

Start-up Instructions



A. O. SMITH
WATER PRODUCTS
COMPANY



COPPER BOILERS FOR HYDRONIC HEATING AND HOT WATER SUPPLY SERIES 300, 301, 302 AND 303. 2-STAGE UNITS

Before starting the boiler please review the Boiler's Instruction Manual (AOS Part Number 212130-000) supplied with the boiler. This is a powered combustion copper tube boiler. If you are not familiar with a powered combustion boiler please contact an authorized A.O. Smith representative before starting the unit.

This boiler is equipped with an EMC5000 control system. The EMC5000 displays the system status and errors that may occur during normal operation. For full details on the controls please refer to the Instruction Manual supplied with the boiler. The boiler must be installed according to the Installation Instructions provided with the unit. Failure to do so will void the warranty.

Prior to starting the boiler for the first time check the following:

Before applying gas or water to the system, the power line electrical hook-up can be verified. If connected, remove the plug in connectors (J1, J2, J3) on the Power Distribution Board (PDB) and place the jumper (JP1) on the PDB in the "Test" position. (Note: Leaving the connectors connected during this test will produce invalid light indications that will not match the table.)

Apply electrical power to the system and observe the three colored LED's on the PDB. Verify that the proper lights turn on according to the following table:

Line Connection Status	Green LED	Red LED	Yellow LED
Proper Connections	(On)	Off	(On)
Open Ground	(On)	Off	Off
Reverse Polarity	(On)	(On)	Off
Open Hot	Off	Off	Off
Open Neutral	(On)	(On)	(On)
Reverse Hot & Ground	Off	(On)	(On)
Hot on Neutral with Hot Open	Off	(On)	Off

When connections are correct, turn off power, move jumper to "Run" position, and reconnect cables to PDB. (Note: With the jumper in the "Run" position, only the Green LED functions.)

Prior to turning on the gas, proper operation of much of the system can be verified. With the water turned on, start the system and allow it to run through a heating cycle. It should stop when it checks for flame and declare a fault. This will verify that the pump, flow switch, igniter, gas valve, blower and blower differential pressure switch are all functioning.

Gas supply lines are sized in accordance with ANSI Z223.1 National Fuel Gas Code or CAN/CSA-B149.1 or most recent edition.

Minimum inlet gas supply pressure of 5.5" W.C. for natural gas or 11.0" W.C. for propane.

Check all gas supply lines for leaks.

Check that all venting is properly sealed in accordance with the Instruction Manual.

Main power is 120 VAC, 60Hz, single phase, rated for 20 Amps or above.

Turn **"ON"** gas and water supply to the boiler (DO NOT DRY FIRE THE BOILER).

Purge air from the gas and water lines.

Make sure the boiler is not damaged. If the unit is damaged contact an A.O. Smith representative for service or replacement parts prior to starting the boiler.

PLACE THESE INSTRUCTIONS ADJACENT TO BOILER AND NOTIFY OWNER TO KEEP FOR FUTURE REFERENCE.

Temperature Setpoints (Dual Stage Ignition)

Before starting the boiler, refer to the temperature setpoint and temperature setpoint adjustment procedure sections in the boiler's Instruction Manual.

Starting the boiler for the first time.

The boiler is tested at the factory and should start properly if installed in accordance with the Boiler's Instruction Manual. The boiler may have a slight rumble on a cold start. This is normal and will not harm the unit nor is it a safety issue. The rumble is caused by cold water in the heat exchanger creating a cold combustion chamber. Thus, the rumble occurs. Once the boiler has been started from a cold start the rumble will disappear on subsequent starts.

Should the boiler not start, a minor air shutter adjustment may be required by the installer, as atmospheric conditions may change the amount of air supplied to the unit at the given installation site (see figure 1 for final flame appearance).

When adjusting the air shutter, 1/2 turns on the air shutter adjustment screw (located at the front of the air shutter) are recommended. If the boiler continues to start hard or rough after the initial cold start, adjust the air shutter until the boiler starts smoothly.

DO NOT try to adjust the gas air mixture to make the flame sit on the burner (see figure 1 for final flame appearance).

This is a powered burner and the flame is not supposed to be on the burner. The flame should be just above the burner deck approximately 1/8" and blue in color (see figure 1).

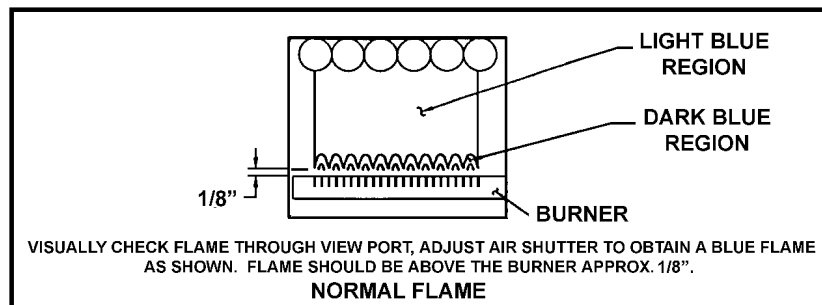


Figure 1. Burner Flame Characteristics

Visually check flame characteristics through either view port located under the headers on the boiler. Figure 1 above shows the normal flame condition. Also, refer to the flame label on the unit (adjacent to the view port).

- A. **Normal Flame:** A normal flame is blue without yellow tips. No adjustments required.
- B. **Yellow Tips:** Yellow tips are caused by a lack of air to the burner.
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|-----------------|-----------------|-----------|---|
| Possible cause: | Blocked intake. | Solution: | Remove blockage. |
| Possible cause: | Air shutter. | Solution: | Open Air Shutter until normal flame occurs. |
| Possible cause: | Gas pressure | Solution: | Check manifold pressure and adjust to proper setting. |
- C. **Yellow Flames:** Yellow flames are caused by a lack of air to the burner.
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|-----------------|-----------------|-----------|---|
| Possible cause: | Blocked intake. | Solution: | Remove blockage. |
| Possible cause: | Blocked burner. | Solution: | Remove blockage. |
| Possible cause: | Air shutter. | Solution: | Open air shutter until normal flame occurs. |
| Possible cause: | Gas pressure. | Solution: | Check manifold pressure and adjust to proper setting. |
- D. **Lifting Flames:** Lifting flames are caused by over firing the burners or excess air.
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|-----------------|---------------|-----------|---|
| Possible cause: | Gas pressure. | Solution: | Check manifold pressure and adjust to proper setting. |
| Possible cause: | Air shutter. | Solution: | Close the air shutter until normal flame occurs. |

Gas Manifold Pressure Settings:

GB & GW-300 thru 750: 3.5" W.C (Natural Gas)

GB & GW-300 thru 750: 10.0" W.C. (Propane Gas).

For additional information please refer to the User's Manual supplied with the boiler or contact:

A.O. Smith Technical Services at 1-800-527-1953

7 a.m. to 7 p.m. Central Time.

Our Internet Site is another source of information 24 hours a day.

<http://www.aosmithwaterheaters.com>