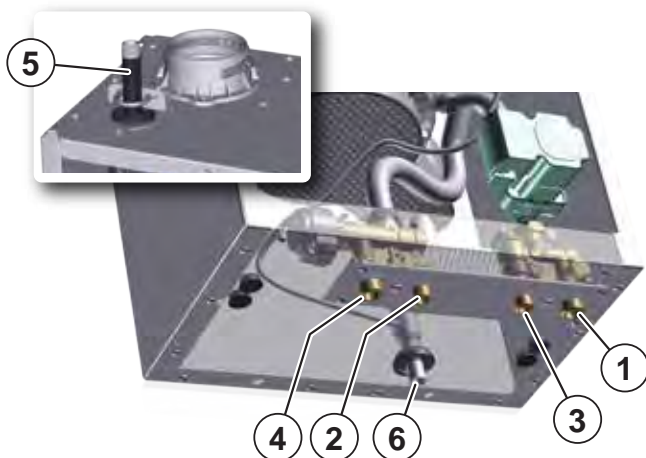
1. Cool down boiler and brazed plate heat exchanger assembly. The following procedure may be used to cool down boiler and components. First follow the operating instructions on [page 134](#) to properly shut off gas supply, but not the power to the boiler. Turn on a domestic hot fixture and allow cool 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 134](#). 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.

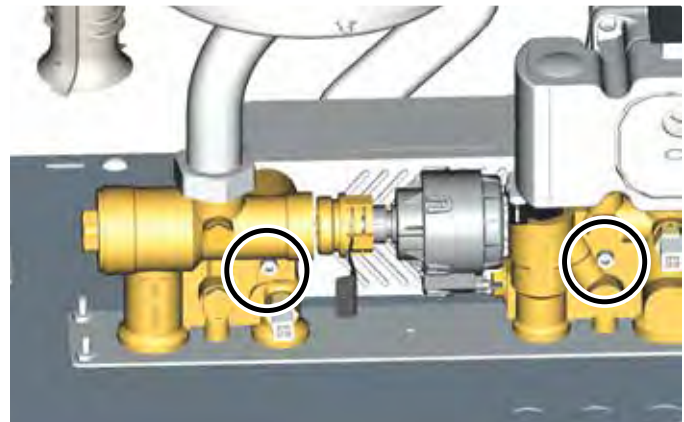
2. Shut down the boiler:
 - a. Follow “To Turn Off Gas to Appliance” instructions on boiler and Operating instructions.
 - b. Close the boiler manual gas valve.
 - c. Only needed if cool down procedure in Step #1 was not needed or followed.
3. Close the domestic cold water inlet isolation valve.
4. Release 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 133 Domestic water circuit on the Combi (Back view shown)



- | | |
|------------------------------|--------------------|
| 1) Boiler In | 4) Boiler out |
| 2) Domestic hot water outlet | 5) Gas inlet |
| 3) Domestic cold water inlet | 6) Condensate tube |

Figure 134 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 134](#). 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 & Outlet Manifolds

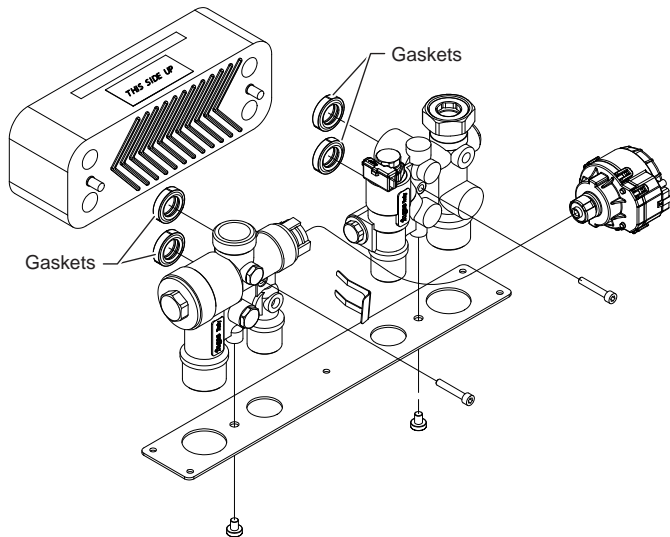
Brazed Plate Heat Exchanger Reinstalled

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 159, page 178** 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.).

Figure 135 Reinstallation of brazed plate gaskets to brazed plate heat exchanger



WARNING

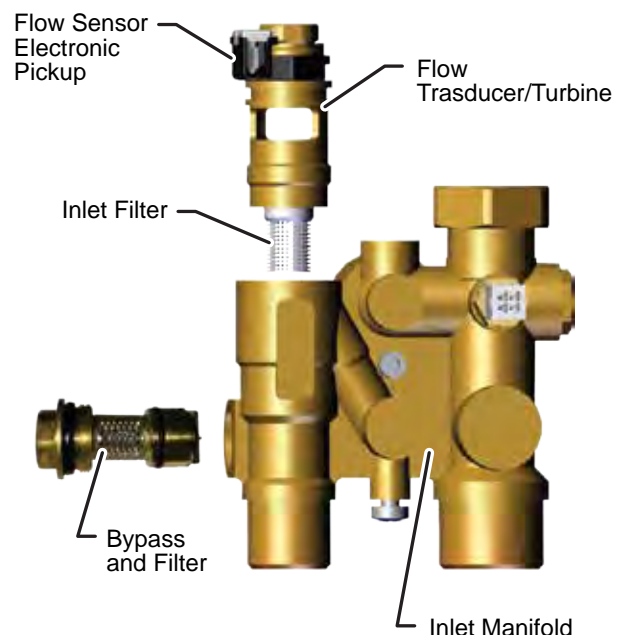
When re-installing components, make sure gaskets are in good condition and properly aligned before tightening screws.

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 134** 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 143** under "3 way valve test". Be sure to reset and clear any faults that may have occurred during this service.

Cleaning & Maintenance for Domestic Water Inlet Manifold (Refer to **Figure 136**)

1. Follow "To turn off Gas Appliance" instructions on boiler and Operating instructions and procedures 1-4 on **page 156** "Before servicing Brazed Plate Heat Exchanger Assembly".
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.

Figure 136 Domestic Water Inlet Manifold components



Cleaning/maintenance for Domestic Water Inlet & Outlet Manifolds (continued)

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 160](#) section "Checking temperature sensors" to verify proper working condition.
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 137](#) and [Figure 138](#))

1. Follow "To turn off Gas Appliance" instructions on boiler and Operating instructions and procedures 1 through 6 on [page 156](#) "Before servicing Brazed Plate Heat Exchanger Assembly".
2. Slide actuator retaining clip out of the slot, see [Figure 138](#).
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 160](#) 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.

Figure 137 Domestic Water Outlet Manifold components (Model 199 configuration shown, see page 179 for model 110/150 configuration)

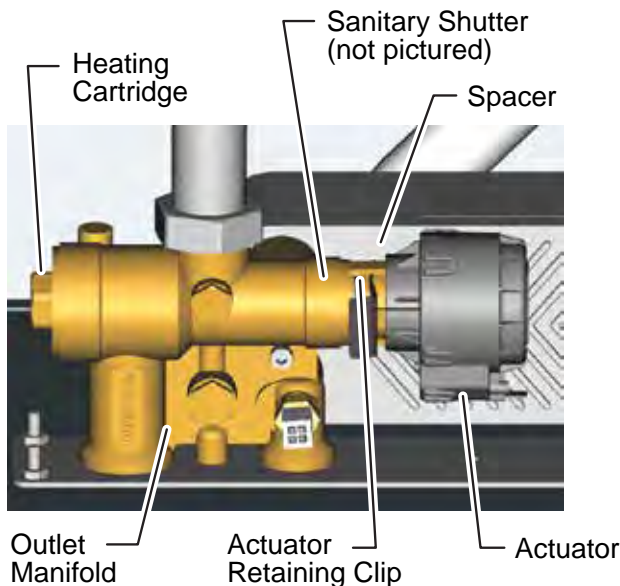
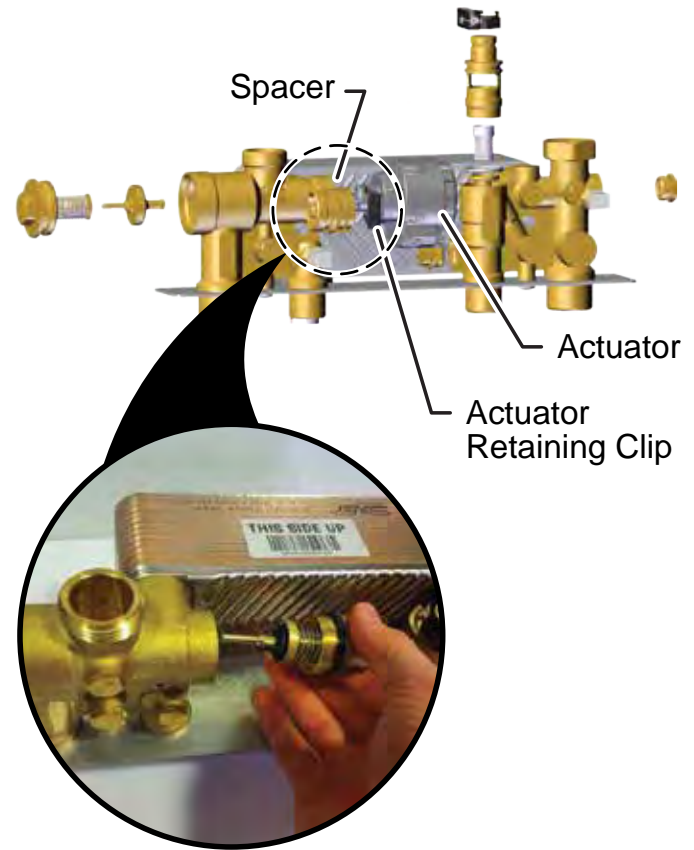


Figure 138 Domestic Water Outlet Manifold components disassembled (Model 199 configuration shown, see page 179 for model 110/150 configuration)



5

SECTION 6

Troubleshooting

VERIFY PROPER OPERATION AFTER SERVICING

Troubleshooting

Before calling for troubleshooting assistance, install the ProTools app (see "[WM ProTools app navigation](#)" on [page 188](#)). Record the boiler size and CP number (located on the right side exterior of the boiler jacket).

⚠ 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 TROUBLESHOOTING —

1. See Figure 139 for tools and kits recommended for troubleshooting ECO Tec boilers.
2. Check for 120VAC (minimum 102VAC to maximum 132VAC) to boiler.
3. Check the control's last six (6) lockout histories. (Navigate to the DIAGNOSTICS menus.)
 - a. See [Figure 100, page 114](#) for CONTRACTOR Menu instructions and [Figure 115, page 127](#) 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 139 Tools and kits needed for troubleshooting

Tool	Purpose
#2 Phillips screwdriver	Multiple uses
2.5 & 4mm Allen wrench	To adjust gas valve settings
3mm Allen wrench	For removing ignition electrode screws
8mm wrench	To remove blower
10mm wrench	To remove heat exchanger cover plate
T20 long-handled Torx driver	To remove burner screws and mixer/venturi
Large crescent wrench	To remove gas valve
Multimeter	Measurements on sensors and electrical components
Manometer (Inclined or digital)	Measure the INLET gas pressure to the boiler
Combustion analyzer (Digital preferred)	Combustion testing and boiler adjustments
Contact thermometer	Checking surface temperatures of heat exchanger and pipes
Maintenance kit	ALWAYS have this kit on hand when performing maintenance in case replacement is required.

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 24](#) 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 141**.
3. Remove and inspect the seven (7) fuses (Items 1, 2, and 3, **Figure 141**).
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 128** 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 141 Control fuses

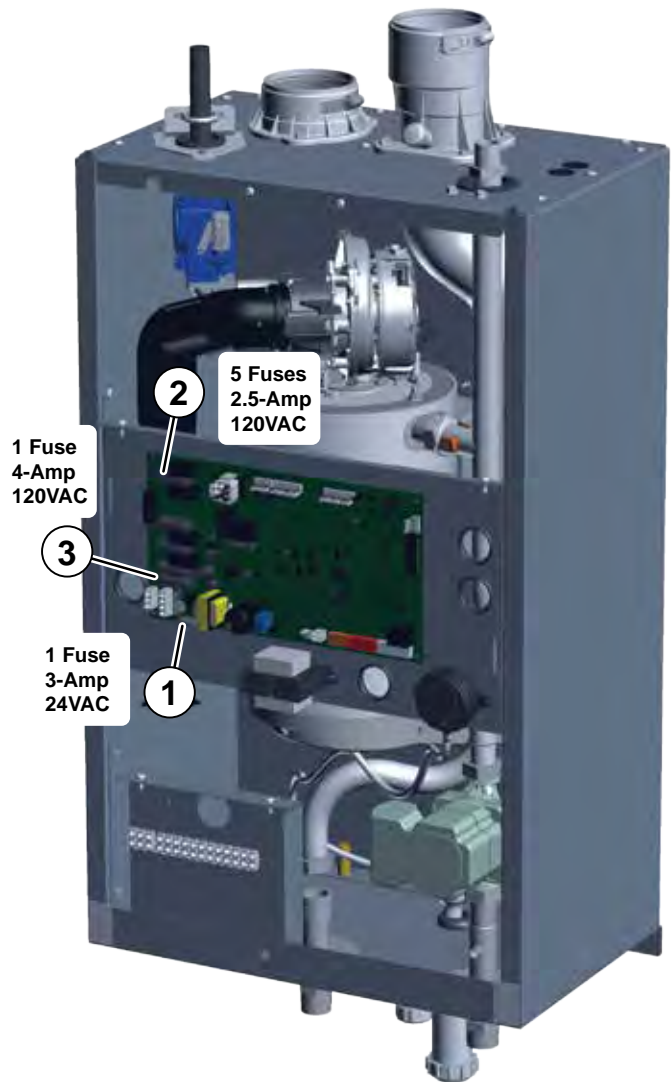


Figure 140 Sensor resistance values

Temp (°F)	Sensor ohms		Temp (°F)	Sensor ohms		Temp (°F)	Sensor ohms	
	Min	Max		Min	Max		Min	Max
32	34265	37871	90	8504	9399	150	2517	2782
40	27834	30764	100	6847	7568	160	2091	2311
50	21630	23907	110	5545	6129	170	1744	1928
60	16944	18727	120	4517	4992	180	1461	1615
70	13372	14780	130	3698	4088	190	1229	1359
80	10629	11747	140	3043	3364	200	1038	1147



Troubleshooting (continued)

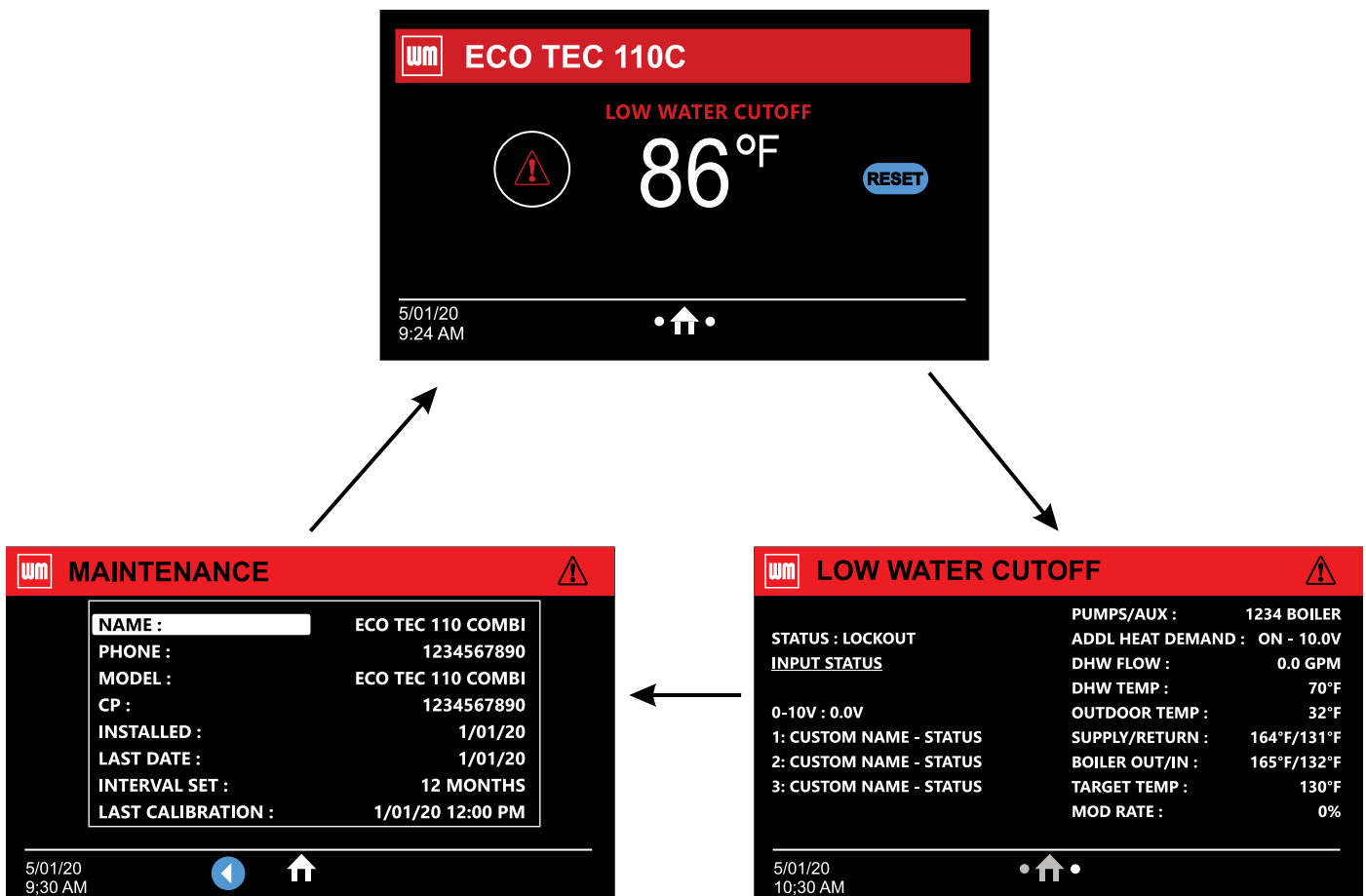
⚠ WARNING

Make sure to determine the causes of outages. Do not leave the boiler operating without a complete diagnosis.

Control Fault Indications

1. The control provides diagnostic information for both automatic reset conditions and manual reset conditions. See **Figure 82, page 88** for information available on the control display
2. **Figure 142** shows the screen behavior during a fault condition. The display illustration and text below in **Figure 142** shows how to reset faults from the Home Owners screen.
3. **Figure 144, page 162** 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 142 Control display toggles when in lockout, with screen red banner





Troubleshooting (continued)

Figure 143 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.

2. Reset to Factory Default can be found on the BOILER SETTINGS menu. For 199 and 199C models, resetting defaults will require selecting the appropriate blower motor. Check the blower motor label and ensure appropriate selection in the display. See **Figure 101, page 115** for additional information.

Figure 144 Troubleshooting suggestions — Control Error Condition Log

The Control is able to record information about the boiler’s condition at the time of the six previous faults or errors. This information is available to view in Contractor Menus under “DIAGNOSTICS” by selecting “FAULT HISTORY” The control will display the following information:

Information	Description	Action
Ignition Retries	Displays cumulative ignition attempts. It is recommended that this be reset during yearly maintenance.	Press and reset button to reset the count or select this parameter and press enter to reset.
Manual Reset Count	Records number of lockouts that required a manual reset since this count was last cleared.	Press the reset button to reset this count.
Auto Reset Count	Records number of lockouts that have automatically reset since this count was last cleared.	Press the reset button to reset this count.
Lockout History 1- 6	Details of present or last recorded lockout, up to 6 previous lockouts.	Select and press the right arrow key for more details.

How to read the last 6 lockout histories:

1. Press “DIAGNOSTICS” button.
2. Select “FAULT HISTORY” and press the right arrow key.
3. Review fault information displayed on screen.
4. Record the fault counts, (Ignition Retries, Manual Reset Count, Auto Reset Count).
5. Select “LOCKOUT HISTORY #” and press the right arrow key.

How to clear all lockout histories:

1. While on the “FAULT HISTORY” screen, hold the reset button until cleared.



Troubleshooting (continued)

Figure 145 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
Nothing is shown on the display screen, and the boiler will not respond to a call for heat.	Control is not receiving 24V power.	Check wiring for short circuit or incorrect wiring.	Correct wiring per wiring diagram including connection of transformer to the control.
		Check 3-amp low voltage fuse on control shown on page 160 .	Replace fuse with proper part found in the Parts section, starting on page 169 . If fuse blows again, recheck wiring per diagrams.
		Check transformer connection to the control per wiring diagram. Check for 24V output of transformer.	Replace transformer if it is receiving 120 Vac, but not outputting 24 Vac.
Nothing is shown on the display screen, and no other boiler components are operating.	Control is not receiving 120V power.	Check service switch and/or circuit breaker to boiler is turned on.	Turn on service switch to power boiler.
		Is there 120 Vac at the service switch?	Troubleshoot and correct the power supply to the service switch.
		Check for 120 Vac at the line voltage terminal block located at J1 on the circuit board.	Correct wiring to circuit board using the wiring diagrams in this manual.
		Inspect 4-amp fuse as shown on page 160 . Replace if necessary.	Replace the fuse with proper part found in the Parts section, starting on page 169 . If fuse blows again, recheck wiring per diagrams.
Nothing is shown on the display screen, but the boiler is operating.	Occurs if the communication is lost from the control to the display.	Check for loose connections and proper pin alignment and engagement on the control's plug J14, and the back of the display circuit board.	Check for continuity on the wire harness from the display to the communications board to the circuit board.
		Cycle power off and on, and check for operation.	Replace with new display module. See the Parts section starting on page 169 for the proper part.
Boiler In Sensor Open Boiler In Sensor Short Boiler Out 1 Sensor Open Boiler Out 1 Sensor Short Boiler Out 2 Sensor Open Boiler Out 2 Sensor Short Flue 1 Sensor Open Flue 1 Sensor Short Flue 2 Sensor Open Flue 2 Sensor Short Temperature Sensor	Specified sensor is sensed as open or short.	Clears automatically when sensor is no longer open or short.	<ul style="list-style-type: none"> • Check for loose or damaged wires on the designated sensor and at the control board. • Replace appropriate sensor. • If issues persist, replace the control.
Boiler Output Sensor Flue Sensor	Occurs if dual temperature sensors values have spread by more than 10°F.	Automatically resets when sensors are within 10°F.	Follow procedure for above for SHORT and OPEN sensor conditions to properly diagnose sensors. If measured resistance values of sensors convert to temperatures separated by more than 10°F, replace the sensors.





Troubleshooting (continued)

Figure 146 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
Outdoor Sensor Error	Outdoor temperature sensor is short or open.	Will automatically reset if the condition clears. Warning only: Max Target Temp is targeted until Outdoor Temp is restored, if used for target adjustment.	<ul style="list-style-type: none"> Determine which sensors are suspect and measure their resistance value and compare it to the values shown in Figure 141, page 160. If the resistance values are incorrect, replace the temperature sensor. Refer to the Parts section, starting on page 169, for the 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 the Parts section, starting on page 169 for kit number.
Return Sensor	Occurs when Return Sensors are chosen as the Target Modulation sensors, and the Boiler Out sensor is either open or short.	Clears warning when valid sensors are detected.	<ul style="list-style-type: none"> 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 values. Compare to the values shown in Figure 141, page 160. If the resistance values are incorrect, replace the temperature sensor. Refer to the Parts section starting on page 169 for the proper part number.
Supply Sensor	Occurs when Supply Sensors are chosen as the Target Modulation sensors, and the Boiler In sensor is either open or short.		<ul style="list-style-type: none"> 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 the Parts section, starting on page 169 for kit number.
AIR PRESSURE Switch Open	Occurs when the High Flue Pressure switch is open.	Reset using Manual Reset screen on display.	<p>Check boiler size selected in control against boiler rating label. Correct if necessary to select the proper boiler size.</p> <p>Check the J22 connection as seen in Figure 76, page 78. Check the High Flue Pressure switch. Note: Pressure Switch comes from the factory set to 3.25" (NOT ADJUSTABLE)"</p>
Blower Fault 1	Blower does not reach zero RPM within four minutes when mode is Standby or Prepump.	Clears 30 seconds after blower is at zero RPM.	Check for loose or disconnected low voltage wires to blower motor. Inspect low voltage blower motor harness.
Blower Fault 2	Blower unable to reach required pre-purge speed or ignition speed. Blower failed to complete calibration within four minutes.	Clears automatically after 35 minutes.	<ul style="list-style-type: none"> Check for loose or damaged wires on high voltage and low voltage blower motor harnesses. Check the in-line blower fuse connected to the 120 Vac power of the blower motor. Replace fuse if necessary. Re-calibrate blower motor in Boiler Settings menu.

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Troubleshooting (continued)

Figure 147 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
Blower Fault 3	Blower is outside of minimum or maximum speed for 10 seconds.	Clears at the end of post-purge heat state.	<ul style="list-style-type: none"> Check for loose or damaged wires on high voltage and low voltage blower motor harnesses. Re-calibrate blower motor in Boiler Settings menu.
Blower Fault 4	Blower drops to zero RPM while burner is firing.	Automatic reset if post-purge is successful. If unsuccessful, automatic reset after 35 minutes.	<p>Check for loose or damaged wires on high voltage and low voltage blower motor harnesses.</p> <p>Check for voltage quality on incoming 120vAC and 24vAC power to the boiler, as well as 24vDC on Pin 1 of the blower motor.</p>
Boiler In > Out	Occurs when the Boiler In temp is greater than either Boiler Out temps + 10F for 30 seconds, after the burner is lit for 60 seconds, and the priority has not changed in the last 60 seconds.	Automatically resets when Boiler In is 7 degrees greater than Boiler Out or less.	<ul style="list-style-type: none"> Verify proper flow direction of the boiler circulator. Check for temperature inrush/cooling from priority switching.
Clock Fault	When the real time clock chip cannot be read.	When the real time clock chip is working correctly and has had a time written to it.	<ul style="list-style-type: none"> Enter an updated time/date. If problems persist, replace display.
Closure Switch fault	Proof of Closure connections on J18, Pins 2 and 3 are open.	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.	<ul style="list-style-type: none"> 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. None - Check jumper on correct pins and secure connection.
Communication errors	Occurs if display or main control communications is out for 30 seconds.	Automatically resets when communication is re-established.	Check for a loose connection at the Molex plug on the control and connection on the back of the display. Improper connections may display the incorrect model numbers.
Configuration fault	Configuration data in the control safety micro does not match data in the control's application micro.	Correct the invalid configuration information.	<ul style="list-style-type: none"> Reconfirm all settings within the Boiler Settings screen. Cycle power to the unit. Perform a factory reset by going to Contractor Menu -> Boiler Settings -> Reset Factory Default, and follow the on-screen instructions. See page 162 for important information before resetting control.
Control fault	Occurs when micro-controllers on main board have a RAM or ROM error.	Check for hardware damages.	<ul style="list-style-type: none"> RAM or ROM errors can be reset with the manual reset option. If problems persist, replace main board.



Troubleshooting (continued)

Figure 148 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
IGNITION 1 FAULT	Boiler went through five ignition attempts and either never detected flame, or flame sense value never reached proof of flame threshold of 0.8 within 2 seconds.	Reset using manual reset screen on display.	<ul style="list-style-type: none"> • Check condensate trap for blockage allowing condensate to accumulate inside heat exchanger. • Check ignition cable connection. • Check Flame Sense Rod harness and connections
IGNITION 2 FAULT	Boiler went through five ignition attempts and did not meet running flame threshold for boiler model within 10 seconds		<ul style="list-style-type: none"> • 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 4.5mm (0.177 in) spark gap. <p>⚠ WARNING <i>Thin white deposits on the igniter are typical, but brown or black deposits could be the result of flue gas recirculation. Thoroughly inspect the venting system and termination for the possibility of leakage or flue gas feedback into the air line. Failure to fix these issues can result in severe personal injury, death, or substantial property damage.</i></p> <p>Dirty burner or heat exchanger will cause high back pressure and poor ignition. Follow instructions starting on page 149 to clean the burner and heat exchanger. Visual inspection of flue ways may not be sufficient to diagnose condition.</p> <p>Check combustion settings on high and low fire. Adjust per setup instructions if necessary. Check flame signal during combustion testing; see Figure 124, page 142.</p> <p>Check incoming gas pressure with boiler off and at high fire. Adjust within limits on rating label.</p> <p>Verify correct boiler model is selected in control and high altitude is selected for installations 2,000 above sea level.</p> <p>Check that ignition cable resistance measures 1000 Ohms (+/- 50 Ohms).</p> <p>Check for flue pipe and intake pipe restrictions or blockage.</p> <p>Check burner fasteners and gaskets.</p> <p>Check venturi gaskets and proper venturi. Propane models use different venturis.</p>
Internal Clock Fault	Occurs when the internal clock of the control is out of sync.	Clears when the control sees a valid clock count within the control.	<ul style="list-style-type: none"> • Cycle power of the boiler. • Check the wiring of the display. • If problem persists, replace display.
LIMIT OPEN	Occurs if manual or automatic reset limit opens.	<ul style="list-style-type: none"> • Automatic external limit will reset 2½ minutes after external limit device closes. • Manual limit fault must be reset by choosing Manual Reset on the display. 	<p>Is there an external safety device connected? If yes, troubleshoot the external limit to determine and correct the cause that opened the limit. Also check for loose wiring connections.</p> <ul style="list-style-type: none"> • 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 an automatic reset external limit.

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Troubleshooting (continued)

Figure 149 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
LOW FLAME SHUTDOWN	Flame quality dropped below allowable Running Flame Threshold, but it did not go out.	Automatically clears when pre-purge is reached.	<ul style="list-style-type: none"> 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 4.5mm (0.177 in) spark gap. <p>⚠ WARNING</p> <p><i>Thin white deposits on the igniter are typical, but brown or black deposits could be the result of flue gas recirculation. Thoroughly inspect the venting system and termination for the possibility of leakage or flue gas feedback into the air line. Failure to fix these issues can result in severe personal injury, death, or substantial property damage.</i></p> <p>Dirty burner or heat exchanger will cause high back pressure and poor ignition.</p> <p>Follow instructions starting on page 149 to clean the burner and heat exchanger. Visual inspection of flue ways may not be sufficient to diagnose condition.</p> <p>Check combustion settings on high and low fire and adjust per setup instructions if necessary. Check flame signal during combustion testing.; see Figure 124, page 142.</p> <p>Check incoming gas pressure with boiler off and at high fire. Adjust within limits on rating label.</p> <p>Verify correct boiler model is selected in control and high altitude is selected for installations 5,500 above sea level.</p> <p>Check that ignition cable resistance measures 1000 Ohms (+/- 50 Ohms).</p> <p>Check for flue pipe and intake pipe restrictions or blockage.</p> <p>Check burner fasteners and gaskets.</p> <p>Check venturi gaskets and proper venturi. Propane models use different venturis.</p>
LOW WATER or LWCO J9 OPEN	Occurs if the LWCO Sensor sees no water.	Manual reset of control if contacts are open.	<ul style="list-style-type: none"> Check for low water condition in system. Repair system as necessary. Refer to the water piping section of this manual, starting on page 47. Check if LWCO Sensor test button is stuck. If so, replace control.
LOW WTR CUTOFF OPEN or LWCO J21 OPEN	Occurs if alternate LWCO contacts open.	Manual reset of control if contacts are open.	<ul style="list-style-type: none"> Check for low water condition in system. Repair system as necessary. Refer to the water piping section of this manual, starting on page 47. If low water condition does not exist, check Diagnostics -> Inputs screen to view status of LWCO. If the LWCO is shown as OPEN, check wiring between LWCO and control. If wiring is fine, remove LWCO and clean the probe. If the problem still exists, replace the LWCO.
LOW WTR CUTOFF WARNING	Occurs if the LWCO needs to be cleaned.	Automatically clears when the condition no longer exists.	Follow maintenance instructions for removal and cleaning of LWCO probe.





Troubleshooting (continued)

Figure 150 Troubleshooting suggestions — **Fault displays, diagnostics and corrective actions**

Fault	Condition	Troubleshooting	Action
Software Incompatible	Main control and display software are not compatible.	Unit is updated to matching software.	Check software versions for main control and display. Replace the hardware that is the incorrect software version.
Supply 60F > Return	<ul style="list-style-type: none"> Occurs if either Boiler Out temperatures are greater than Boiler In temperature by more than 60F, 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. 	<p>The first time a lockout occurs, the time to clear is 2 minutes 30 seconds. The second time, the lockout is 3 minutes 30 seconds. The third time, its 4 minutes 30 seconds, the fourth time its 5 minutes 30 seconds. The fifth time its 6 minutes 30 seconds.</p> <p>The system will retry, indefinitely, every 6 minutes 30 seconds as long as the temperatures return to < 60 degrees.</p> <p>If the burner fires for at least 2 minutes without the temperature difference exceeding 60 degrees, the time condition for the > 60 degree soft lockout is reset back to the minimum value of 2 minutes 30 seconds.</p>	<ul style="list-style-type: none"> 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.
System Return > Supply	Occurs when the System Return temp is greater than the System Supply temp + 10F, after the burner is lit for 10 minutes, and the priority has not changed in the last 10 minutes.	Automatically resets when condition no longer exists.	<ul style="list-style-type: none"> 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.
Target Reduced – Boiler	Boiler Outlet sensor detected above Max Boiler Temp minus Boiler Out On Diff. This fault can only occur if using System Supply or DHW Out as a modulation sensor*	Clears warning when Boiler Outlet sensor is detected below Max Boiler Temp minus Boiler Out On Diff.	No corrective action required. Boiler is operating normally.
Target Reduced – Flow	Boiler Outlet sensor detected > Boiler Inlet sensor + 50°F. Modifies Target temperature to prevent over-stressing the heat exchanger.	Clears warning and target modification when Boiler Outlet sensor is detected ≤ Boiler Inlet sensor + 50°F.	<ul style="list-style-type: none"> Check water flow through the boiler heat exchanger. Check circulators for malfunction or wiring issues.
Target Reduced – Flue	Flue temperature detected between 200°F and 210°F. Modifies target temperature to prevent overheating flue.	Clears warning when Flue temperatures have been below 200°F and the target has returned to its original setpoint, then one hour of burner run time has elapsed without the Flue temperature exceeding 200°F.	<ul style="list-style-type: none"> 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 the boiler manual.
TEMP RISE TOO QUICKLY	Occurs if supply water temperature in heat exchanger rises faster than 10°F per second for two seconds during the first two minutes the burner is on.	<ul style="list-style-type: none"> Automatically resets after one minute delay or using manual reset on display. Manual reset is necessary after 5 automatic resets have occurred during the same Priority heat demand. Reset using manual reset screen on display. 	<p>Verify water pipe is installed correctly per instructions in this manual.</p> <p>Verify proper circulator and speed for boiler size and system requirements.</p> <p>See message displayed TEMPERATURE SENSOR and follow procedure for loose connections.</p>
Unconfigured Net 1 or Net 2 Demand	Net 1 or 2 input active when its priority settings have not been configured.	Clears once configured. Boiler will not run this priority while this warning is active.	Configure Net 1 or 2 priority settings in the system settings menu.
Virtual Input Active	If Modbus is activating any virtual TT input.	No virtual inputs are active.	Check Modbus communication device for virtual TT input commands.

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SECTION 7

Parts

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 152, page 171** for part number.

Replacement Part Numbers

Weil-McLain part numbers are found in this manual and in Weil-McLain Boilers and Controls Repair Parts Lists.

When Operating the Boiler on Propane Gas

⚠ WARNING

ALL ECO Tec boilers must be converted in order to operate with propane gas.

Figure 151 Propane conversion kits and instructions

Boiler model	Kit part number	Installation instructions
80/110	510-811-415	See page 19 .
150	510-811-416	See page 19 .
199	510-811-417	See page 19 .

⚠ WARNING

Failure to adhere to these guidelines can result in severe personal injury, death or substantial property damage.

Obtain Parts Only Through WM Technologies

Replacement parts must be purchased through a local WM Technologies 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 139** 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

⚠ CAUTION

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



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Replacement Parts (continued)

Figure 152 Miscellaneous service parts and kits

Description	Part Number
CHEMICALS	
Antifreeze, Sentinel X500, 1 Gallon	592-900-029
Corrosion inhibitor, Sentinel X100.	592-900-002
Sentinel X100 Quick Test Kit	592-900-005
BOILER ACCESSORIES	
ECO Tec Quick start kit - Heating only (System Temp Sensors, Inhibitor-Sentinel, LWCO Probe, Easy-Up Manifold, Condensate Neutralizer, 3" Vent Termination)	383-700-395
ECO Tec Quick start kit - Combi (System Temp Sensors, Inhibitor-Sentinel, LWCO Probe, Easy-Up Manifold, Combi-Valve Set, Condensate Neutralizer, 3" Vent Termination)	383-700-396
ECO Tec 80/110 maintenance kit (Igniter, igniter gasket, venturi gasket, cover plate gasket, venturi-gas valve o-ring, refractory, inhibitor test kit, clips, and instructions)	383-700-265
ECO Tec 150 maintenance kit (Igniter, igniter gasket, venturi gasket, cover plate gasket, venturi-gas valve o-ring, refractory, inhibitor test kit, clips, and instructions)	383-200-102
ECO Tec 199 maintenance kit (Igniter, igniter gasket, venturi gasket, cover plate gasket, venturi-gas valve o-ring, refractory, inhibitor test kit, clips and instructions)	383-700-267
Condensate trap kit - supplied with boiler (condensate tube, barb polypropylene 3/16, and hose clamps)	383-700-268
ECO Tec Pedestal - floor stand	383-800-245
Adjustable floor stand	383-800-102
Wall-mount kit - wall mount bracket and hardware	383-200-115
ECO Tec Easy Up Manifold	383-700-343
Combi service valve	383-700-346
Low Water Cut-Off	511-100-005
System sensor (2)	383-700-371
Multi-boiler wiring kit (RS-485 communication harness) - one kit needed per boiler	383-700-272
ECO Tec ModBus wiring harness	383-700-401
CONDENSATE HANDLING ACCESSORIES	
Condensate neutralizer kit	383-500-631
RELIEF VALVE	
Relief Valve (50psi) Kit	383-600-090
VENT/AIR PARTS AND KITS (PVC or STAINLESS STEEL) Available from WM Technologies	
Weil-McLain Direct Exhaust Venting Kit Includes interior/exterior intake/exhaust plates, 2" & 3" vent screens, templates & mounting hardware	383-500-778
Weil-McLain sidewall vent/air cap termination kit for PVC vent and air pipes Includes sidewall vent/air termination cap, inside and outside cover plates, and mounting hardware; openings are sized for 3" PVC pipe (requires field-installed 3 x 2 adapter if using 2" vent/air pipes)	383-500-397
Weil-McLain sidewall vent/air cap termination kit for AL29-4C vent pipe and PVC air pipe Includes sidewall vent/air termination cap, inside and outside cover plates, and mounting hardware; openings are sized for 3" SS vent pipe and 3" PVC air pipe (requires field-installed 3 x 2 adapter if using 2" vent/air pipes)	382-200-430

Description	Part Number
Bird screens (1 screen each) For 2" PVC vent and air pipes. For 3" PVC vent and air pipes.	560-907-728 383-500-105
Sidewall separate pipes vent/air termination kits (includes two cover plates) Kit for 2" PVC vent and air pipes Approved for 80/110/150 models only Kit for 3" PVC vent and air pipes Kit for 3" AL29-4C SS vent pipe and PVC air pipe	383-700-171 383-500-100 383-700-172
PVC concentric vent kit — horizontal or vertical (includes components for concentric assembly) Kit for 2" PVC vent and air pipes Approved for 80/110/150 models only Kit for 3" PVC vent and air pipes	383-700-167 383-500-350
VENT/AIR PARTS AND KITS (PVC IPEX) Available from IPEX ONLY	
PVC concentric vent kit — horizontal or vertical (includes components for concentric assembly) 2" PVC concentric Approved for 80/110/150 models only 3" PVC concentric	196005 196006
VENT/AIR PARTS AND KITS (POLYPROPYLENE PIPE) Available from M&G Simpson-DuraVent ONLY	
M&G Simpson-DuraVent PolyPro VERTICAL concentric vent/air kit; color = black (part number shown) or terra cotta (add -TC suffix) 2" polypropylene pipe 3" polypropylene pipe	2PPS-VK 3PPS-VK
M&G Simpson-DuraVent PolyPro SIDEWALL separate air and vent pipes 2" polypropylene pipe 3" polypropylene pipe	2PPS-HTP 3PPS-HTP
M&G Simpson-DuraVent PolyPro 3" PP to 2" PP Adapter polypropylene 3" PVC to 2" PP Adapter Stainless Steel	3PPS-R2L 3PPS-03PVC/M-2PPF
VENT/AIR PARTS AND KITS (POLYPROPYLENE PIPE) Available from Centrotherm Eco Systems ONLY	
Centrotherm INNOFLUE SIDEWALL concentric vent/air kit 3" polypropylene pipe 2" polypropylene pipe	ICWT352 ICWT242
Centrotherm INNOFLUE VERTICAL concentric vent/air kit 2" polypropylene pipe 3" polypropylene pipe	ICRT2439 ICRT3539
Centrotherm INNOFLUE 3" to 2" Adapter Polypropylene	ISR0302
Stainless Steel Vent/Flue & Air Adapter Connections	
Heat Fab, Inc. – Saf T Vent Z Flex, Inc. – Z Vent Metal Fab, Inc. – CORR/Guard	9301PVC 2SVSAFNS03 3CGPVA

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Replacement Parts (continued)

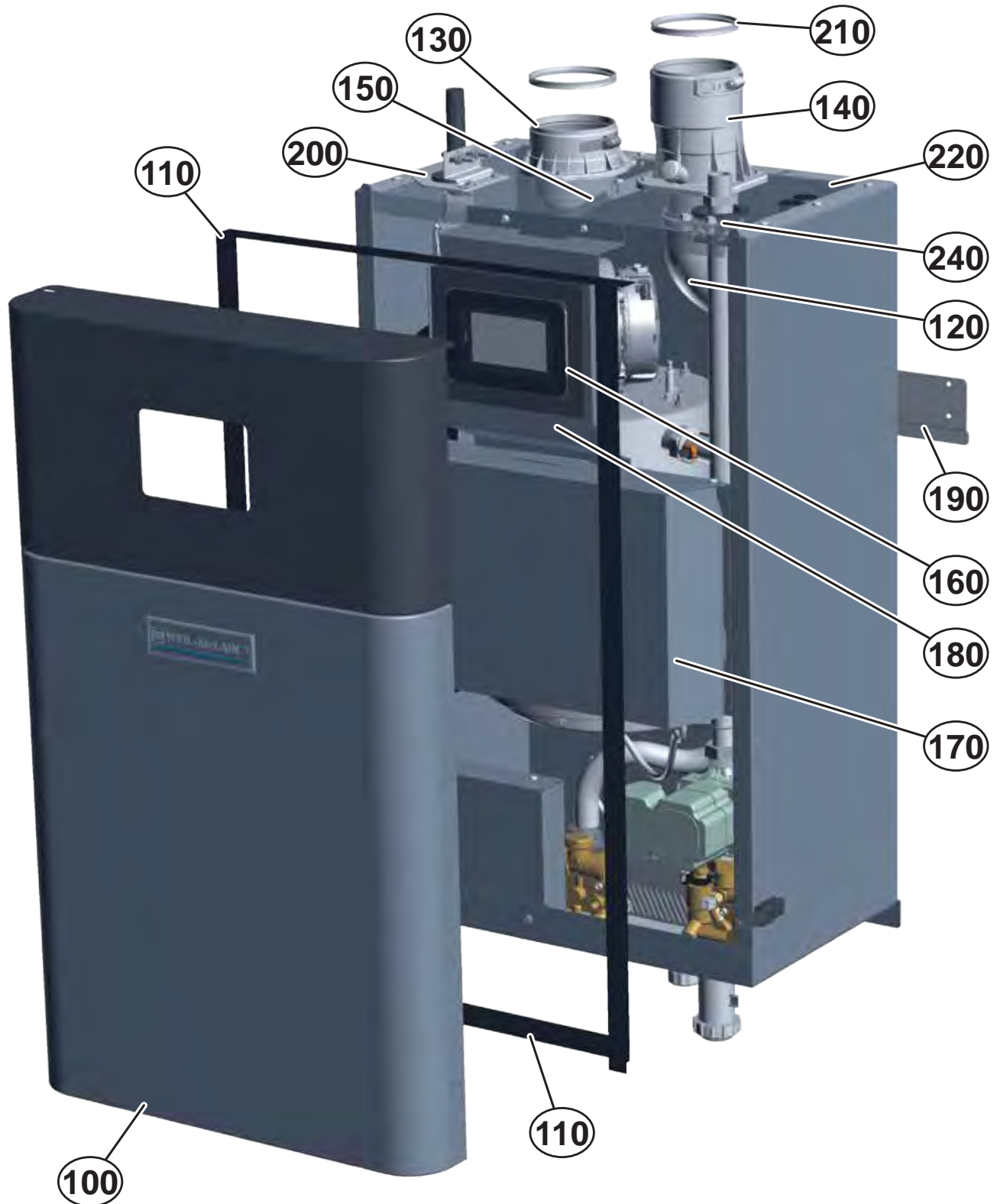
Figure 153 Jacket parts — ECO Tec 80/110/150/199 (see **Figure 154, page 173** for illustration)

Item	Name	Description / contents	Part Number
100	Jacket door	Jacket door, gaskets and labels	383-800-246
110	Gasket bottom, top & sides for jacket door	Seals for door bottom, sides and top of cabinet	383-800-259
120	Flue pipe 80mm Polypropylene	Offset flue pipe	383-200-110
130	Adapter Vent-Air Inlet	Top air inlet adapter with internal gasket	383-200-112
140	Adapter Vent-Air Outlet	Top air outlet adapter with internal gasket	383-700-275
150	Air baffle and screws	Air baffle and screws	383-200-113
160	Display/bracket gasket	Display gasket	383-700-361
	Display/door gasket	Display housing to door gasket	
170	Panel control bracket/cover	Control bracket, cover and hardware	383-800-256
180	Display board bracket and gaskets	Mounting for the display to inside of cabinet	383-800-247
190	Wall-mount bracket (jacket side)	(includes screws)	383-800-257
200	Dome plug (Not shown)	Hole plug, 1-3/8" Dia. Black, for sealing Combi pipe holes (199 model only)	383-700-362
	Pipe grommet seal (for 2" I.D. hole)	Seals top water pipe to cabinet	
	Pipe grommet seal (for 1-5/8" I.D. hole)	Seals condensate tube to bottom of cabinet	
210	Kit-Service Gasket Flue/Adapter	(Quantity 2)	383-700-384
220	Kit-Service Cabinet Top	80/110	383-800-248
		150 - 383800249	383-800-249
		199 - 383800250	383-800-250
240	Kit-Service Water pipe bracket		383-200-120

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Replacement Parts (continued)

Figure 154 Jacket assembly — ECO Tec 80/110/150/199 (see **Figure 153, page 172** for part numbers)



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Replacement Parts (continued)

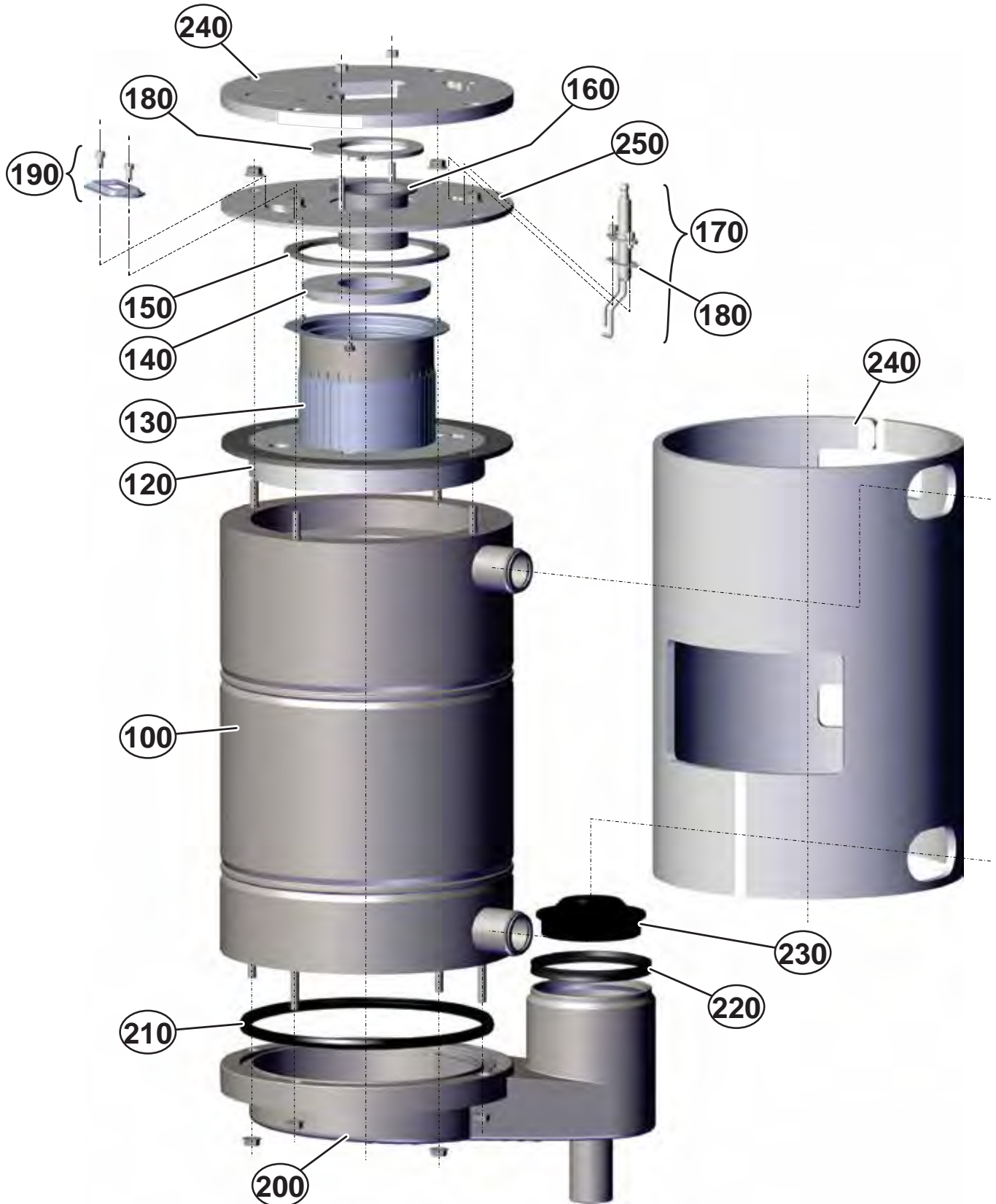
Figure 155 Heat exchanger parts ECO Tec 80/110/150/199 (see **Figure 160, page 178** for illustration)

Item	Name	Part Number	Model 80	Model 110	Model 150	Model 199
100	Heat exchanger	383-700-284	●	●	—	—
		383-700-285	—	—	●	—
		383-700-286	—	—	—	●
110	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)	383-700-287	●	●	—	—
		383-200-121	—	—	●	—
		383-700-289	—	—	—	●
120	Insulation with integrated seal - bottom cover plate	383-700-291	●	●	—	—
		383-200-122	—	—	●	—
		383-700-293	—	—	—	●
130	Burner	383-700-297	●	●	—	—
		383-700-298	—	—	●	—
		383-700-299	—	—	—	●
140	Disc burner refractory	383-700-372	●	●	—	—
		383-700-373	—	—	●	●
150	Burner gasket	383-700-300	●	●	—	—
		383-700-301	—	—	●	●
160	Burner tube	383-700-290	●	●	—	●
170	Kit-Ignition electrode (Includes: igniter, gasket and screws)	383-700-295	●	●	●	●
180	Kit-Service Gaskets/O-Ring ECO Tec (Includes: Silencer gasket, blower gasket, blower O-ring (80-150 boilers), blower O-ring (199 boiler), gas flex line to cabinet gasket, garlock washer, and igniter gasket) (Also see Item 110 on page 177)	383-700-360	●	●	●	●
190	Sight glass kit (bracket, glass, gaskets, and hardware)	383-700-185	●	●	●	●
200	Condensate dish	383-700-331	●	●	—	—
		383-700-332	—	—	●	—
		383-700-333	—	—	—	●
210	Condensate dish gasket	383-700-381	●	●	—	—
		383-700-382	—	—	●	—
		383-700-383	—	—	—	●
220	Flue gasket	383-700-384	●	●	●	●
230	Flue restrictor	383-700-364	●	●	—	—
240	Top cover insulation & heat exchanger insulation wrap	383-700-366	●	●	—	—
		383-200-123	—	—	●	—
		383-700-368	—	—	—	●
250	Cover plate	383-700-326	●	●	—	—
		383-200-124	—	—	●	—
		383-700-328	—	—	—	●

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Replacement Parts (continued)

Figure 156 Heat exchanger assembly ECO Tec 80/110/150/199 (see [Figure 155, page 174](#) for part numbers)



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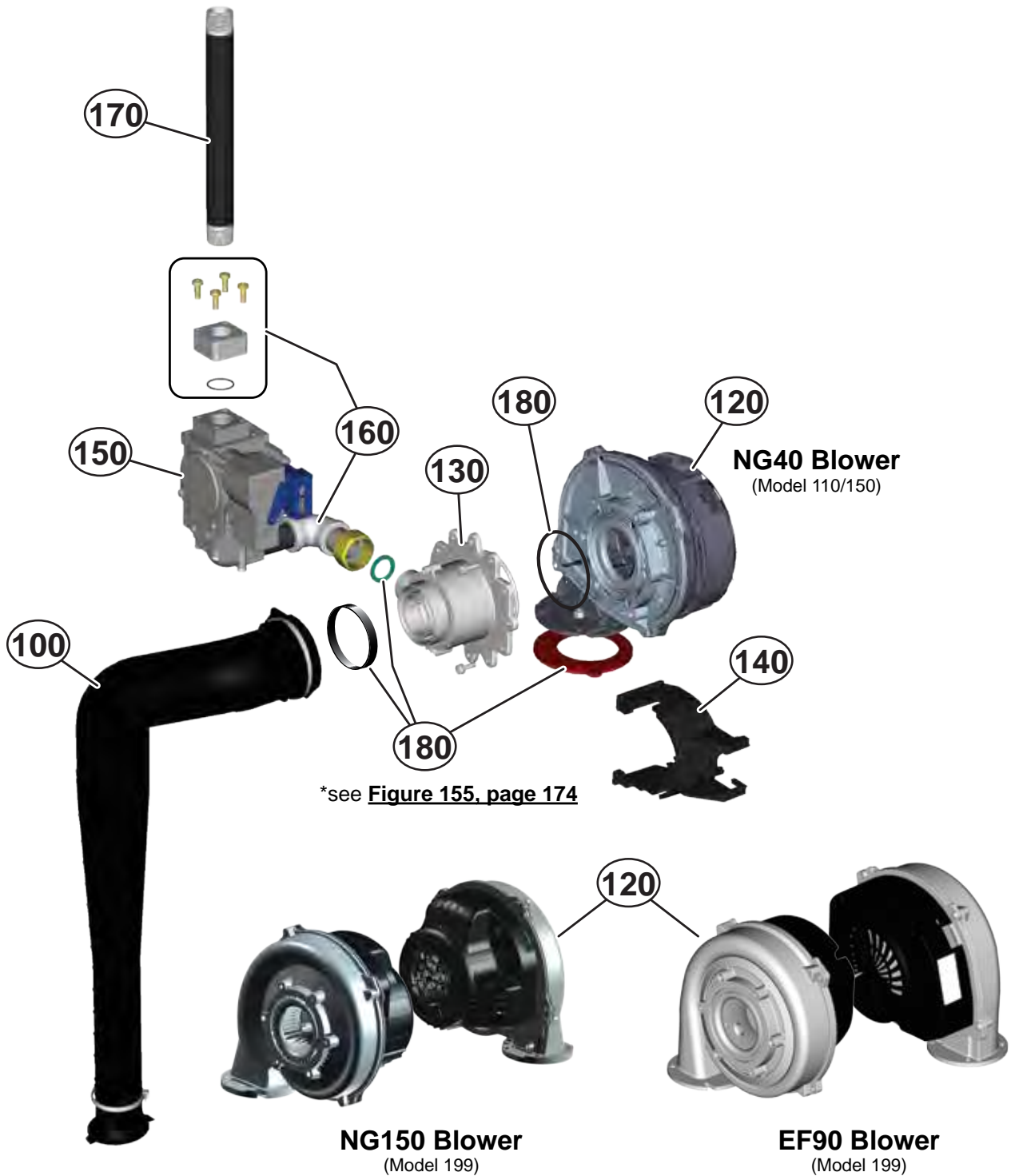
Replacement Parts (continued)

Figure 157 Combustion components parts ECO Tec 80/110/150/199 (see **Figure 158, page 177** for illustration)

Item	Name	Part Number	Model 80/110	Model 150	Model 199
100	Air silencer, clip and gasket	383-700-294	●	●	●
120	Blower model NG40	383-700-303	●	●	—
	Blower model NG150 or EF90	383-200-103	—	—	●
130	Venturi - NG	383-700-305	●	—	—
		383-700-306	—	●	—
		383-700-307	—	—	●
	Venturi - LP	510-811-415	●	—	—
		510-811-416	—	●	—
		510-811-417	—	—	●
140	Air silencer clip	383-700-308	●	●	●
150	Gas valve assembly	383-700-313	●	●	●
160	Gas Line 80/110/150/199	383-200-125	●	●	●
170					
180	Kit-Service Gaskets/O-Ring ECO Tec (Includes: Silencer gasket, blower gasket, blower O-ring (80-150 boilers), blower O-ring (199 boiler), garlock washer, and igniter gasket) (Also see Item 180 on page 174)	383-700-360	●	●	●

Replacement Parts (continued)

Figure 158 Combustion components parts ECO Tec 80/110/150/199 (see [Figure 161, page 179](#) for part numbers)



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Replacement Parts (continued)

Figure 159 Combi water piping for ECO Tec 80/110/150/199 (see **Figure 161, page 179** for illustration)

Item	Name	Description / contents	Part Number
110	Pipe - water top		383-700-377
120	Condensate drain tube	With hose nipple	383-700-268
130	Pipe - water flex 1"		383-700-378
140	Pipe - water return		383-700-375
150	Brazed plate heat exchange	Brazed Plate and Gasket (includes item 230) (199) Brazed Plate and Gasket (110/150)	383-700-355 383-200-127
160	Outlet Manifold with Components	Domestic Outlet Manifold with Component (includes item 210) (199) Domestic Outlet Manifold with Component (110/150)	383-700-356 383-200-128
170	Actuator - 3-way valve	Includes retaining clip	383-700-358
180	DHW Inlet Manifold with Components	With sensor tapping (includes item 220) (199) Domestic Inlet Manifold with component (110/150)	383-700-357 383-200-129
190	Circulator		383-700-379
200	Flow transducer/turbine	DHW Transducer	383-700-380
210	Domestic flow manifold components	Flow Manifold Components (includes 3-way valve components) (199) Flow Manifold Components (110/150)	383-700-349 383-200-131
220	DHW return manifold components	Return Manifold Components (199) Return Manifold Components (110/150)	383-700-350 383-200-132
230	Brazed Plate/DHW Gasket Kit (Not shown here, can be seen in Figure 135, page 157)	Gaskets Brazed Plate / Domestic Hot Water Manifold (199) Gaskets Brazed Plate / Domestic Hot Water Manifold (110/150)	383-700-359 383-200-133
240	DHW, return & supply gaskets	Gasket Brazed Plate to cabinet (199 Combi) Gasket Brazed Plate to cabinet (110/150 Combi)	383-700-392 383-200-134
250	Pressure switch		383-200-105
260	Water temperature sensor (Qty 1)	a) Boiler in temp . sensor, c) DHW out temp . sensor..... b) Boiler Out Temp Sensor	383-700-319 383-200-106
270	Flow sensor electronic pickup	Flow sensor electronic pickup	383-700-389

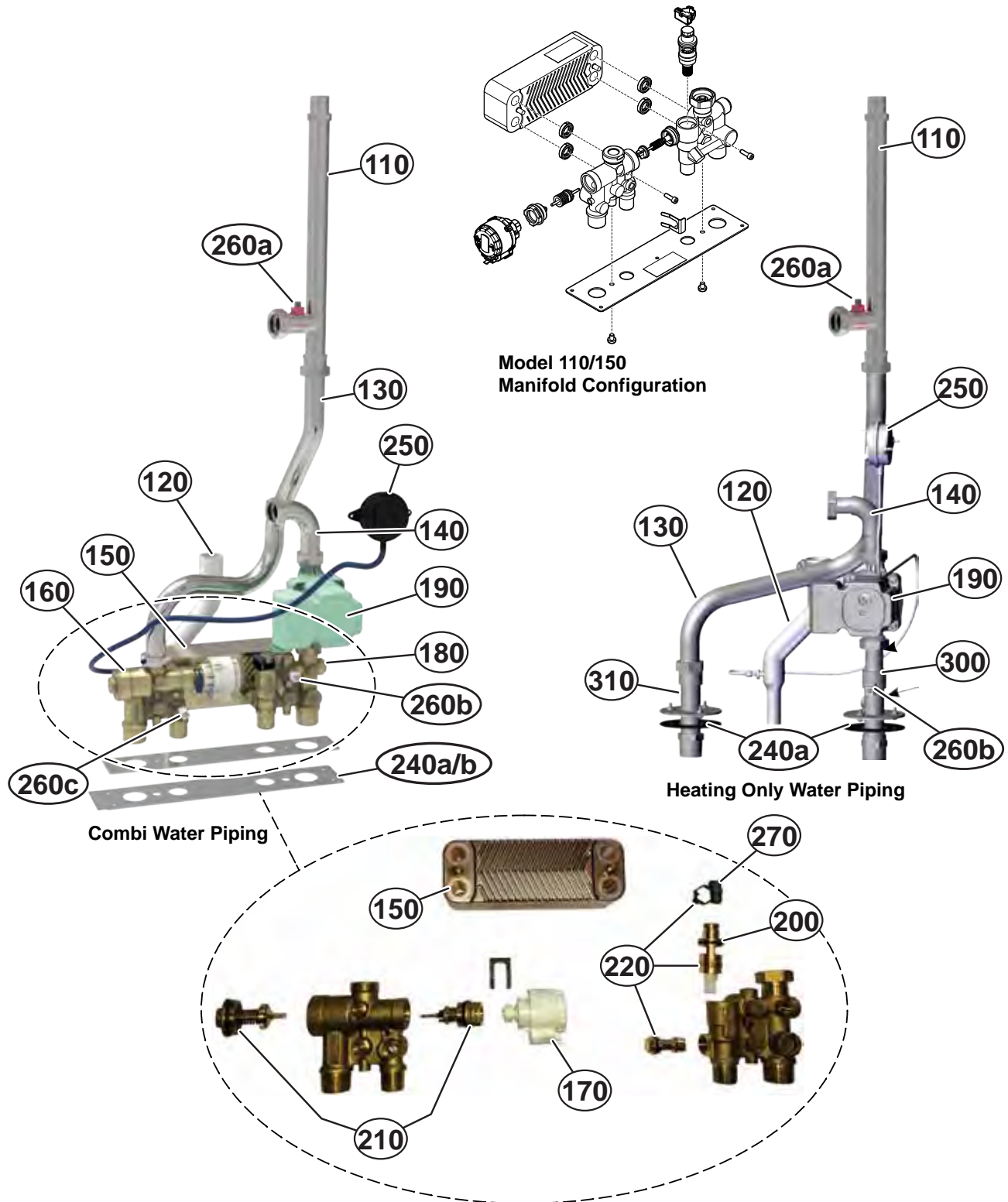
Figure 160 Heating Only water piping for ECO Tec 80/110/150/199 (see **Figure 161, page 179** for illustration)

Item	Name	Description / contents	Part Number
110	Pipe - water top		383-200-126
120	Condensate drain tube	With hose nipple	383-700-408
130	Pipe - water flex 1"		383-700-378
140	Pipe - water return		383-700-375
190	Circulator		383-700-379
240	DHW, return & supply gaskets	Gasket supply/return pipes to cabinet (199 Combi)	383-700-392
250	Pressure switch		383-700-329
260	Water temperature sensor (Qty 1)	a) boiler in temp. sensor, b) boiler out temp. sensor	383-700-319
300	Pipe - water return bottom	With sensor tapping	383-700-376
310	Pipe - water supply bottom		383-700-374

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Replacement Parts (continued)

Figure 161 Combi and Heating Only water piping for ECO Tec 80/110/150/199
 (see [Figure 159, page 178](#) or [Figure 160, page 178](#) for part numbers)



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Replacement Parts (continued)

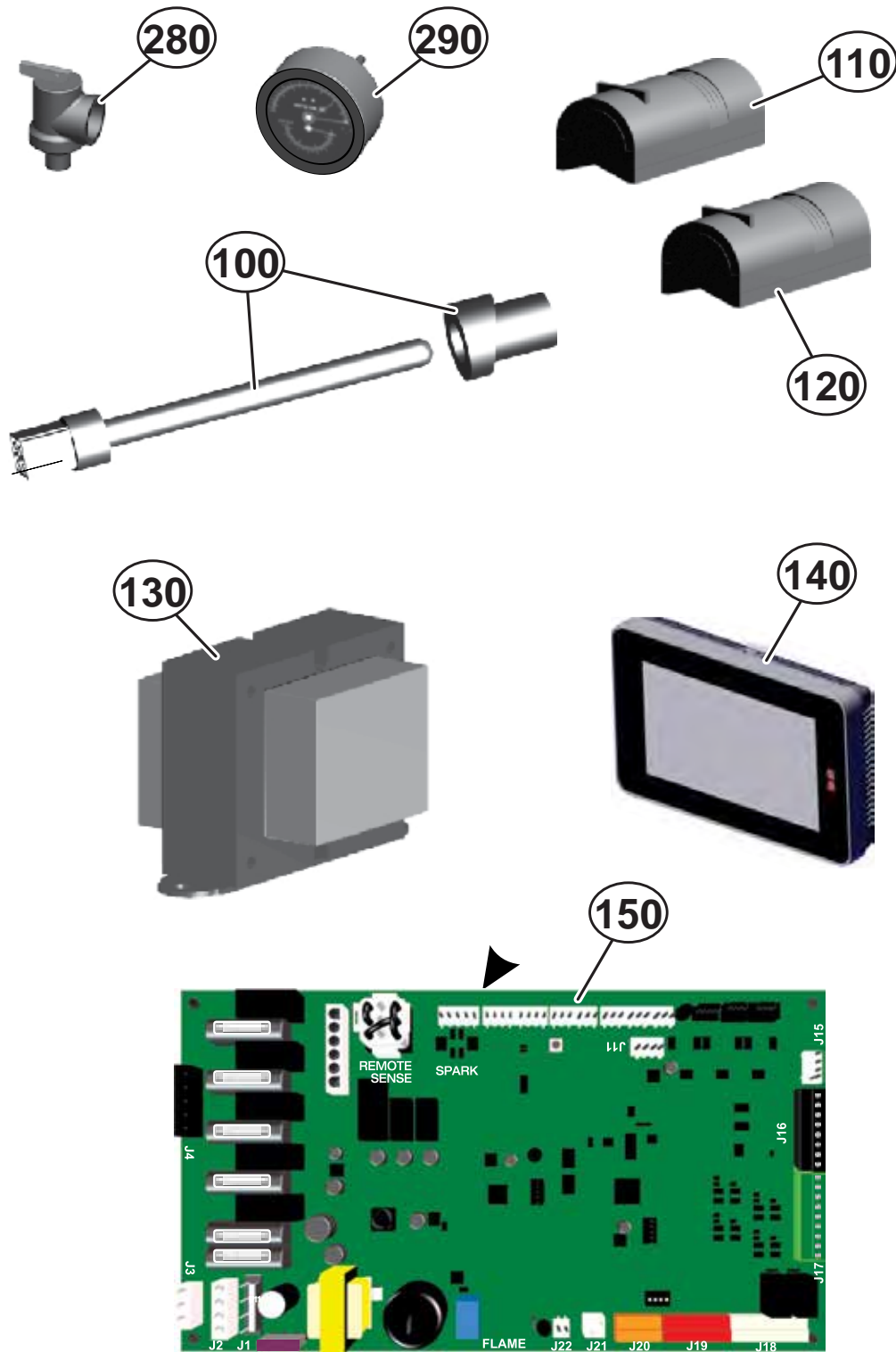
Figure 162 Controls and electrical components - ECO Tec 80/110/150/199 (see **Figure 163, page 181** for illustration)

Item	Name	Description / contents	Part Number
100	Flue temperature sensor & grommet	One (1) sensor & grommet	383-500-600
110	Outdoor temperature sensor		383-500-125
120	System temperature sensor	Two (2) sensors	383-700-371
130	Transformer 120V/50V/24V	50 VA transformer	383-700-320
140	Display board assembly	Includes circuit board and plastic housing	383-900-342
150	Control module assembly	Control module and housing Note: Please remove and save all plugs from original control board as some of the plugs will need to be reinstalled on new control board.	383-900-341
160	Wire harness — line voltage (not shown)		383-800-254
170	Wire harness — low voltage (not shown)		383-800-255
180	Ignition cable (not shown)		383-500-619
190	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	(Not shown — see Figure 141, page 160)	383-700-369
200	Jumper for low voltage terminal blocks (not shown)	Five (5) Jumpers	383-500-641
210	Connector electrical control (not shown)	Includes Eight (8) connectors	383-900-111
220	Low voltage sealed wire grommet (not shown)	Seals thermostat wire at entrance to cabinet	383-700-385
240	Harness - Display to control module (not shown)		383-800-258
250	Harness - Actuator (Combi only) (not shown)	110/150 199	383-200-139 383-700-353
260	Harness - Flow sensor (Combi only) (not shown)		383-700-354
270	Harness - Modbus wiring (not shown)		383-700-401
280	Relief valve	30 PSIG relief valve — shipped loose for field installation	383-500-095
290	Pressure & temperature gauge	Shipped loose for field installation	380-000-000

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Replacement Parts (continued)

Figure 163 Controls and electrical assemblies - ECO Tec 80/110 /150/199 (see [Figure 162, page 180](#) for part numbers)



7

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SECTION 8

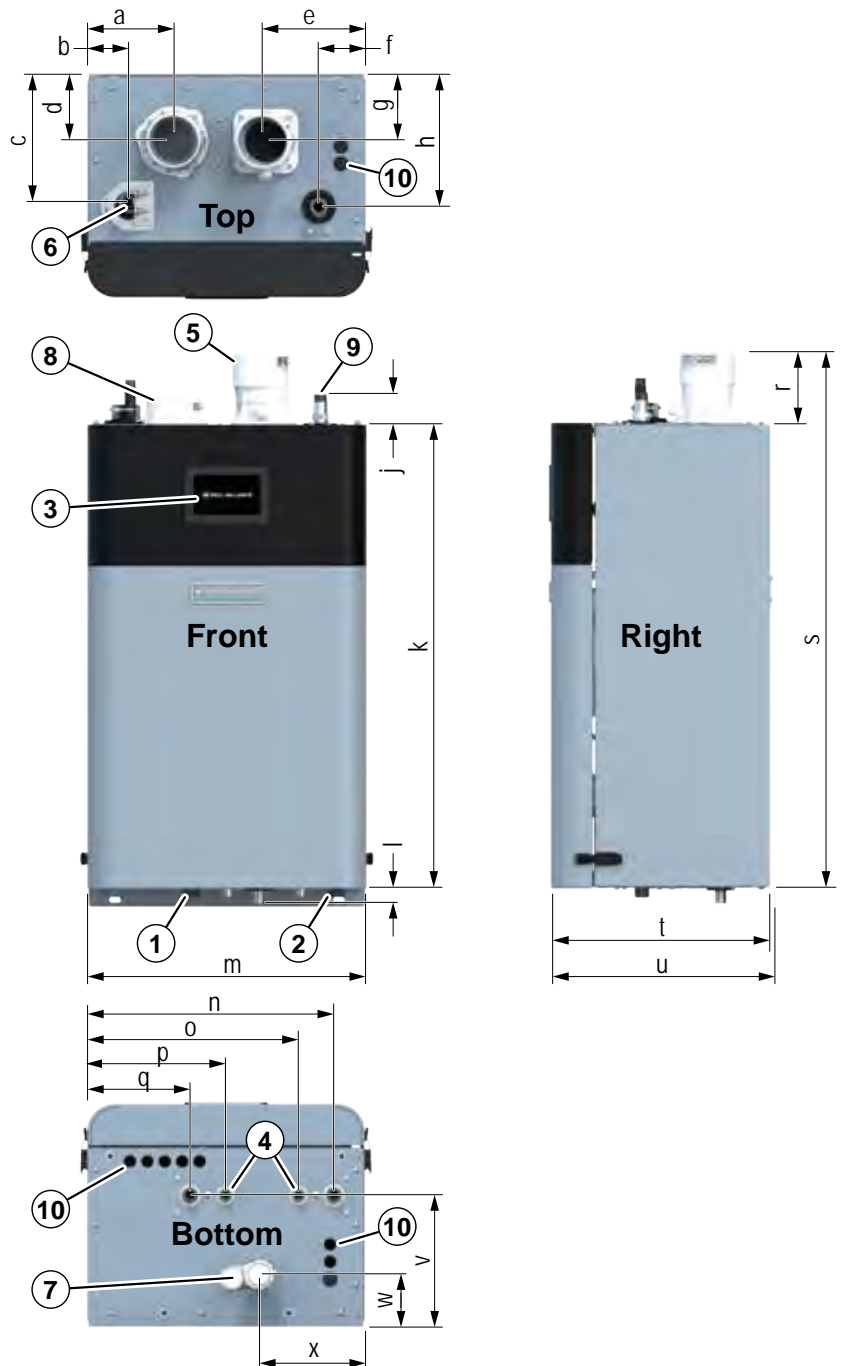
Service Information

Dimensions

Figure 164 Dimensional data — ECO Tec 80/110/150/199 (all dimensions in inches)

- 1) Boiler Out Tapping – ¾" Male NPT (110C/150C), 1" Male NPT (80HO / 110HO / 150HO / 199HO&C)
- 2) Boiler In Tapping – ¾" Male NPT (110C/150C), 1" Male NPT (80HO / 110HO / 150HO / 199HO&C)
- 3) Control Display and Navigation Buttons
- 4) DHW In/Out Tapping – ½" Male NPT (110/150), ¾" Male NPT (199)
- 5) Vent Connection: 3" PVC/PP/SS
- 6) Gas Connection ½" Male NPT
- 7) Condensate Tube Connection
- 8) Air Connection: 3" PVC
- 9) Boiler Connection for Relief Valve, LWCO, and Air Vent - ¾" Male NPT
- 10) Electrical Entrance Openings.

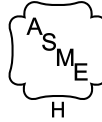
Dimension	Model 110/150	Model 199
a	6-3/16"	4-13/16"
b	3"	2.5"
c	9 1/4"	13"
d	4-13/16"	4-13/16"
e	7-5/8"	9-9/16"
f	3-3/8"	3-3/16"
g	4-13/16"	4-13/16"
h	9-1/2"	8"
j	1-5/8"	1-11/16"
k	33-5/16"	33-5/16"
l	1-5/16"	1-5/16"
m	20"	20"
n	17-13/16"	16-3/4"
o	15-1/4"	14-3/16"
p	10"	8 7/8"
q	7-7/16"	6-3/8"
r	5-1/8"	5-1/8"
s	38-1/4"	38-1/4"
t	15-11/16"	19-1/4"
u	16"	19-9/16"
v	9-1/2"	8"
w	3-3/4"	3-3/16"
x	7-5/8"	10-3/16"





Ratings – ECO Tec Boilers

Figure 165 Ratings and engineering data — ECO Tec 80/110/150/199



		AHRI Certified Ratings						% Input derate vs vent length (Values shown are at MAX vent/air pipe length – See Note 6) Direct Vent Venting ONLY			
Boiler Model	CSA Input	Heating Capacity	Seasonal Efficiency	Net Water Rating	Boiler Water Content	Vent/Air* Connection Diameter	Natural gas		Propane		
	ECO Tec	MBH (Note 5)	MBH (Note 2)	AFUE, % (Note 1)	MBH (Note 3)	Gallons	Inches (Note 4)	2" Vent/air piping	3" Vent/air piping	2" Vent/air piping	3" Vent/air piping
80	80	74	95.0	64	2.2	3" PVC/PP/SS	5 %	—	5 %	—	
110	110	100	95.0	87	2.2	3" PVC/PP/SS	10 %	5 %	10 %	5 %	
150	150	139	95.0	121	3.1	3" PVC/PP/SS	13 %	5 %	13 %	5 %	
199	199	184	95.0	160	3.8	3" PVC/PP/SS	13 %	5 %	13 %	5 %	

*Air connection is 3" PVC only

Notes

- As an Energy Star Partner, WM Technologies 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.
- 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 know as Annual Fuel Utilization Efficiency or Seasonal Efficiency.
- 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.
- 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.
 - ECO Tec vent/air pipes can be either 2" or 3". An adapter is required for 2" venting.
 - Air intake must be 3" PVC at the adaptor, Exhaust must be 3" PVC/PP/SS at the adaptor.
- All vent and air pipe elbows must be sweep elbows, NOT short-radius elbows.
- Ratings shown are for sea level applications only. For altitudes from sea level to 2,000 feet above sea level, the ECO Tec boiler requires no modifications and automatically derates itself by approximately 4% per 1000 feet above sea level.
- All of the boilers will automatically de-rate as vent/air pipe length increases, due to the pressure loss through the piping. For vent/air pipe lengths less than the maximum, the derate equals the value above (% Input derate vs. vent length) times vent length ÷ 100, for all except for the 199 - 2" venting. 199 -2" derate equals 13% times vent length ÷ 50.

THE OUTDOOR SENSOR SUPPLIED WITH THE BOILER MUST BE INSTALLED UNLESS EXEMPTED BELOW:

IMPORTANT

In accordance with **Section 303 of the 2007 Energy Act**, this boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

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

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



Ratings — ECO Tec Boilers (continued)

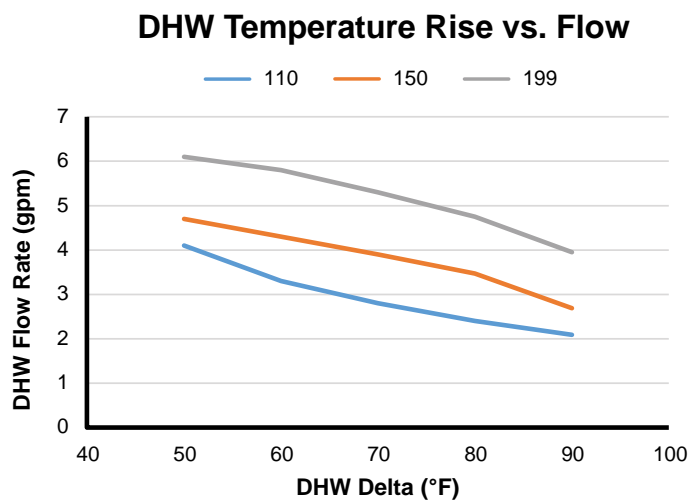
Figure 166 Engineering Data — ECO Tec 80/110/150/199 boilers

Boiler Model	Shipping weight	Operating weight	Water content	Water flow rate per boiler		Vent/air pipe size: (Provide a separate vent for each boiler)	Electrical service required
	Pounds per boiler	Pounds per boiler		GPM @ 20°F rise	GPM @ 40°F rise		Amps per boiler
	Note 1		Gallons per boiler			Note 2	Note 3
	HO / Combi	HO / Combi					
80	122	114	2.2	7.4	3.7	2" or 3"	15.0
110	122 / 132	114 / 124	2.2	10.0	5.0	2" or 3"	15.0
150	131 / 141	131 / 141	3.1	13.9	7.0	2" or 3"	15.0
199	138 / 148	144 / 154	3.8	18.4	9.2	2" or 3"	15.0

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 165, page 184 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 167 DHW Temperature Rise vs Flow (Chart 3)





Ratings – FCC Statement of Compliance

Figure 168 FCC information



Assembled From tested components Complete system not tested

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Installation and Service Certificate

Boiler Data		
Boiler Model / Series ECO Tec _____ / Series _____	Date installed _____	
Consumer Protection (CP) Number _____	FUEL: Natural _____ LP _____	Btu Input _____
<p>CERTIFIED THAT:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Installation instructions have been followed. <input type="checkbox"/> Check-out sequence has been performed. <input type="checkbox"/> Information on next two pages is certified to be correct. <input type="checkbox"/> Information received and left with owner/maintenance person. 		
<p>Installer _____</p>		
_____	_____	
(Company)	(Address)	
_____	_____	
(Phone)	(Installer's Signature)	

Read Configuration Settings

Bluetooth Connection

To access configuration settings, connect to Bluetooth.

1. Swipe right on the display to navigate to the Menu screen.
2. Press the <BLUETOOTH> button. See **Figure 169**.
3. Toggle the Bluetooth ON by pressing the blue toggle button. See **Figure 169**. Bluetooth will remain on for 30 minutes of inactivity.
4. Turn on the Bluetooth of your smartphone device.

Saving the Boiler Configuration

Connecting to the WM ProTools™ app allows the boiler configuration to be loaded, saved, and viewed. To download the app, point the smartphone camera at the QR code in **Figure 171**, then click the link on the screen.

1. Open the WM ProTools app. See **Figure 170**.
2. Press the <Connect> button.
3. Press <Connect to Boiler>.
4. Press the WM boiler to connect to on the screen.

IMPORTANT

If no boilers appear in the list, toggle the Bluetooth radio of the boiler off then on again. Wait for the Bluetooth screen of the display to connect via the app before navigating away from this screen.

5. Swipe down to view the connectivity options. Choose the <READ/WRITE Configuration> button.
6. Press <READ Configuration>. It takes several seconds to gather all configuration information of the boiler.
7. Review the information, then press <Save Configuration> at the bottom of the screen.
8. Choose a descriptive name for the saved configuration, then press the <Save> button.

IMPORTANT

Files are saved locally on the phone. If the app is uninstalled, all files are lost. Save the information for your records.

9. To view any saved files, at step 6 above press <WRITE Configuration> instead.
 - a. Choosing WRITE Configuration will bring up a list of configurations saved on your device.
 - b. Pressing any of the bubbles will open that file.

IMPORTANT

DO NOT WRITE a file unless certain the configuration is correct for your application.

Figure 169 Menu screen

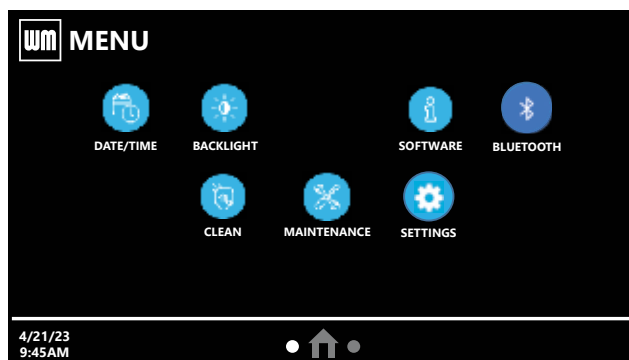


Figure 170 Toggle the Bluetooth connection

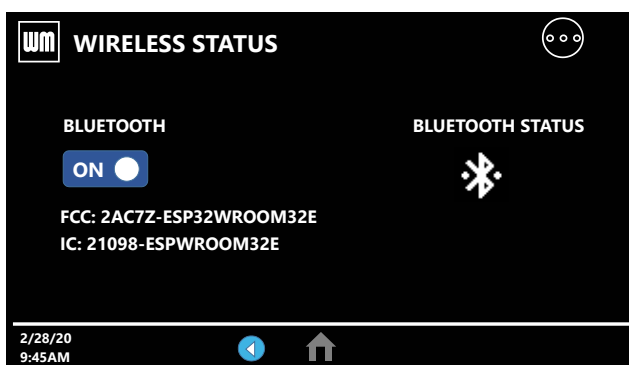


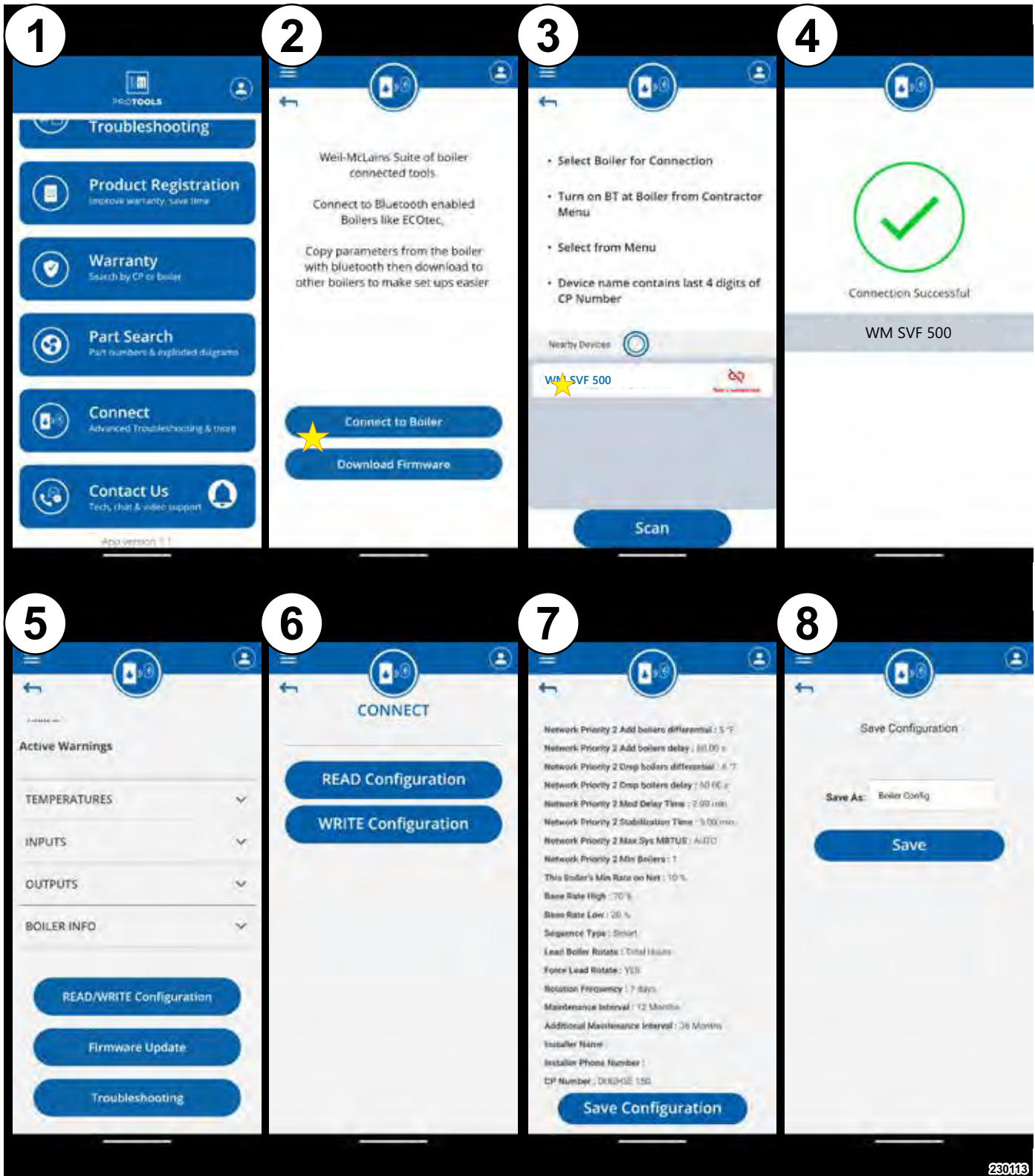
Figure 171 WM ProTools app download



10. Write Configuration is possible with the app. The Model number and Master/Shadow/Single settings must match the boiler for a successful Write Configuration to occur.



Figure 172 WM ProTools app navigation



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