

XIV Trouble Shooting

A. Combustion

- 1) Nozzles - The selection of the nozzle supplied with the FWZ boiler is the result of extensive testing to obtain the best flame shape and efficient combustion. Other brands of the same spray angle and pattern may be used but may not perform at the expected level of CO₂ and smoke. Nozzles are delicate and should be protected from dirt and abuse. Nozzles are mass-produced and can vary from sample to sample. For all of those reasons a spare nozzle should be part of a serviceman's replacement parts inventory.
- 2) Flame Shape - As seen for the observation port, the flame should appear straight with no sparklers rolling up toward the crown of the chamber. If the flame drags to the right or left, sends sparklers upward or makes wet spots on the chamber walls, the nozzle should be replaced. If the condition persists look for fuel leaks, air leaks, water or dirt in the fuel as described below.
- 3) Fuel Leaks - Any fuel leak between the pump and the nozzle will be detrimental to good combustion results. Look for wet surfaces in the air tube, under the ignitor and around the air inlet. Any such leaks should be repaired as they may cause erratic burning of the fuel and in the extreme case may become a fire hazard.
- 4) Air Leaks - Any such leaks should be repaired as they may cause erratic burning of fuel and in extreme cases may become a fire hazard.
- 5) Gasket Leaks - If CO₂ readings between 11.5% and 12.8% with a #1 smoke cannot be obtained in the breeching, or if odors are observed, look for leaks around the burner mounting gasket, observation door and canopy gasket, or in the breeching below the point where the flue gas sample is taken. Air leakage into the boiler or breeching can cause low CO₂ readings (the lower the firing rate, the greater effect an air leak can have on CO₂ readings). Such leaks can also cause flue gas leakage into the building, resulting in odor complaints.
- 6) Dirt - The use of a fuel filter is good practice. Accidental accumulation of dirt in the fuel system can clog the nozzle or nozzle strainer and produce a poor spray pattern from the nozzle. The smaller the firing rate, the smaller the slots in the nozzle and the more prone to plugging it becomes.
- 7) Water - Water in the fuel in large amounts will stall the fuel pump. Water in the fuel in smaller amounts will cause excessive wear on the pump. More importantly it chills the flame and causes smoke and unburned fuel to pass through the combustion chamber and clog the flueways of the boiler.
- 8) Cold Oil - If the oil temperature near the fuel pump is 40°F or lower, poor combustion or delayed ignition may result. Cold oil is harder for the nozzle to atomize, thus the oil droplets get larger and travel further creating a longer flame. An outside fuel tank that is above grade or has fuel lines in a shallow bury is a good candidate for cold oil. The best solution is to bury the tank and lines deep enough to keep the oil above 40°F. Be sure to follow any state and local codes when burying fuel oil tanks and/or fuel oil lines.
- 9) Start-Up Noise - Delayed ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.
- 10) Shut Down Noise - If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.

TEST PROCEDURE FOR FUEL SIDE PROBLEMS

A good test for isolating fuel side problems is to disconnect the fuel system and with a 24" length of tubing, fire the burner out of an auxiliary five gallon pail of clean, fresh, warm #2 fuel oil from another source. If the burner runs successfully when drawing out of the auxiliary pail then the problem is isolated to the fuel or fuel lines being used on the installation.

B. Control System

The following pages contain trouble shooting tables for use in diagnosing control problems. When using these tables the following should be kept in mind:

- 1) This information is only meant to be used by a professional heating technician as an aid in diagnosing boiler problems.
- 2) Where applicable, follow all precautions outlined in the Section XI (Start-up and Checkout).
- 3) In general, these tables assume that there are no loose or miswired electrical connections. Before using these tables inspect all electrical connections on the boiler to make sure that they are tight. Also, check the wiring on the boiler against the wiring diagram in Figures 10.0 and 10.1. Ensure that incoming 120 VAC power polarity is correct and that the boiler is properly grounded.
- 4) All controls on the boiler are tested at least once in the manufacturing process and a defective control or component is generally the least likely cause. Before replacing a component, try to rule out all other possible causes.

C. If Display is Blank

Check for 120 VAC across L1 and L2. If voltage not present turn on system power. If voltage is present check polarity. If polarity is correct replace the control.

D. If Control Shows *Err* Code

Use Table 14.0 to help identify and correct the cause of the problem.

E. If Control Shows *SEt* Code, but Other Problem Present

If no *Err* Code is observed (even after repeatedly pressing **I** to cycle through Operation Mode), use Table 14.1 to help identify and correct the cause of the problem.

TABLE 14.0 - ERROR CODES

Error Code	Meaning	Possible Cause
1	Temperature Sensor Fault	<ul style="list-style-type: none"> • Loose connection between sensor and control • Sensor wire damaged • Defective Sensor • Defective control
2	Communication Fault	<ul style="list-style-type: none"> • Enviracom wiring is shorted to ground or line voltage • Field wiring to external Enviracom device is incorrect.
3	Internal electronics failure	<ul style="list-style-type: none"> • AC power supply frequency problem • Possible internal problem with boiler control. Cycle power to the boiler and replace control if problem persists.
4	Burner Output (B1) Fault	<ul style="list-style-type: none"> • Application of power to B1 from external source (control miswired) • Possible internal problem with boiler control. Cycle power to the boiler and replace control if problem persists.
5	Line voltage error (Supply voltage too high or low)	<ul style="list-style-type: none"> • Power supply voltage is incorrect (should be 120VAC nominal)
6	Open fuse in L7248L	<ul style="list-style-type: none"> • Incorrectly wired burner primary control (See Section X).
7	User settings lost (reset to factory defaults)	<ul style="list-style-type: none"> • Clear error by entering and exiting the Adjustment mode (and changing settings back to user values as needed). Replace control if problem persists.
8	L7248L Lockout	<ul style="list-style-type: none"> • Set if Err 4 was invoked four times in a row. Check wiring and clear Lockout by pressing all three user keys for 30 seconds.

TABLE 14.1 - FAULTS WITHOUT ERROR CODE PRESENT

Displayed Codes	Problem	Possible Cause
5tA 1 hr OFF dh OFF	Burner and Circulator Off	<ul style="list-style-type: none"> • Thermostat/s not calling for heat • Loose connection in thermostat, zone valve end switch, or zone panel wiring. • Thermostat, zone valve, or zone panel miswired • Defective thermostat, zone valve, or zone panel
5tA 1 hr On	Burner Off Circulator On Boiler Warm	<ul style="list-style-type: none"> • Boiler off on high limit (normal operation) • Boiler off on thermal purge (normal operation - See Table 12.6)
hr On	Heating Circulator Off	<ul style="list-style-type: none"> • Heating Circulator is being forced off on DHW priority (normal operation if Pt=ON - see Table 12.7). • See causes for “DHW Circulator off“ below
dh On	DHW Circulator Off	<ul style="list-style-type: none"> • Loose connection in circulator wiring • Defective circulator • Circulator is running, but system problem is preventing circulation
5tA 8	Burner Off No LEDs illuminated on Burner Primary control	<ul style="list-style-type: none"> • External Limit or LWCO is open. • Burner is unplugged • Loose connection between L1-L2 on L7248L and burner • Loose or missing T-T jumper on burner primary control.
5tA 8	Burner Off LED is illuminated on Burner Primary control	<ul style="list-style-type: none"> • Consult burner documentation for cause of problem.