Fire Coil 85 Startup Guide

Common for all heaters

I. Check water piping

- ☐ Check against application-specific drawing if there is one.
- ☐ Be sure to check that cold makeup water will mix in the storage tank, and will not go directly into the cold water inlet.
- ☐ If the system is going to store water below 130F, check for the bypass. Open it fully to start.
- ☐ Check that there are no check valves between the expansion tank, and the storage tank.

II. Check gas piping

- ☐ Check that the gas pipe is adequately sized for the input BTU's of the heater.
- ☐ If the heater has its own regulator, check that there is at least 6' of pipe sized according to the chart downstream from the regulator.

The natural gas chart is below. See manual for propane gas charts.

Natural Gas	**Distance from Gas Meter or Last Stage Regulator**		
MBTU Input	*0 to 100 feet*	*100 to 200 feet*	*200 to 300 feet*
200	1.25"	1.25"	1.25"
300	1.25"	1.5"	1.5"
400	1.5"	1.5"	2"
500	1.5"	2"	2"
600	1.5"	2"	2.5"
750	2"	2"	2.5"
800	2"	2.5"	2.5"
1000	2"	2.5"	3"
1250	2.5"	2.5"	3"
1500	2.5"	3"	3"
1750	2.5"	3"	3"
2000	3"	3"	3.5"

III. Check vent pipes

For vertically terminating vents:

- ☐ Check that the material for the vent pipe is double wall aluminum gas vent (B-vent).
- ☐ Check that there is nothing higher than the vent terminal for a 10’ radius.
- ☐ Check that the vent always slopes upwards towards the termination at a minimum slope of ¼” per 1’.
- ☐ Check that the horizontal run of vent is no more than 60% of the vertical run. For example, if the vent rises 10’, the maximum horizontal run is 6’.
- ☐ If the vertical run of the vent pipe is greater than 20’, install a single-acting barometric damper, such as the Fields control RC Series.

For horizontally terminating vents:

- ☐ If the vent terminates horizontally, ensure that the vent materials are approved AL294C gasketed stainless steel vent.
- ☐ Side wall termination kits are required, and are available from NATCO.
- ☐ It is recommended to specify horizontally vented before an installation, to ensure all vent pieces, fittings, and terminations are obtained ahead of time.

III. Check Combustion Air

- ☐ Check that combustion air pipe material is galvanized, and sized for the particular heater. See chart below.
- ☐ Check that the combustion air pipe length is less than 50 equivalent feet in length. 90 degree elbows are worth 10 feet. 45 degree elbows are worth 5 feet.
- ☐ Check that fresh air termination is not going to suck in exhaust from the heater, or lint from dryers. There are diagrams in the manual, but common sense prevails:
  - ☐ Fresh air terminals are not above exhaust terminals (exhaust rises).
  - ☐ Fresh air terminals are at least 3’ above grade, and at least 2’ above roofline if on roof.
  - ☐ Vertical terminations should be candy-caned so rain doesn’t get in.
- ☐ If fresh air is *not* ducted directly to the heater, two passive air openings are required in the heater’s room - one 12” from the floor, and another 12” from the ceiling. Each opening must have a minimum area of 1 square inch per 4,000 BTUs input. (e.g. a 199,000 BTU heater must have two 4” diameter openings in the room).

Heater	Combustion Air CX Diameter)
F85V0200	4"
F85V0300	4"
F85V0400	6"
F85V0500	6"
F85V0750	6"
F85V1000	8"
F86V1250	8"
F85V1500	8"
F85V1750	8"
F85V2000	12"

NATCO strongly recommends vertical terminations for exhaust, and horizontal terminations for fresh air, especially if dryers are vented to the roof.

IV. F85V0200-400 Heaters only procedure

1. Turn incoming gas cock off.
2. Remove the slanted black control panel cover, and the larger gray front panel beneath it.
3. Check the wiring for tank mounted aquastat.
4. Set the tank mounted aquastat to the desired temperature. Then set the aquastat inside the heater to 35 degrees above that temperature.
5. Remove the cover of the flow switch - it’s the gray box on the outlet side of the heater.
6. Flip the pump status switch on the heater’s control panel to constant pump.
7. Watch the flow switch, and power on the heater. The flow switch should move, and stay in place if the pump is circulating water. If it is, replace the cover of the flow switch, but leave an air gap.
8. Locate the hose fitting on top of the firebox that goes to the firebox pressure switch. Zero out your manometer, remove the hose from the fitting, and attach your manometer to the hose. When the blower is on, measure the positive air pressure through the firebox. Set the firebox

air pressure to 1.25” of water column to 1:35” of water column. You can do this by moving the slide on the immediate left hand side of the blower motor. When done, remove your manometer, and replace the hose to the firebox pressure switch.

9. Power off the heater. Locate the peep sign on the right hand side of the heater towards the floor, underneath the envelope with the product manual. Turn the heater on. About 15 seconds after the blower motor turns on, you should see the hot surface ignitor glowing. If it does, continue. If it does not, see the troubleshooting guide. Power the heater down.

10. Locate the gas valve. Remove the ¼” plug on the upper part of the gas valve. Attach your manometer there. Turn on the gas cock. Record the static pressure. For natural gas applications, the static pressure must be between 5” and 13” of water column. The 6” to 10” range is ideal. Leave your manometer there through the next step.

11. Power on the heater, and observe the sequence. The pump and blower should come on, and then the ignitor. Finally the gas valve should click. Note how the reading on your manometer changes. It should drop, but not below 5” of water column. Also, it is best if the drop is no more than 1.5” of water column from the dynamic pressure.

12. If you have stable ignition, and the dynamic pressure looks good, turn off the gas cock to the heater, wait a minute, and then power down the heater.

13. Remove your manometer from the upper port in the gas valve, and replace the plug. Remove the lower port in the gas valve, and place your manometer probe there.

14. Turn on the gas cock to the heater, and power on. When ignition is achieved, note the gas pressure read on the manometer. Do not pay attention to readings on the manometer until ignition is achieved. For natural gas applications, this reading should be 3” of water column. If it is not, remove the dime-sized cover with a single slit across it on the upper-right of the gas valve. A plastic regulator screw is underneath. Turning it clockwise increases gas, counterclockwise decreases gas. Adjust, but turn the screw very slowly, no more than ¼ turn each time. If the gas varies 1/10 of an inch of water column, set it so that varies between 3” and 3.1” instead

15. When it does, watch through the peep sight for ignition. Ignition should be smooth. If it isn’t, or there’s a popping, call NATCO. 2-3 minutes after ignition, flame should be 1-1.5” tall, blue with orange tips, and well organized by the pre-mix burners. If the flames are an undifferentiated glow, or very high, slowly push the combustion air baffle to the left of the blower until it looks better. If the flame is orange, slowly pull the combustion air baffle to the left of the blower until it looks better.

16. You can fine tune combustion with a combustion analyzer. If you do this, CO2 reading should be 8% for natural gas, or 9.2% for propane. CO should be less than 100ppm.

17. Turn the main gas cock off, wait 3 minutes, and then turn off the heater. Locate the time delay relay on the back side of the control panel. Set the time delay to between 3 and 5 minutes. Change the pump status switch to AUTO if there is a tank aquastat. If there is no tank aquastat, leave it in CONSTANT.

18. Turn the gas cock back on, power on the heater, and check automatic pump operation. When the temperature in the tank is below the setpoint, the pump will come on, and the heater will ignite. When the tank setpoint temperature is reached, the gas valves will close, the blower motor will continue running for 60-90 seconds until it shuts off, and the pump will continue for 2-4 minutes and then shut off.

V. F85V0500-2000 Heaters only procedure

1. The heater should start out off. Open the black slanted cover over the low voltage controls, the main gray door on the front of the heater, and the small square cover on the right hand side below the power switch.

2. Turn all of the gas valves inside the heater off. Close the main gas supply to the heater.

3. Check the high voltage wiring to the heater. See the wiring checklist for details. Specifically check:
    a. Check that the circuit is of the correct voltage and amperage rating.
    b. Check that the pump is set for the correct voltage.
    c. Check that the pump is correctly wired - either directly through the heater's high-voltage terminal strip, or indirectly through a pump contactor.

4. If there is an aquastat on the storage tank, ensure that the only wires going to it are low voltage, going to terminals 3 and 4 of the low voltage terminal strip. Order does not matter. Terminal 4 is marked 'FIELD INTERLOCK'.

5. Set the temperature on the tank aquastat to the desired temperature (120 degrees minimum). Set the operating control inside the heater to 30-35 degrees higher than the tank set point. Leave the high-limit manual reset aquastat set to 200 degrees.

6. Flip the pump status switch on the heater control panel to 'CONSTANT', and the control setting switch to 'LOCAL'. Remove the cover on the flow switch (gray box on the outlet side of the inlet/outlet header).

7. Take the upper ¼" plug out of any gas valve except for the one on the far left. Zero out your manometer, set it for inches of water column, and connect it to that port. Open the main gas supply to the heater. Record the static gas pressure. If it is natural gas fired, it must be between 5" and 12" of water column.

8. Close the main gas supply, remove your manometer, and replace the plug. Then reopen the main gas supply.

9. With a stubby phillips head screwdriver, remove the cover from the low gas pressure switch. The gas pressure switches come off the gas valve on the far left. They have clear covers. The upper of these two is the low gas pressure switch. Once the cover is removed, press the small red button inside. Leave the cover off for now.

10. Turn on the heater. The pump should immediately come on, and you can observe the flow switch should close, and lock. If this does not happen, call NATCO or see troubleshooting.

11. The blower should come on next. Locate the hose fitting on top of the firebox just to the right of each blower motor. A silicone tube goes from that fitting to the firebox pressure switch. Remove this tube, attach your manometer there, and record the firebox pressure. You want this to read 1.25” of water colum. To adjust - loosen the screws holding the slide in place between the firebox and the blower, then slide to set it properly. For heaters 1,000,000 BTU and above, you will need to do this for each blower. The ignition control may lock out during this procedure. If so, press the small black reset on the lower right hand corner of the ignition control.

12. Turn the heater off. Close the main gas supply. Attach your manometer to the inlet port of the gas valve you previously had it attached to. Turn on the main gas supply. Once again, reset the low gas pressure switch.

13. Turn on each of the gas valves inside the heater. Now locate the peep sight on the right hand side of the heater towards the floor.

14. Turn the heater on, and observe the firing sequence. The following should occur:
    a. Pump turns on, and blower follows.
    b. The ignitors (1 for F85V0500-750, 2 for F851000-1250) will begin to glow.
    c. In approximately 10 seconds, there will be a click, and the gas valves will open. It will ignite, or it won’t.

15. Presuming ignition, check the gas pressure on the manometer. Ideally, this should not drop more than 1-2 inches from the static pressure, and it must not drop below 4” of water column. If there is no ignition, reset the ignition control, and attempt it again this time observing the manometer reading. If it fails to ignite while there is a very significant drop in gas pressure, it is likely a gas supply issue. If it fails to ignite, and there is no significant drop, make sure that the gas line has been fully bled.

16. After ignition, shut off all of the individual gas valves, wait three minutes, and then turn the heater off. Shut off the main gas supply. Remove your manometer from the inlet port of the gas valve, and replace the plug. Open the main gas supply. Reset the low gas pressure switch.

17. Remove the plugs from the manifold test ports on each gas valve. Remove the dime-sized covers over the regulator screws on each gas valve. Turn each gas valve back on. Power the heater on, and reset the ignition controls.

18. After the heater is fired, attach your manometer to the test port furthest from where the gas enters the heater. Open the test cock on the port. Your target is a manifold pressure of 2.5” inches of water column for natural gas. Adjust the manifold pressure by turning the regulator screw clockwise to increase, counterclockwise to decrease. Always turn the screw in ¼” turn or smaller stages. When complete, turn the test cock off, and remove your manometer.

19. Once you have completed that gas valve, go to the next, making the same sort of adjustments. Once you have adjusted the gas on the valve closest to the side where the gas comes in, go back to the opposite side to check it once more.

20. Once this is complete, turn the individual gas valves off, wait 3 minutes, and turn the heater off. Replace all of the plugs, and regulator screw covers. Turn the individual gas valves back on.

21. Set the time delay relay. It is inside the main compartment of the heater, to the right. Set the blue knob to between 3 and 5 minutes. If there is a tank aquastat, flip the pump status switch to Automatic.
22. Power on the heater, reset ignition controls if it is necessary, and check automatic pump operation. When the temperature in the tank is below the setpoint, the pump will come on, and the heater will ignite. When the tank setpoint temperature is reached, the gas valves will close, the blower motor will continue running for 60-90 seconds until it shuts off, and the pump will continue for 2-4 minutes and then shut off.