10.1 Troubleshooting Condition Table

Behavior	Component
01. The furnace does not operate when you set the wall thermostat to a high temperature.	1. Wall T-Stat (See Section 10.3)
	2. Blower/Fan Limit (See Section 10.3)
	3. Burner Motor (See Section 10.2)
	4. Burner Plug (See Section 10.2)
	5. Primary Controller (See Section 10.3)
	6. Preheater (See Section 10.3)
02. The burner runs 30-45 (Old Primary) or 15 (New Primary) seconds then stops and the red button of the primary control requires reset (popped up).	1. Burner Motor (See Section 10.2)
	2. Primary Controller (See Section 10.3)
	3. Cad Cell (See Section 10.3)
	4. Tank/Tank Controls (See Section 10.2)
	5. Pump/Filter (See Section 10.2)
	6. Fuel Quality (See Section 10.2)
	7. Transformer/Electrode (See Section 10.3)
	8. Air Compressor (See Section 10.2)
03. The burner will not light and fuel pressure is between 3 and 15 PSI (normal) on the pressure gauge at the fuel pump outlet.	1. Go to Behavior Tree 2 Component 6 (See Section 10.2)
04. The furnace has a build-up (coke tree) at the front of the burner in the heat exchanger (combustion chamber) after running many hours.	1. General Action/Question - Boiler ONLY! (See Section 10.2)
	2. Solenoid Valve (See Section 10.3)
	3. Heat Exchanger (See Section 10.2)
	4. Damper Tee/Manometer (See Section 10.2)
	5. Air Compressor (See Section 10.2)
	6. Pump/Filter (See Section 10.2)
	7. Fuel Quality (See Section 10.2)
05. Smoke is seen from the external flue cap or internal damper door, or the furnace is running rough.	1. Go to Behavior Tree 4 Component 2 (See Section 10.2)
06. The unit frequently requires reset in the mornings.	1. Pump/Filter (See Section 10.2)
	2. Go to Tree 2 (See Section 10.2)
07. The wall thermostat will not shut the burner off.	1. Wall T-Stat (See Section 10.3)
	2. Blower/Fan Limit (See Section 10.3)
	3. Primary Controller (See Section 10.3)
08. The furnace no longer provides enough heat.	1. Heat Exchanger (See Section 10.2)
	2. Damper Tee/Manometer (See Section 10.2)
	3. Burner Motor (See Section 10.2)
	4. Air Compressor (See Section 10.2)
09. The burner cycles on and off every few minutes	1. Heat Exchanger (See Section 10.2)
	2. Go to Behavior Tree 1 (See Section 10.2)

10.2 Troubleshooting Trees

Component	Action/Question	Response
Air Compressor	1. Check Air Shutter Setting. What is the air shutter setting?	Correct settings are: 140H=5, 200H=7, and 340H=4. Adjust as necessary
	2. See Air Compressor Maintenance (Section 9.5.8) for testing air pressure.	Follow procedure in Section 9.5.8 for Air Compressor Maintenance
Burner Motor	1. Verify the burner motor reset status.	In operational mode - Go to next Action/Question
		Popped up (thermally tripped) - Reset motor by pressing in red button
	2. Verify electrical connections to the terminal strip from the burner under the primary control	If connections are loose, frayed or missing, repair and go to next Action/Question
	3. Visually inspect the coupling and blower wheel on the burner by flipping back the transformer. Is everything tight and free of interference?	Yes - Go to next Action/Question
		No - Remedy the Issue or Replace damage/worn parts
	4. With burner unplugged, try to spin the burner blower wheel.	Yes - Go to Next Component
		No - Verify operational status by following the steps in the Air Compressor Maintenance in Section 9.5.8 starting with section B of the Procedure. If okay, replace burner motor
Burner Plug	1. Check the connections underneath the burner plug casing (male end). Are the connections tight and free of damage?	Yes - Go to Next Action/Question
		No - Repair connections
Damper Tee /Manometer	1. Verify that the door swings freely. What is the reading on the draft gauge with the probe unit running? Is it 0 with the probe removed. If not zero the gauge per instructions in Section 6.3.	Between 0.03 and 0.07, then go to next Component. Otherwise adjust the weight on damper door. If still less than 0.03, then add one piece of flue to exterior or add a draft inducer. If greater than 0.07, add another damper tee and adjust its weight.
Fuel Quality	1. If the oil in the tank is below 50°F, allow for oil to warm or add filter band heater.	Oil going through the pump should be at a minimum of 50°F. This might require heat tape or other methods of heating the fuel
	2. Was fuel recently added?	Yes - Go to Next Action/Question

		No - {Skip Next Action/Question}
	3. What was in the recently added fuel?	Standard Mix - Go to Next Action/Question/Component
		Unknown/Cold/New Oil/Non Standard Mix - Call EnergyLogic Technical Services group for an Oil Analysis to be performed
	4. When was the tank last drained of water and other fall out materials?	Used Oil Storage Tanks should be drained on an annually from the bottom most drain port until only oil flows from the tank
	5. When was the oil last analyzed?	EnergyLogic recommends that an oil analysis be performed annually
	6. Analysis Results (If EL does not have the results, could we get them)	Consult EnergyLogic Technical Services group for oil analysis interpretation
General Action/Question - Boiler ONLY!	1. Return Water Temperature?	EnergyLogic requires that return water to the boiler system be a minimum of 140°F
Heat Exchanger	1. Clean Heat Exchanger and Flue: See Heat Exchanger Cleaning in Section 9.5.1.	The entire furnace should be maintained and clean every 800 to 1000 run hours
Pump/Filter	1. Check Fuel Pump Motor. Is the fuel pump motor running while the burner is running?	Yes - Go to Next Action/Question/Component
		No - See Metering Pump Assembly Testing in Section 10.3
	2. Check Fuel Pressure: Turn furnace on or reset the red button of the primary control. What is the fuel pressure reading (gauge at pump outlet-PSI) while burner is running?	0 or erratically fluctuating then Go to Action/Question 4, or greater than 20 psi, see Nozzle/Solenoid cleaning, or between 3 and 15 (normal) go to Component
	3. Fuel line check. Do the fuel lines contact an exterior/cold wall?	Yes - If fuel line is in contact with an exterior wall, this could result in extra load on the pump. If fuel line is cold, add spacers (at least .5 inches) to eliminate contact with the exterior wall
		No - Go to Next Action/Question

	4. Check Fuel Vacuum: Turn furnace on or reset the red button of the primary control. What is the fuel vacuum reading (gauge at pump inlet-inches Hg) during the time the burner is running?	Zero or erratically fluctuating then Go to Next Action/Question, or 1 to 10 In./Hg then Go to Action/Question 6, or 10 in./Hg or higher (for more vertical suction distance, allow more vacuum) then Replace oil filter -see filter replacement. If you are using a non-EnergyLogic tank with strainer, inspect the strainer for debris.
	5. See Metering Pump Assembly Testing Procedure in Section 10.3	If Metering Pump Assembly Tested Good, go to next Component. Otherwise repair/replace necessary components
	7. (SKIP - for Tank Mounted Pumps w/plenty of fuel) Check for Air Leaks: Check all fittings from the pump back to the tank for suction side air leaks (make sure pipe sealant is used for all threaded connections). Inspect for cracked flares, tighten fittings and look for cracked lines. If you see no evidence of leaks, try soap and air pressure test on the suction side lines by pressurizing at the inlet where the 3/8 inch copper line that leaves the fire-stop valve at the tank.	Yes - Repair/Replace leaking component(s) No - Go to Next Component
Tank/Tank Controls	1. In the tank from which the metering pump is supplied, is the fuel pickup submerged into the oil source?	Yes - Go to Next Action/Question No - Fill Tank
	2. Is there continuity across the wires for the Low Level Cutoff Switch?	Yes - Go to Next Action/Question No - Replace Switch
	3. Check wire connections from Switch to thermostat plug on primary control. Are all connections properly secured?	Yes - Go to Next Component No - Repair connections

10.3 Testing Procedures

⚠ DANGER Only qualified servicemen are to perform the testing procedures. Many of the tests involve high voltage electricity, which if mishandled may cause serious injury or death.

10.3.1 Wall Thermostat Testing

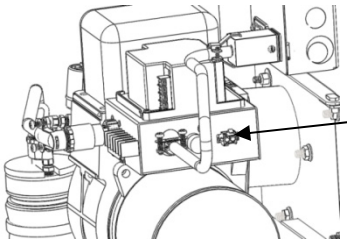
Tools Needed:
Digital Multi-Meter

Wall Thermostat Function:
Monitors the temperature of the room and compares it to the set desired temperature. When the room temperature falls below the desired, it sends a signal (by closing a switch providing continuity) to the primary controller initiating the call for heat.

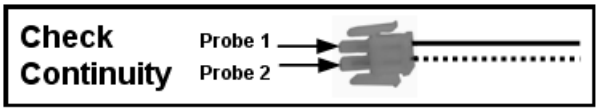
Note: During this test, if the thermostat does not function as stated, call Technical Services for assistance, or Customer Service to order a new thermostat.

Procedure:

1. Disconnect the Thermostat wires from the burner by removing the T-Stat plug (see image below) and verify the pins on the plug and receptacle are straight and secure.



2. If the system has a Fuel Low Cutoff Switch
   a. Verify the fuel level in the tank is above the switch float. If not, then remedy.
   b. Check for continuity across the wires of the float switch.
      If no continuity, remove the fuel switch and verify when the float is in the up position, the continuity status. No continuity = replace switch, Continuity = check fuel status
3. Set the thermostat to a temperature higher than the current reading.
4. Using the ohm meter, connect the leads to each of the T-Stat wires at the plug.



5. You should see continuity across the leads, check the wire connections at the thermostat and recheck.

10.3.2 Blower Assembly Testing

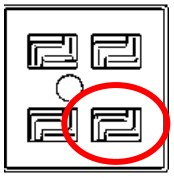
Tools Required:
1/8" Allen wrench, 5/16" & 3/4" wrench, Flat-blade screwdriver, 120VAC capable Digital Multi-Meter,alligator clips or a jumper wire and Tachometer

Blower Assembly Function:
Moves air across the Heat Exchanger, once it is above 130°F to warm the air during the call for heat.
Note: During this test, if the Blower Assembly does not function as stated, call Technical Services for assistance, or Customer Service to order a new or components of the blower assembly. Make sure the blower has recently been maintained. Neglect will negatively affect the results of testing

⚠ DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. Verify power to the unit by testing for 120V across the receptacle terminal indicated in the figure below and ground.



2. Set the Fan Limit Control to Manual (Push the white button in). The blower should start immediately. If so, go to step 10
3. If not, turn the power supply breaker off and return the fan limit control to Auto (white button out)
4. Remove blower wheel safety cage and verify the blower will freely spin and is clear of interference. If a non-correctable interference is present, replace the blower assembly.
5. Return cage to assembly, and turn on the power at the supply breaker.
6. With the Fan Limit Control to Manual (white button in) and verify 120V at the blower wiring box. If 0V, check Fan Limit wiring connections.
7. Return the Fan Limit Control to the Auto and remove the motor safety cage.
8. Remove wires from the capacitor and connect to each other (temporarily). **IMPORTANT!** *The capacitor is charged and can cause injury if shorted across contacts.*
9. Set the Fan Limit Control to Manual.
    a. If the blower starts (it will run slower than when properly functioning), the capacitor will need to be replaced
    b. If the blower does not start, replace the blower assembly
10. Using the tachometer, measure the speed of the blower wheel as assembled on the furnace (should be near 1075 RPM).

10.3.3 Cad Cell Testing

Tools Required:
Flat-blade screwdriver, 120VAC capable Digital Multi-Meter (Ohms)

Cad Cell Function:
The Cad Cell senses the flame via a resistance measurement, so the primary controller will continue to power the burner during the call for heat. The normal flame sensing range is less than 1600 ohms. With a reading greater than 1600 ohms, the primary controller does not recognize that a flame is present and will stop the burner as a safety precaution.
Note: During this test, if the Cad Cell does not function as stated, call Technical Services for assistance, or Customer Service to order a new Cad Cell.

Procedure:

1. Unplug the burner plug from its receptacle.
2. Loosen or remove two ignition transformer screws. The cad cell is located on the underside of the ignition transformer. Lift the ignition transformer and inspect the yellow cad cell leads for cuts or breaks.
3. Inspect the cad cell for signs of overheating, such as melted plastic or coating of soot. Clean or replace if you see any of these signs.
4. Gently wipe dust off the cad cell lens with a soft clean cloth (DO NOT use solvents on lens).
5. Set your multi-meter to the 100 ohm or 1K ohm range.
6. On the primary control, use the multi-meter to check across the "F" terminals.
    a. The reading should be very high in the dark (30K ohms+ with ignition transformer closed) and very low in light (below 1600 ohms with ignition transformer lifted open).
7. Return the Transformer to its operating position and plug in the burner.

10.3.4 Metering Pump Assembly Testing

Tools Required:
1/8" Allen wrench, 3/4" wrench, Flat-blade screwdriver, 120VAC capable Digital Multi-Meter, alligator clips or a jumper wire, Tachometer, stop watch and a graduated cylinder (ounce or milliliter).

Metering Pump Assembly Function:
Pumps fuel from the tank to the preheater and burner during the call for heat (given the preheater is up to temperature)
Note: During this test, if the Pump Assembly does not function as stated, call Technical Services for assistance, or Customer Service to order service parts.

⚠DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. Remove the pump assembly cover.
2. Inspect the coupler for damage or wear and make sure the set screws are tight and positioned on the flats of the two shafts. If worn or damaged, replace.
3. Inspect the condition of, and rotate by hand, the shafts (pump and gear box). If worn or damaged, replace.
4. Verify the gear box model number to the EnergyLogic model number. Refer to the following table.

	Pump Shaft Speed	Gear Box Model
Model	**115V**	**115V**
140	193 - 240	3GN7.5KA
200	241 - 300	3GN6KA
340	402 - 500	3GN3.6KA

5. Jumper the T-T terminals, as soon as you hear the burner start, jumper the F-F terminals.
6. **⚠CAUTION** Use Caution when approaching the pump assembly, rotating parts will be in operation.
7. Chattering from the gear box usually means damaged gearing. If chattering is heard or felt, replace the gear box.
8. Close the ball valve at the bottom of the preheater.
9. Using a multi-meter, verify the voltage across the wires going to the pump motor, should be around 115V AC.
   a. If voltage is not present, check the wires from the pump conduit to the wiring box and in the primary control to ensure a secure fit and connections are proper (refer to wiring diagram for wire location and colors).
   b. If voltage is present, but the motor does not function
      i. Remove jumper terminals from the T-T and F-F terminals.

ii. Unhook the pink wire from the pump motor capacitor and hook it into the conduit wire feeding the black wire going to the capacitor.
iii. Jumper the primary as in Step 5.
1. If the motor runs, the capacitor is bad and must be replaced.
2. If the motor does not run, remove jumpers from the primary.
3. Remove the coupler from the pump assembly, and jumper the primary as in Step 5
a. If the motor runs
i. Remove jumpers and test with capacitor.
1. If the motor runs with the capacitor, then the pump is seized and should be replaced.
2. If motor does not run, replace capacitor.
b. If motor does not run, replace motor.

10. With pump operating and preheater ball valve closed, verify that the pump outlet pressure is around 60 psi (pump is now in bypass).

Speed testing with a tachometer

11. Test pump shaft speed per tachometer instruction and compare to values found in the table under step 4.

Perform a suction test on system

12. Close fire stop valve and push down on the stem.
13. Run pump until the vacuum gauge reads 15 in/Hg (should quickly reach), and stop pump.
14. Cap the discharge side of the pump and note the vacuum gauge reading.
15. Wait 30 minutes.
16. Vacuum gauge reading should be the same as noted in step 14.
a. If not, check fittings and connections and retest, looking for signs of vacuum leaks.

Flow test

17. Disconnect the 3/16" copper line from the inlet of the solenoid valve at the top of the preheater (you will use this tube to catch oil coming from the preheater.).
18. Have the graduated cylinder located so as to catch oil from the tube in step 17.
19. Start timing once the burner turns on by applying jumpers to the T & F terminals.
20. Allow to run for 120 seconds (2 minutes) and remove jumpers.
21. Fluid levels should be near the listed values in the following table, per the model number.

Model	Listed Flow Rates [gph]	Flow [oz/120 seconds]	Flow [ml/120 seconds]
140	1.00	4.3	126.2
200	1.40	6.0	176.7
340	2.25	9.6	283.9

10.3.5 Preheater and Nozzle PTC Testing Procedure

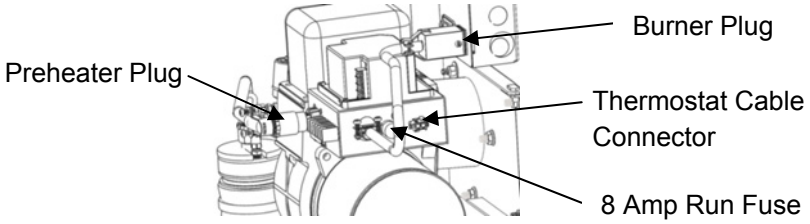
Tools Required:
1/4", 5/16" wrenches, alligator clips or jumper wire, 120VAC capable Digital Multi-Meter DMM, temperature probe, or the TPI combustion analyzer with a type K thermocouple attached.

Preheater/Nozzle PTC Function:
Heats the fuel to a temperature over 120°F for proper combustion. There are standby PTCs in the Preheater and the Nozzle that are energized whenever there is power to the burner in order to keep the fuel warm for immediate start up. When the burner is firing, there are extra run PTCs in the Preheater that energize to heat the fuel as it flows to the nozzle. **Note:** During this test, if the preheater does not function as stated, call Technical Services for assistance, or Customer Service to order a new preheater.

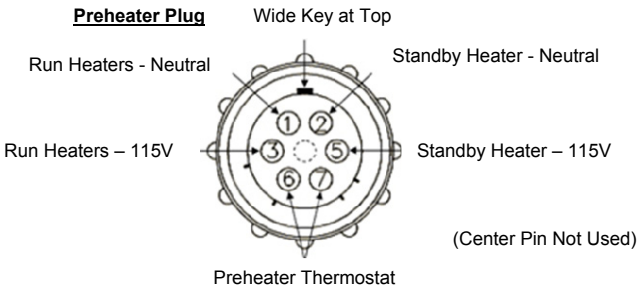
⚠CAUTION The preheaters are on at all times, making the nozzle block and external preheater assembly very hot to the touch.
CAUTION Make sure the Preheater has recently been maintained. Neglect will negatively affect the results of testing
⚠DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. With the burner unplugged, verify the pins at the preheater plug and receptacle are straight and secure.
2. Check the 8 Amp fuse (refer to figure below). If the fuse is blown, there is a high probability that at least one of the run PTCs has shorted out.
3. Remove the wall thermostat connector from the side of the primary control and/or any jumpers across the T-T terminals.

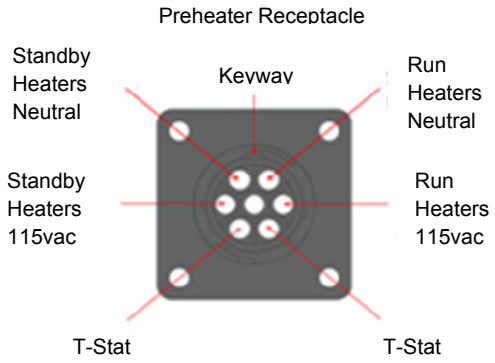


4. Disconnect the preheater plug. Allow the preheater to cool, and check the following with the digital multimeter:
   a. Verify that the circuit between the two thermostat pins is open.
   b. Verify that there is a resistance of 100-1000 ohms between the standby power and neutral pins.
   c. Verify that there is a resistance of 100-1000 ohms between the run power and neutral pins.

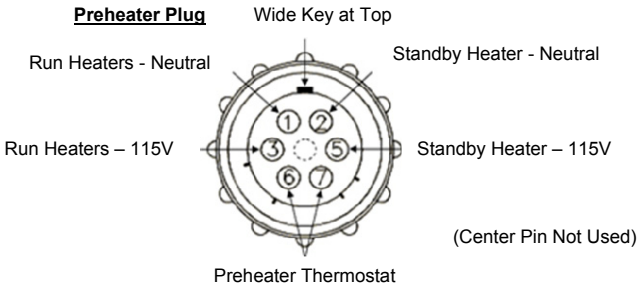


If any of these tests fail, the preheater will need to be replaced.

5. Plug the burner in. Unplug the preheater. Turn the preheater ball valve off. Verify power by testing for 120VAC across the preheater receptacle (see figure).
    a. Verify power across the preheater receptacle Standby Heater pins.
    b. Note: This should only be performed with the burner fully attached to the furnace cabinet. Next, jump across the TT and FF terminals on the Primary Control. Verify power across the preheater receptacle Run Heater pins.
    c. Remove the jumpers from the TT and FF terminals, return the plug to the receptacle and open the ball valve when finished.



6. If the tests in step 4 and 5 are successful, plug the preheater into the receptacle and allow the preheater to heat up. After 30 minutes, the standby PTC should have heated the oil to the point where the preheater thermostat should have closed. Note: If the room temperature is below 50°F, allow additional time.
    a. Using the temperature probe (or TPI combustion analyzer with a type K thermocouple attached), touch the thermocouple probe to the surface of the top preheater cap (under the insulation). It should register above 120°F.
    b. Unplug the preheater and check for continuity across the thermostat pins of the preheater plug (refer to figure). If the preheater is hot, but there is no continuity across the thermostat pins, the preheater will need to be replaced.



7. If the burner does not light off well, there may be a problem with the Nozzle Block Standby PTC. To check the Nozzle Block Standby PTC: Remove the screws and flip back the transformer on top of the burner to expose the nozzle block.
    a. Using the temperature probe (or TPI combustion analyzer with a type K thermocouple attached), touch the thermocouple probe to the surface of the nozzle extrusion, it should register above 120°F
    b. Unplug the burner and check the physical connection and pins of the white PTC electrical plug.
    c. Return the transformer to its operational position. Plug the burner in.
8. If the burner starts okay, but then trips after a few minutes, then restarts again repeatedly, then the run pills may not be providing enough heat or the incoming oil is cold. If the incoming oil to the preheater is above 50°F and the preheater cannot maintain temperature, the preheater will need to be cleaned or replaced.

10.3.6 Primary Control Testing

Tools Required:
Flat-blade screwdriver, alligator clip or piece of jumper wire.

Primary Controller Function:
Processes the call for heat and distributes power to the necessary components in order to operate the furnace or boiler. During the startup and heating cycle, the primary controller looks for a flame to insure that there is combustion, and shuts down the burner if there is no flame.

Note: During this test, if the Primary Controller does not function as stated, call Technical Services for assistance, or Customer Service to order a new Controller. **Note:** With the T-T terminals jumped, if the Burner does not operate, verify that the primary is sending power by checking the voltage across the orange and white terminals beneath the primary control.

DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. Set the Wall Thermostat to a temperature setting lower than current ambient temperature.
2. Disconnect one of the wires going to the F-F terminals on the primary

Testing the Limited Recycle Mode function of the Primary Control

3. Use the alligator clip or jumper wire to connect the T-T terminals
    a. Burner should run for –several seconds, resulting in reset.
    b. –If this happens, the primary control is working properly.
        i. If the burner does not operate, unplug the burner and check the connections in the burner wiring box. Then, repeat the testing. If the burner still does not operate, replace the primary control.
        ii. Go to step 7 if complete, else go to continue to step 4.

Testing the Recycle function of the Primary Control

4. Use the alligator clip or jumper wire to connect the T-T terminals.
5. When burner starts, use alligator clip or jumper wire to connect the F-F terminals and allow to run for 1 minute.
6. Remove jumper from F-F terminals
    a. Burner should run for several seconds, resulting in reset. If this happens, the primary control is working properly.
    b. If the burner does not operate, unplug the burner and check the connections in the burner wiring box. Then, repeat the testing. If the burner still does not operate, replace the primary control.

Completing the Test

7. Reconnect the wire removed in Step 2.
8. Return the Wall Thermostat setting to an appropriate temperature.

10.3.7 Solenoid Valve Testing

Tools Required:
7/16" wrench, Flat-blade screwdriver, 120VAC capable Digital Multi-Meter and alligator clips or jumper wires.

Solenoid Valve Function:
Blocks flow of the fuel from the preheater to the nozzle block when burner is not operating, and allows for flow during burner operation. The valve is a Normally Closed Valve.

Note: During this test, if the Solenoid does not function as stated, call Technical Services for assistance, or Customer Service to order a new Solenoid Valve.

CAUTION Make sure the Solenoid has recently been maintained. Neglect will negatively affect the results of testing.

⚠DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. Unplug the burner plug from its receptacle. Unplug preheater.
2. Remove the primary control cover plate, allowing access to the terminal strip under controller.
3. Find the solenoid valve wires, purple and white of the same gauge, and remove from terminal strip.
4. Using a multi-meter, test for continuity across the solenoid wires. There should be continuity across wires.
5. Leaving the purple and white wires disconnected, loosely replace the primary cover.
6. Remove copper tubing from between the solenoid and the nozzle (have cup or disposable towel ready to catch oil).
7. **⚠CAUTION Wear Safety Glasses for the following steps!**
8. Plug in the burner and jumper the T-T terminals.
9. After the burner starts, jumper the F-F terminals.
10. Holding the cup near the open end of the solenoid valve, observe to see if the valve leaks while the burner is running. The valve should not leak during operation.
11. Remove the T-T and F-F terminal jumpers.
12. Unplug the burner plug from its receptacle. Reconnect the solenoid to the terminal strip. Plug the burner back in.
13. Apply the jumpers as in steps 9 and 10.
14. The solenoid should open and oil should flow out of the solenoid.
    a. If oil does not flow, verify 105-120VAC is supplied to the solenoid from the terminal strip.
15. Remove the jumpers from the T-T terminals, then the F-F terminals and unplug the burner.
16. Return the wires, primary, copper and preheater plug to their operational positions.
17. Plug in the burner.

10.3.8 Top Suction Kit Testing (for kits with foot valve and standpipe only)

Tools Required:
3/4" wrench, 3/8" flare nut cap, alligator clips

Top Suction Kit Function:
Save time/money and increase reliability when delivering fuel from the top of various types of tanks. An EnergyLogic Top Suction Kit combines fuel pick-up with a foot valve and a low fuel cut off switch. The fuel pick-up line has a rigid copper tube, increasing reliability of the fuel delivery. An EnergyLogic Low Fuel Cutoff Switch is provided to interrupt operation when the fuel level in the tank is low, reducing the chance of introducing air into the fuel lines.

Note: This test should be performed only AFTER a Vacuum Test has been performed between the pump and fire-stop or ball valve.

Note: During this test, if the Top Suction Kit does not function as stated, call Technical Services for assistance, or Customer Service to order a new Top Suction Kit.

Note: If your top suction kit does not have the standpipe and foot valve, simply run the vacuum check in the priming instructions - and make sure that you have proper and tight flare connections.

Procedure (for top suction kits with foot valve and standpipe only):

1. Disconnect the 3/8" copper tube at the filter head assembly.
2. Remove Top Suction Kit Assembly from tank.
3. Remove the foot valve from the copper tubing and cap pickup.
4. Support the Top Suction Kit during the test procedure.
5. Reconnect the filter head assembly to the suction side of the metering pump.
6. Refill stand tube with fuel (allow for air to bubble up).
7. Ensure that the Top Suction Kit ball valve is closed.
8. Jumper the T-T terminals on the primary control.
    a. Once the burner starts, immediately jumper the F-F terminals on the primary control.
9. Allow the suction gauge to pull down to 15" Hg and remove clip from T-T jumper.
    a. Note the suction gauge reading.
10. Let the suction side set for 30 minutes.
11. The suction gauge should register the same level of suction as in step 6a.
    a. If not, call Technical Services for assistance, or Customer Service to order a new Top Suction Kit.

10.3.9 Iron Core Transformer Testing

Tools Required:
Flat-blade screwdriver, 120VAC capable Digital Multi-Meter (must have mA AC capability) and alligator clips or a jumper wire.

Transformer Function:
Transforms 120 Volts into a low ampere, high voltage (10,000 V) supply to the electrode. This provides the spark needed for combustion.

Note: During this test, if the Transformer does not function as stated, call Technical Services for assistance, or Customer Service to order a service part.

⚠WARNING EnergyLogic does not recommend the use of a screwdriver or any other conductor to contact the transformer springs other than the testing procedure below!

⚠DANGER ***During a portion of this test, high voltage electrical components will be energized. Only a certified electrician is to perform the following procedures, and with extreme caution.***

Procedure:

1. Unplug the preheater.
2. Use the screwdriver to loosen the primary control mounting cover and lift to allow access to terminal strip underneath.
3. With the burner plugged in, jumper the T-T terminals to simulate a call for heat. When the burner starts, jumper the F-F terminals on the primary control.
4. Find the Black wires coming from the transformer and cautiously check the voltage across the terminals. Should read between 105 and 120 volts AC.
    a. If reading is not within range, call your electrician to rectify voltage issue. There may be an issue with your local power company.
5. Remove jumpers from T-T and F-F terminals.
6. Unplug the burner plug from its receptacle.
7. Loosen or remove two ignition transformer screws.
8. Tilt back the transformer.
9. Verify that the springs are making contact with the electrode extensions by visually aligning the springs with the extensions. If they are misaligned, reshape the springs to ensure good contact. If soot is present, clean with wire brush or emery cloth.
10. ***Use Caution when approaching the transformer springs! They will be energized with step 11.***
11. Plug in the burner and replace the jumpers as in step 3. You will need to disconnect the yellow wires from the terminal strip to the cad cell for the burner to restart.

Using a digital multi-meter:

12. Using your digital multi-meter
    a. Without an amp clamp (must have mA AC capability)
        i. Set the reading to amperes.
        ii. Test amperes from spring to spring.

iii. Reading should be between 20mA and 26mA with a nominal of 23mA. (transformer should be labeled)

b. With an amp clamp (must have mA AC capability)
   i. With burner plug unplugged, run wire from spring to spring of the transformer.
   ii. Plug in the burner and apply jumpers as in step 11.
   iii. Using the amp clamp around the wire, read the amperes.
      1. Reading should be between 20mA and 26mA with a nominal of 23mA. (transformer should be labeled)

13. Remove jumpers from T-T and F-F terminals.
14. Unplug the burner plug from its receptacle.
15. Return the Transformer and Primary Controller to its operating position and plug in the burner.

10.3.10 Fan and Limit Controller Testing

Tools Required:
None.

Fan and Limit Controller Function:
Turns fan on and off at designed temperatures. The controller limits the high temperature of the furnace by turning off the burner at a designated high limit temperature, providing a safety control.

Note: During this test, if the Controller does not function as stated, call Technical Services for assistance, or Customer Service to order a service part.

Procedure:

1. The fan and limit control is the small silver box next to the hour meter on the furnace cabinet above the burner for models 140H/200H. For model 340H, the control is located at the front panel. Remove the Fan and Limit switch cover.
2. Check the fan OFF and ON tabs to see that they are set at 90° F/32° C and 130° F/54° C. The high limit shut-off tab should be set at 250° F/121° C.
3. Turn the furnace on and watch the fan and limit dial as the furnace rises in temperature. The blower should come on around 130° F/54° C and stay on. Turn the wall thermostat down to stop the burner. The blower should stay on to cool the heat exchanger (combustion chamber) until it reaches 90° F/32° C on the fan and limit dial.
4. To check the high limit function, turn power to the furnace off at the breaker box and disconnect a blower lead in the blower panel wiring box above the blower. Turn the power back on and start the furnace. Watch the fan and limit dial. Your burner should shut off when the dial reaches the 250° F/121° C setting.
5. Now, turn off the power and reconnect the blower. When you turn the power back on, the blower will come on to cool the heat exchanger.
6. If the fan and limit control does not operate as described above, replace it with an identical fan and limit control. Replacement instructions will come with the new fan and limit control.