

<b>Start-Up, Adjust, and Test</b>	<b>Yes</b>	<b>No</b>
Has the boiler been started?		
If necessary, has the boiler gas valve been adjusted?		
Has the installation been customized per installation location requirements?		
Have all customized system parameters been tested?		
Has proper boiler operation been confirmed?		
<b>Burner Flame</b>	<b>Yes</b>	<b>No</b>
Has the burner flame been checked?		
Have combustion values been verified with a calibrated combustion analyzer?		
If the flame does not appear normal, it may need to be cleaned by a qualified service technician. See Figure 53 for flame sight glass window location.		
<b>Final Installation Approvals</b>		
<b>Signed by Technician</b>	<b>Date</b>	

Table 35 - Installation Checklist

## Part 13 - Maintenance

### **DANGER**

The boiler must be inspected and serviced annually, preferably at the start of the heating season, by a qualified service technician. In addition, the maintenance and care of the boiler as outlined in this manual must be performed by the user/owner to assure maximum efficiency and reliability. Follow the maintenance procedures given throughout this manual. Failure to perform the service and maintenance or follow the directions in this manual could damage the boiler or system components, resulting in substantial property damage, severe personal injury, or death.

#### Check the Surrounding Area

### **DANGER**

To prevent the potential of substantial property damage, severe personal injury, or death, eliminate all the materials listed in Table 6 from the area surrounding the boiler and the vicinity of the combustion air intake. If contaminants are found:

- Remove products immediately from area.
- If contaminants have been there for an extended period, call a qualified service technician to inspect the boiler for possible damage from acid corrosion.

If products cannot be removed, immediately call a qualified service technician to re-pipe the combustion air intake piping away from the contaminated areas.

#### Combustible/Flammable Materials

Do not store combustible materials, gasoline, or other flammable vapors or liquids near the boiler. If found, remove these materials immediately.

#### Air Contaminates

If allowed to contaminate combustion air, products containing chlorine or fluorine will produce acidic condensate that will cause significant damage to the boiler. Read the list of potential contaminates and areas likely to have these contaminates in Table 6. If any of these contaminates are in the room where the boiler is located, or combustion air is taken from one of the areas listed, the contaminants must be removed immediately or the intake pipe must be relocated to another area.

#### Ensure the Boiler Cabinet is Closed

Ensure the boiler cabinet is closed. Tighten the two upper and lower screws to secure it. The cabinet must be closed while the boiler is running.

#### Check the Power Source

Make sure the power cord is properly connected. The main power line is connected to the manual switch box inside the boiler.

#### Check the Status of the Control Panel

Observe the Control Panel to ensure the boiler is powered on, and to check for any error codes. Clear any debris from the panel.

#### Check CH and DHW Pressure Gauges

- Ensure the pressure reading on the CH gauge does not exceed 30 psig. Higher pressure readings may indicate a problem with the expansion tank.
- Ensure the pressure reading on the DHW gauge does not exceed 150 psig. Higher pressure readings may indicate a problem with the domestic expansion tank.
- Contact a qualified service technician if problem persists.

#### Check Exhaust Vent and Intake Pipe Terminations

Verify that the boiler exhaust vent and intake pipe terminations are clean and free of obstructions. Remove any debris from the exhaust vent or intake pipe openings. If removing the debris does not allow the boiler to operate correctly, contact your qualified service technician to inspect the boiler and the vent system.

#### Check Exhaust Vent and Intake Piping

Visually inspect the exhaust vent for any signs of blockage, leakage, or deterioration of the piping. Inspect the exhaust vent bracing. Ensure bracing is undamaged and in good condition. Notify a qualified service technician immediately if any problems are found.

### **WARNING**

Failure to inspect the venting system and have it repaired by a qualified service technician can result in vent system failure, causing severe personal injury or death.

#### Check Pressure Relief Valve

- Visually inspect the primary pressure relief valve and discharge pipe for signs of weeping or leakage.
- If the pressure relief valve often weeps, the expansion tank may not be operating properly. Immediately contact a qualified service technician to inspect the boiler and system.

#### Check the Condensate Drain System

- While the boiler is running, check the discharge end of the condensate drain tubing. Ensure no flue gas is leaking from the condensate drain tubing by holding your fingers near the opening.

- If you notice flue gas leaking from the opening, this indicates a dry condensate drain trap. If problem persists, contact a qualified service technician to inspect the boiler and condensate line and refill the condensate trap.
- If applicable, check the condensate neutralizer and ensure it is full of condensate neutralizing marble chips.

#### Check the Air Vent

Loosen cap one counterclockwise turn to allow air vent to operate. See Figure 55. If the air vent works freely without leaking, close the valve by turning clockwise. If vent does not operate correctly, contact a qualified service technician to replace the vent.

#### Check Primary and Gas Piping

- Remove the boiler cover and perform a gas leak inspection following Operating Instructions, page 2, this manual. If gas odor or leak is detected, follow procedures on page 2. Call a qualified service technician.
- Visually inspect for leaks around the boiler water connections and around the heat exchanger. Visually inspect the external system piping, circulators, and system components and fittings. Immediately call a qualified service technician to repair any leaks

### WARNING

Have leaks fixed at once by a qualified service technician. Failure to comply could result in substantial property damage, severe personal injury, or death.

#### Operate Pressure Relief Valve

- Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.
- Shut power off to the boiler. To avoid scalding, wait for boiler to cool before operating the relief valve.

### WARNING

To avoid water damage or scalding due to relief valve operation, a discharge line must be connected to the valve outlet and directed to a safe place of disposal. This discharge line must be installed by a qualified service technician in accordance with the boiler installation manual. The discharge line must be terminated so as to eliminate possibility of severe burns or property damage should the valve discharge.

- Lift the relief valve lever. If water flows freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the lever again to attempt to clean the valve seat. If the valve does not properly seat and continues to weep, contact a qualified service technician to inspect the valve and system.
- If water does not flow from the valve when you completely lift the lever, the valve or discharge line may be blocked. Immediately shut the boiler down per instructions on page 2 and call a qualified service technician to inspect the valve and system.
- If relief valve seats properly, restore power to the boiler. Observe operation for five minutes and ensure it operates properly.

#### Check the Burner

Clean the exterior of the burner.

#### Flushing the CH Closed Loop Heat Exchanger

Flushing the heat exchanger is a complicated procedure that should only be performed by a qualified service technician. It is recommended to flush the heat exchanger annually if water hardness exceeds 12 grains per gallon (considered extremely hard water). If water hardness falls below 12 grains per gallon it is recommended to flush the heat exchanger every two to three years.

**NOTE:** Improper maintenance WILL VOID boiler warranty.

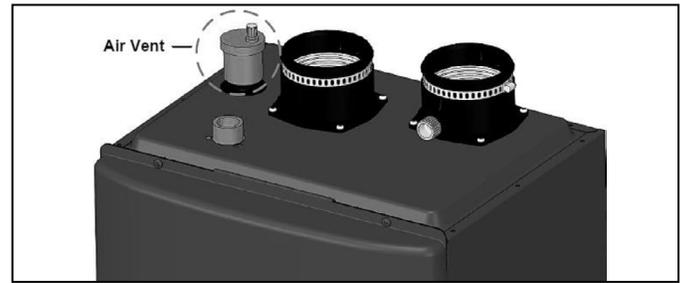


Figure 55 - Air Vent Detail

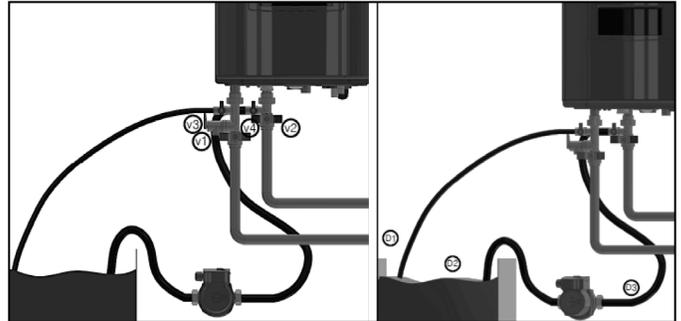


Figure 56 - Flushing the CH Closed Loop Heat Exchanger

1. Initiate a CH thermostat call to position the 3 way valve in CH Mode.
2. Disconnect electrical power to the boiler when the blower icon appears on the display panel.
3. Close the shutoff valves on both CH supply and CH return lines (V1 and V2). See Figure 56.
4. Connect one hose (D1, Figure 56) to the valve (V3) and place the free end in a bucket. Connect one of the hoses (D3) to the circulation pump outlet and the cold water inlet line to valve V4. Connect the other hose (D2) to the circulation pump inlet and place the free end in the bucket.
5. Pour tankless cleaning solution into the bucket. Use an FDA approved cleaner for potable systems on the heat exchanger. Place the drain hose (D1) and hose D2 to the pump inlet in the cleaning solution.
6. Open service valves (V3 and V4) on the hot water outlet and cold water inlet lines.
7. Turn on the circulation pump. Operate the pump and allow the cleaning solution to circulate through the boiler for at least 1 hour at a rate of 4 gallons per minute.
8. Rinse the cleaning solution from the heat exchanger as follows:
  - a. Remove the free end of drain hose D1 from the bucket.
  - b. Close service valve V4 and open shutoff valve V2.
  - c. Do not open shutoff valve V1.
  - d. Allow water to flow through the boiler for 5 minutes.
  - e. Close shutoff valve V2.
9. Disconnect hoses from lines. Properly dispose of used cleaning solution.
10. Remove the CH filter from the boiler and clean out any residues.
11. Repeat process on the DHW loop of the boiler.

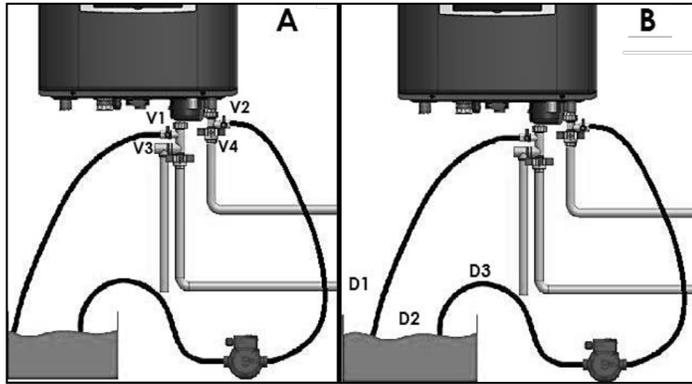
#### Flushing the DHW Loop Heat Exchanger

Flushing the heat exchanger is a complicated procedure that should only be performed by a qualified service technician. It is recommended to flush the heat exchanger annually if water hardness exceeds 12 grains per gallon (considered extremely hard water). If water hardness falls below 12 grains per gallon it is recommended to flush the heat exchanger every two to three years.

**NOTE:** Improper maintenance WILL VOID boiler warranty.

1. Disconnect electrical power to the boiler.
2. Close the shutoff valves on both hot water outlet and cold water inlet lines (V1 and V2). See Figure 57-A.
3. Connect one hose (D1, Figure 57-B) to the valve (V3) and place the free end in a bucket. Connect one of the hoses (D3) to the circulation

pump outlet and the cold water inlet line to valve V4. Connect the other hose (D2) to the circulation pump inlet and place the free end in the bucket.



**Figure 57 - Flushing the DHW Loop**

4. Pour tankless cleaning solution into the bucket. Use an FDA approved cleaner for potable systems on the heat exchanger. Place the drain hose (D1) and hose D2 to the pump inlet in the cleaning solution.
5. Open service valves (V3 and V4) on the hot water outlet and cold water inlet lines.
6. Turn on the circulation pump. Operate the pump and allow the cleaning solution to circulate through the boiler for at least 1 hour at a rate of 4 gallons per minute.
7. Rinse the cleaning solution from the heat exchanger as follows:
  - a. Remove the free end of drain hose D1 from the bucket.
  - b. Close service valve V4 and open shutoff valve V2.
  - c. Do not open shutoff valve V1.
  - d. Allow water to flow through the boiler for 5 minutes.
  - e. Close shutoff valve V2.
8. Disconnect hoses from lines. Properly dispose of used cleaning solution.
9. Remove the DHW inlet filter from the boiler and clean out any residues.

**Cleaning the CH and DHW Inlet Filters (Draining the Boiler)**

1. Place a bucket under the boiler to collect the residual water inside the boiler.
2. Press the Power button on the control panel to turn off the electrical power to the boiler. Then turn off the gas valve.
3. Valve off the boiler from the system. If the boiler cannot be isolated from the system, turn off the main water valve.
4. Open the hot water faucets in the system to aid in draining the system.

**WARNING**

Water drained from the boiler could be scalding hot. Wait for the boiler to cool before removing the CH or DHW inlet filters. Failure to do so could result in property damage, personal injury, or death.

5. Remove the DHW inlet filter. Then clean it with a toothbrush and clean running water. See Figure 58.



**Figure 58 - Cleaning the Inlet Filters**

6. Reinstall the DHW inlet filter.
7. Purge air from the DHW lines by opening a hot water faucet in the system. When water flows freely, all air is purged.
8. Repeat the process on the CH inlet filter on the boiler.
9. Restore water service to the boiler by opening the isolation valves, or turning on the main water valve.

10. Turn on the gas valve. Turn on electrical power to the boiler and press the Power button to turn the boiler on.

11. Reinsert the filter and ensure the filter cap is securely tightened.

12. Connect electrical power to the boiler.

**DANGER**

The condensate trap assembly **MUST BE PROPERLY INSTALLED** according to these instructions when operating the boiler. Operating the boiler without the condensate trap assembly will cause flue gases to leak and result in serious personal injury or death.

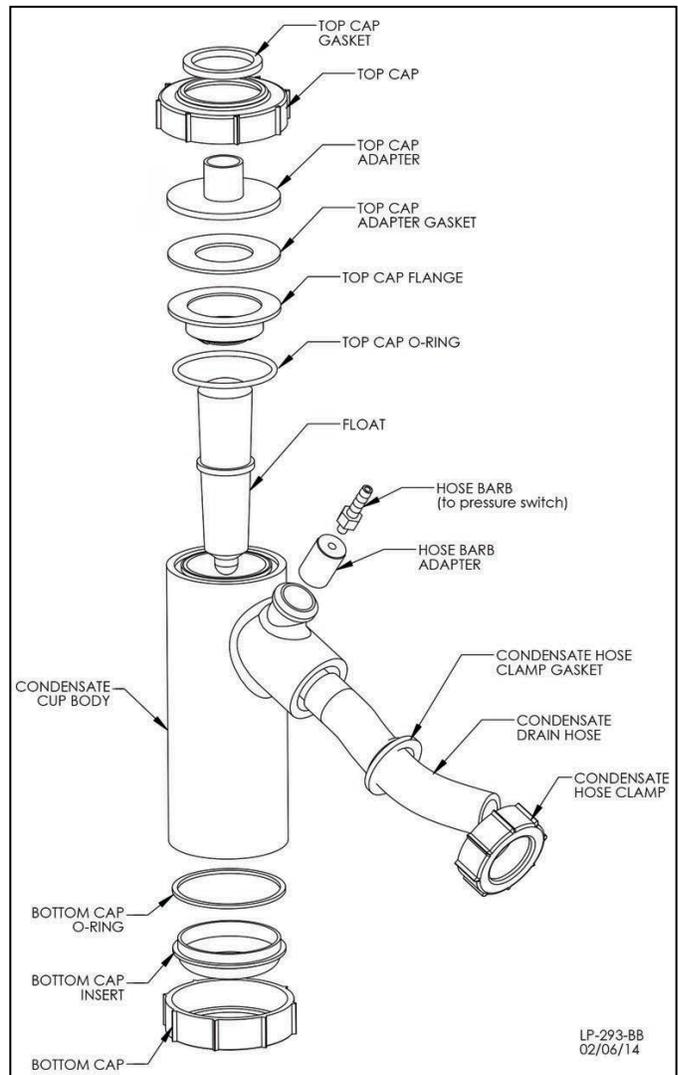
**WARNING**

When servicing is complete, make sure the condensate collector cap is replaced securely. Failure to do so will cause venting issues that will result in serious injury or death.

**Maintaining the Condensate System**

1. Ensure the boiler is powered off and has had time to cool.
2. Remove the hose clamp attaching the condensate trap to the condensate hose from the heat exchanger. Remove the clear plastic hose from the hose barb. Remove the condensate hose clamp to detach the condensate trap from the drain tube. Remove the condensate trap from the boiler.
3. Remove the bottom cap from the condensate trap.
4. Flush trap with fresh water to remove debris from the trap.

**NOTE:** Ensure the float moves freely within the trap. If the float does not move, **DO NOT** reinstall the trap.



**Figure 59 - Condensate Detail**

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5. When the condensate trap is sufficiently clean, reinstall the bottom cap on the trap.

**NOTE:** Ensure all parts shown in Figure 59, Condensate Detail, are installed with the condensate trap. If any parts are missing DO NOT reinstall the trap. Replace the entire assembly.

### WARNING

Do not install the condensate assembly if a component is lost or missing. Replace the entire assembly. Failure to follow this warning could result in property damage, serious personal injury, or death.

6. Fill the condensate trap with fresh water prior to reassembly on the boiler.

7. Install the condensate trap on the condensate hose from the heat exchanger. Use the hose clamp to secure the trap. Attach the clear plastic hose onto the hose barb. Reinstall the condensate hose clamp to detach the condensate trap from the drain tube.

### WARNING

Do not operate the boiler without the clear hose attached from the hose barb to the pressure switch. Failure to follow this warning could result in property damage, serious personal injury, or death.

8. If a condensate neutralizer kit is installed with the boiler, check the assembly when cleaning the condensate trap, and replenish the limestone chips if necessary. When replacing the limestone chips, take care to ensure chips are no smaller than ½" to avoid blockage in condensate piping (for piping details, refer to condensate neutralizer installation instruction.)

9. Check condensate piping for sagging and/or leakage. Repair any sags or leaks before restoring power to the boiler.

### CAUTION

It is very important that the condensate piping be no smaller than ¾". To prevent sagging and maintain pitch, condensate piping should be supported with pipe supports, and pitched ¼" per foot to allow for proper drainage.

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

10. If the boiler has a condensate pump, ensure the pump operates properly before considering maintenance complete.

## Maintenance Report

### CAUTION

In unusually dirty or dusty conditions, care must be taken to keep boiler cabinet door in place at all times. Failure to do so VOIDS WARRANTY!

### WARNING

Allowing the boiler to operate with a dirty combustion chamber will hurt operation. Failure to clean the heat exchanger as needed by the installation location could result in boiler failure, property damage, personal injury, or death. Such product failures ARE NOT covered under warranty.

The combustion chamber insulation in this product contains ceramic fiber material. 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 a 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 job site conditions. Current NIOSH recommendations can be found on the NIOSH website: <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this website.
- Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining to prevent dust.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

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

The boiler requires minimal periodic maintenance under normal conditions. However, in unusually dirty or dusty conditions, periodic vacuuming of the cover to maintain visibility of the display and indicators is recommended.

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the boiler. Installer must also inform the owner that the lack of proper care and maintenance of the boiler may result in a hazardous condition.

INSPECTION ACTIVITIES		DATE LAST COMPLETED			
PIPING		1st YEAR	2nd YEAR	3rd YEAR	4th YEAR*
Near boiler piping	Check boiler and system piping for any sign of leakage. Leaking pipes could cause property damage. Make sure all piping is properly supported. Flush tankless heat exchanger annually (more in hard water conditions). See User's Information manual for instructions.				
Vent	Check condition of all vent pipes and joints. Ensure all vent piping is properly supported. Check for obstructions exhaust and intake termination points.				
Gas	Check Gas piping, test for leaks and signs of aging. Make sure all pipes are properly supported.				
<b>SYSTEM</b>					
Visual	Do a full visual inspection of all system components.				
Functional	Test all functions of the system (central heat, water heating, Safeties)				
Temperatures	Verify safe settings on boiler or Anti-Scald Valve				
Temperatures	Verify programmed temperature settings				
<b>ELECTRICAL</b>					
Connections	Check wire connections. Make sure they are tight.				
Smoke and CO detector	Verify devices are installed and working properly. Change batteries if necessary.				
Circuit Breakers	Ensure the circuit breaker is clearly labeled. Exercise circuit breaker.				
Switch and Plug	Verify ON/OFF switch and convenience plug are both functional				
<b>CHAMBER/BURNER</b>					
Combustion Chamber	Check burner tube and combustion chamber coils. Clean according to maintenance section of manual. Vacuum combustion chamber.				
Spark Electrode	Clean. Set gap at 1/8".				
<b>CONDENSATE</b>					
Condensate Trap	Clean debris from the condensate trap. Fill with clean water.				
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate hose	Disconnect condensate hose. Clean out dirt and re-install. <b>(NOTE: Verify the flow of condensate, making sure that the hose is properly connected during final inspection.)</b>				
<b>GAS</b>					
Pressure	Measure incoming gas pressure (3.5" to 14" W.C.)				
Pressure Drop	Measure drop in pressure on light off (no more than 1" W.C.)				
Check for leaks	Check gas piping for leaks. Verify that all are properly supported.				
<b>COMBUSTION</b>					
CO/CO2 Levels	Check CO and CO2 levels in Exhaust. Record at high and low fire.				
<b>SAFETIES</b>					
ECO (Energy Cut Out)	Check continuity on Flue and Water ECO. Replace if corroded.				
<b>CH AND DHW LOOPS</b>					
	It is recommended to flush the CH and DHW heat exchangers annually if water hardness exceeds 12 grains per gallon (considered extremely hard water). If water hardness falls below 12 grains per gallon it is recommended to flush the heat exchanger every two to three years. It is also recommended to clean the CH and DHW inlet filters annually.				
<b>FINAL INSPECTION</b>					
Check list	Verify that you have completed entire check list. WARNING: FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.				
Homeowner	Review what you have done with the homeowner.				
<b>TECH SIGN OFF</b>					

Table 36 - \*Continue annual maintenance beyond the 4<sup>th</sup> year as required.