

1. General Installation Information (to be completed by technician)

Date installed: _____

Location (city & state): _____

Cleaner's name: _____

National Board number (boiler): _____

Installed by (company): _____

Installed by (technician): _____

2. Clearances and Boiler Room

2.1. Boiler placement

- 2.1.1. Lattner recommends a minimum of 36" clearance from the all sides of the boiler to any combustible surface.

2.2. Combustion air

- 2.2.1. Boiler room must be vented with a 22" x 22" opening (minimum). If other combustion equipment is present, vent may need to be larger.

3. Connections

3.1. Feedwater inlet 1"

- 3.1.1. Install two (2) 1" spring-loaded check valves for use with steam boilers.

3.2. Blowdown outlet 1"

- 3.2.1. Install one (1) 1" slow-opening y-type valve and one (1) 1" quick-opening ball valve for use with steam boilers rated at 200 psi design pressure. Lattner recommends using schedule 80 pipe for blowdown piping. Never reduce blowdown piping.

3.3. Steam outlet 1-1/4"

- 3.3.1. Install one (1) 1-1/4" rising stem main steam stop valve. Lattner recommends installing a 2" x 6' steam header (pipe) as close to the boiler as possible for reserve and surge steam storage. Steam line should be pitched downward, away from the boiler toward the first steam trap.

3.4. Stack connection 8"

- 3.4.1. Install double wall stack per ANSI Z2231.1, appliance category III for positive pressure boilers. Boiler must be vented separately from all other equipment. Limit stack connection to two (2) 45 degree elbows. Avoid any horizontal runs of stack.

3.5. Gas train/connection 1"

- 3.5.1. Lattner recommends a gas supply line the same size or larger than the gas train. Do not reduce the gas line at any point to less than 1".



3.6. Grounding

- 3.6.1. Verify that green ground wires are securely attached to grounding screw in boiler panel box. In addition to the grounding wire provided, Lattner recommends grounding the boiler/burner package with a grounding rod. Grounding rods are available at most hardware stores. Follow the instructions included with the grounding rod.

3.7. Electrical connection 120/1/60

- 3.7.1. All wiring must be done in strict accordance with the National Electrical Code. The boiler requires a 120 volt single phase connection with a separate fused disconnect (supplied by installer or contractor) and a 20 amp circuit breaker (supplied by installer or contractor).

- 3.7.2. Wire the boiler feed pump/motor to pump contactors in panel box (see Lattner wiring diagram supplied with boiler).

- 3.8. Connect the power supply to the terminals in the panel box (see Lattner wiring diagram supplied with boiler).

3.9. Pressure Control Settings

- 3.9.1. The controls operate as follows:

3.9.1.1. Operating control - This control allows the burner to fire at its maximum rate.

3.9.1.2. Limiting control - This control stops the burner from firing when a pre-set maximum pressure has been reached.

- 3.9.2. The controls should be set as follows:

3.9.2.1. Adjust the operating control to a 85 psi. Adjust the differential setting to 10 to 15 psi.

3.9.2.2. Adjust the limiting control to a pressure not greater than 115 psi.

3.9.3.

4. Burner Start-Up

4.1. Required equipment for burner start-Up

4.1.1. Combustion analyzer

4.1.2. "U" tube manometer or aneroid gas pressure gauge

4.2. Procedure¹

4.2.1. Before attempting start up, thoroughly study and familiarize yourself with the exact sequence of operation. This information will be found in bulletins supplied with the burner, as well as technical bulletins covering other components. All of these should be used as reference material in burner start up and service.

4.2.2. Check boiler water level. Water level should be approximately 2" to 3" above bottom of sight glass.

4.2.3. Attach gas pressure gauge or manometer to upstream side of main gas cock and to burner side orifice tee. See Section 4.3 for gas pressure requirements at all locations. Verify that there's at least 4" pressure at tee.

4.2.4. Make certain that all dampers in flue or stack are in wide open position, or positioned appropriately for start up.



- 4.2.5. Insert combustion analyzer probe in stack. Drill a 1/2" hole in double wall stack 6" above stack outlet.
- 4.2.6. Review instructions for operating combustion analyzer (Bacharach manual). Turn on combustion analyzer. Place in a position where analyzer can be read while making adjustments to the combination gas valve and air shutter.
- 4.2.7. Make sure the pump switch is in the "ON" position.
- 4.2.8. Turn on boiler.
- 4.2.9. Boiler should enter purge cycle lasting approximately 90 seconds.
- 4.2.10. After 90 seconds, boiler should make a clicking sound and pilot burner should light. Immediately thereafter the main burner should light. Visual flame confirmation can be made through the observation port on the back side of the boiler (centerline, near the bottom of the boiler).
- 4.2.11. Allow boiler to run for 60 seconds. Establish data baseline on combustion analyzer (save data on analyzer).
- 4.2.12. Depending on data, make appropriate adjustments to combination gas valve and air shutter on the back of the blower assembly. Make only small, incremental adjustments to both until combustion data meets or exceeds analysis objectives below (section 4.3).

4.3. Critical Data & Combustion Analysis Objectives

Constituent	Value
Fuel	Natural Gas
Supply Voltage	120/1/60
Operating Principle	ON/OFF
BTU Rating	398 MBH
Minimum Gas Inlet Pressure	6" w.c.
Maximum Gas Inlet Pressure	9" w.c.
Manifold Pressure	4" w.c.
Oxygen (O ₂)	5% to 6%
Carbon Dioxide (CO ₂)	0% to 10%
Carbon Monoxide (CO)	Less than 400 ppm
Nitrogen Oxides (NO _x)	Less than 25 ppm (uncorrected for 3% O ₂)
Stack Temperature	375° F to 425° F
Efficiency	80% to 82.5%

5. Troubleshooting²

5.1. Burner fails to start

- 5.1.1. Bad fuse or switch open on incoming power source, or motor overload out.
- 5.1.2. Control circuit has an open control such as operating, limit or low water cut-off.
- 5.1.3. Reset button on motor or flame safeguard programming control open. Push reset button.
- 5.1.4. Loose or faulty wiring. Tighten all terminal screws. Check wiring against wiring diagram furnished with burner.

5.2. Burner motor runs but pilot does not light

- 5.2.1. Be sure gas is turned on at meter and pilot cock is open.



- 5.2.2. Place hand on pilot valve to feel it open. Check gauge at tee in pilot line for gas pressure and prompt opening of pilot valve.
- 5.2.3. Check visually or by sound for spark arcing.
- 5.2.4. Check air switch and be sure its circuit closes during start. Be sure timing card is inserted into flame safeguard.
- 5.3. Burner motor runs and pilot lights but main gas valve does not open
 - 5.3.1. Check flame signal. If low, adjust pilot gas pressure and air settings for improved readings.
 - 5.3.2. Check gas valve circuit, both main valve and proof of closure switch.
 - 5.3.3. Main valve opening too slow, adjust bleed on diaphragm valve.
 - 5.3.4. Shut-off cock or test cock not open.
 - 5.3.5. Defective main valve.
- 5.4. Occasional lockouts for no apparent reason
 - 5.4.1. Re-check D.C. voltage readings. If insufficient, check gas pressure and air damper setting. Check electrodes setting. If flame rod pilot, flame rod may have to be re-positioned.
 - 5.4.2. Check ignition cable and electrode porcelain for damage or breaks which could cause short.
 - 5.4.3. Check for loose or broken wires.
- 5.5. Burner will not start, even though burner has not failed before and/or has been running normally
 - 5.5.1. Operating Control circuit open.
 - 5.5.2. Starting interlock such as proven low fire switch or proof of closure switch open.
 - 5.5.3. Defective control or loose wiring.
 - 5.5.4. Limit circuit open.
 - 5.5.5. An additional source of information relative to trouble-shooting can be found in the flame safeguard programmer manual supplied with the burner.
- 5.6. Boiler and pump switch are ON but pump does not run and water level in the boiler is low
 - 5.6.1. Circuit breaker is tripped or fuse is blown.
 - 5.6.2. McDonnell Miller float is stuck.
 - 5.6.3. McDonnell Miller is wired incorrectly.
 - 5.6.4. Pump is wired incorrectly.
- 5.7. Pump runs but does not maintain water level in boiler
 - 5.7.1. Bad check valve. Always use spring-loaded check valves for use with steam boilers (see section 3.1.1).
 - 5.7.2. Bad steam trap/s.
 - 5.7.3. Strainer is plugged.
 - 5.7.4. No water in tank.
 - 5.7.5. Pump is out of adjustment.
- 5.8. Pump overfills boiler (high water alarm)
 - 5.8.1. McDonnell Miller is not operating correctly (and/or snap switch is stuck in the closed position).
 - 5.8.2. McDonnell Miller is wired incorrectly.
 - 5.8.3. Pump is wired incorrectly.
- 5.9. Boiler takes excessive time to reach pressure
 - 5.9.1. Burner is not tuned properly.
 - 5.9.2. Improper gas pressure (low gas inlet pressure; i.e. less 7" w.c.).
 - 5.9.3. Boiler flue passage requires cleaning.



5.9.4. Gas valves operating incorrectly.

5.10. Boiler shuts down on auxiliary low water cut-off

5.10.1. Pump switch is turned off.

5.10.2. Warrick probe wired incorrectly.

5.10.3. Probe is not seated in socket properly.

5.10.4. Probe length is incorrect length.

5.10.5. Boiler/burner grounding is incorrect.

5.10.6. Warrick relay wired incorrectly.

5.10.7. Probe has scale, dirt, or debris on it.

5.10.8. Foaming in boiler (over treatment of water with chemical).

5.10.9. McDonnell Miller is operating incorrectly.

5.10.10. Pump is not functioning properly.

5.10.11. Bad check valve. Always use spring-loaded check valves for use with steam boilers (see section 3.1.1).

¹ Burner start-up procedure and information in sections 4.1 and 4.2 (and all subsections therein) is provided by Power Flame Incorporated. This information is available in Power Flame burner manuals. Some of this information has been edited and/or modified for use with Lattner boilers, Lattner supplied equipment, and burners other than those manufactured by Power Flame.

² Burner start-up procedure and information in sections 5.1 through 5.5 is provided by Power Flame Incorporated. This information is available in Power Flame burner manuals. Some of this information has been edited and/or modified for use with Lattner boilers, Lattner supplied equipment, and burners other than those manufactured by Power Flame.

