

EB400D Field Assist Troubleshooting Guide



Welcome to the Campo “**Field Assist Troubleshooting Guides**”.

These guides were developed to assist the working technicians in the field. We’ve supplied issues and solutions to the most common problems encountered in the field. If you need assistance while troubleshooting on the job, they are easy to store in your smart phone, tablet or computer.

Getting Started is easy! Just click on ‘**Page #**’ for the problem you are encountering

Burner control is locked-out on reset



Burner control is NOT locked-out on reset

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[Page 23](#)

➤ **Registration, Tech Tips and Bulletins** for you...[Page 39](#)

➤ **Quick set-up** and technical information...[Page 40](#)

➤ **Contact Us...**[Page 38](#)

Burner control is locked-out on reset...

“Field Assist Troubleshooting Guide”



➤ **Warning!** Continuous resetting of the burner control may cause an accumulation of fuel oil in the heatexchanger, and this could lead to an Implosion of the heatexchanger or personal harm.




- Resetting the Burner Control From Lock-out... [Page 3](#)
- You Reset The Control, The Burner Starts , But Does Not Fire...[Page 4](#)
- The Burner motor Did Not Start and Locks-out on Reset...[Page 16](#)
- If the 'Flame Present' Light Is Illuminated Before The Call For Heat...[Page 20](#)
- If A Flame Is Present During The Pre-Purge...[Page 22](#)



Reset
button

- A flashing reset button light indicates the burner control is **locked-out on reset**. Press and release the button to reset.  **Flashing**

- A solid red 'reset button light' indicates the burner control is in **hard lock-out**. Reset the control by pressing the button for 15 seconds or till the prime light comes on. 

Solid red

➤ **Warning!** Continuous resetting of the burner control may cause an accumulation of fuel oil in the heatexchanger, and this could lead to an Implosion of the heatexchanger or personal harm.

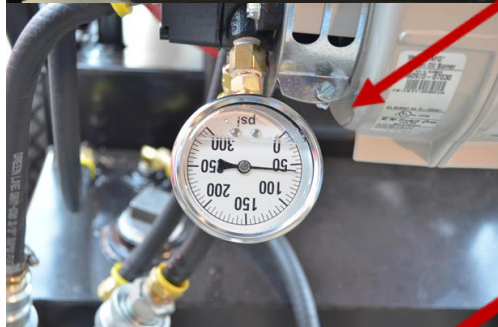
➤ Return to menu... [Page 2](#)

You Reset The Control, The Burner Starts , But Does Not Fire

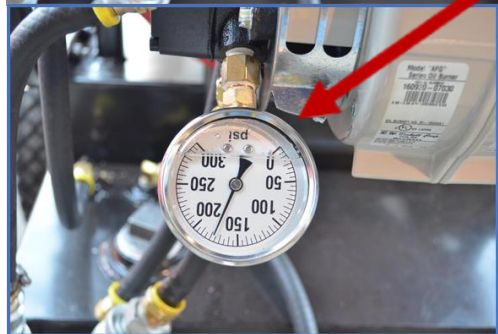
“Field Assist Troubleshooting Guide”



- Reset the control from Lock-out and check for pressure on the gauge.
- If the pressure gauge reads **50 Psi**. and remains at **50 Psi**... [Page 5](#)



- If the pressure increases to **150 Psi** after the pre-purge... [Page 8](#)



- If the pressure gauge reads **0 Psi**... [Page 11](#)

If there is only 50 PSI and the control locks out on reset...

“Field Assist Troubleshooting Guide”



- ✓ Defective solenoid valve coil.
- ✓ Defective burner control.
- ✓ Defective fuel pump.



➤ Test the components... [Page 6](#)

Check the solenoid valve coil

“Field Assist Troubleshooting Guide”



- Set your meter to **ohms**, Measure the resistance across the two terminals of the solenoid coil.
- ✓ If there is approximately .357ohms resistance, the coil is good.
- ✓ If **NO** resistance, the coil is defective.
- If the coil tests good... [Page 7](#)

Check the burner control and fuel pump...

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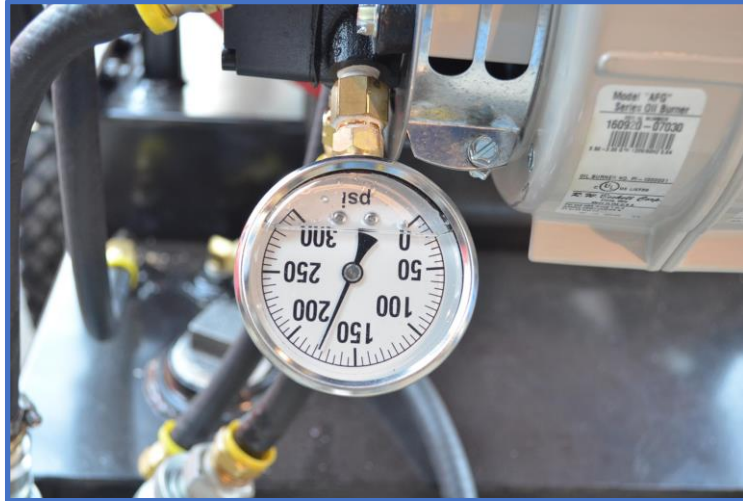


- Reset the Burner control and check for **120 volts** on the coil plug.
- ✓ If **120 volts** is **not** present, the control is defective.
- ✓ If **120 volts** **is** present, defective pump.



Problem Solved

If the pressure increases to 150 psi after the pre-purge...



✓ Defective igniter.



✓ Defective electrodes.



✓ Water in fuel oil.



✓ Defective nozzle.



➤ Test the components... [Page 9](#)

Check the igniter for spark

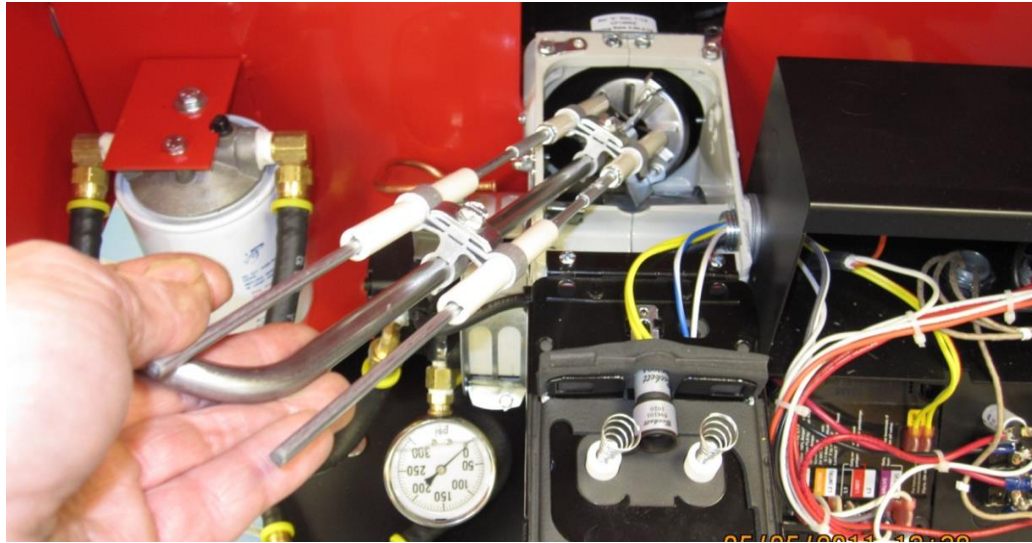
“Field Assist Troubleshooting Guide”



- Shut off the power supply to the heater, Open the igniter from the burner housing and remove the cad from the igniter base plate. Restore power and start the burner, check for spark across igniter terminals
- **NOTE ensure to use a well insulated screwdriver to test for spark.**
- If there is **no** spark.
- ✓ Defective igniter.
- If there is a good spark... [Page 10](#)

Check electrodes and nozzle...

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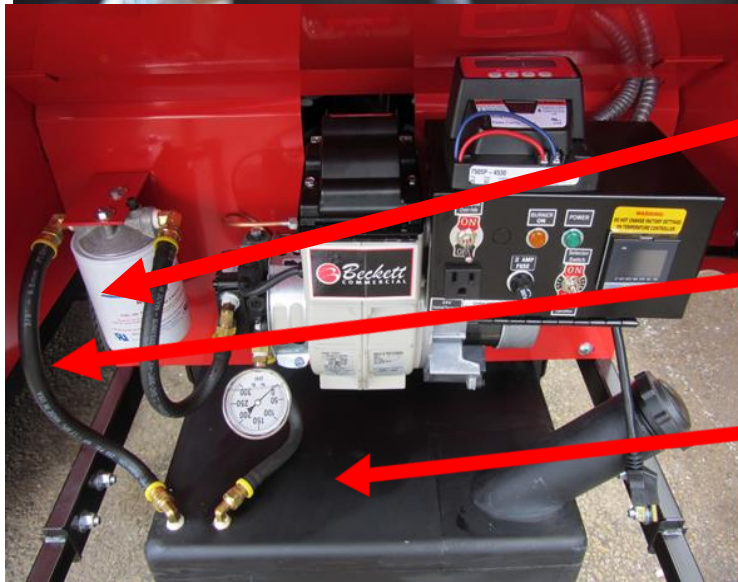
- Remove the Nozzle Line Assembly...
- Inspect electrode porcelains for cracks
- Check for water in nozzle assembly tube.

➤ If electrodes are good and there is no water in oil tube, the nozzle needs to be replaced.



Problem Solved

ZERO pressure on the gauge...

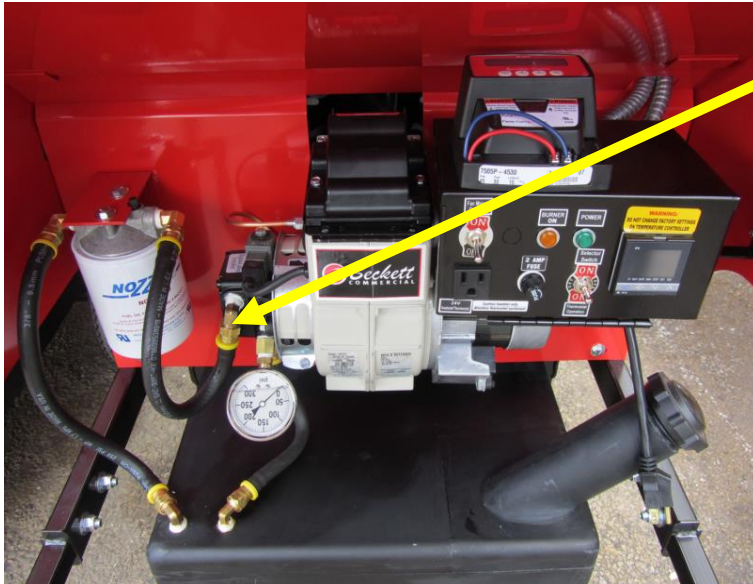


- ✓ Defective pump
- ✓ Broken pump coupling
- ✓ Clogged filter
- ✓ Clogged oil lines
- ✓ No fuel in tank

➤ Test the components...[Page12](#)

Checking the pump coupling and fuel oil pump...

“Field Assist Troubleshooting Guide”



- Remove the oil line fitting at the pump to see if there is fuel oil in the line.
- If there is fuel in the pump and oil line...
 - ✓ Defective pump coupling
 - ✓ Defective fuel oil pump
- If there is fuel in the pump and oil lines...[Page 13](#)
- If there is NO fuel in the pump and oil lines...[Page 15](#)

Check fuel pump and coupling...



Remove the pump and coupling. Inspect the coupling to ensure the coupling is fixed secure to both the motor shaft and the pump shaft.

- **NOTE:** If the coupling is good, then the pump is defective. Before replacing the fuel pump...[Page 14](#)



Problem Solved

When replacing the fuel oil pump...!!!!



Special Note: You MUST ensure there is a bypass plug installed in the pump when replacing.



Bypass plug port indicated on pump label

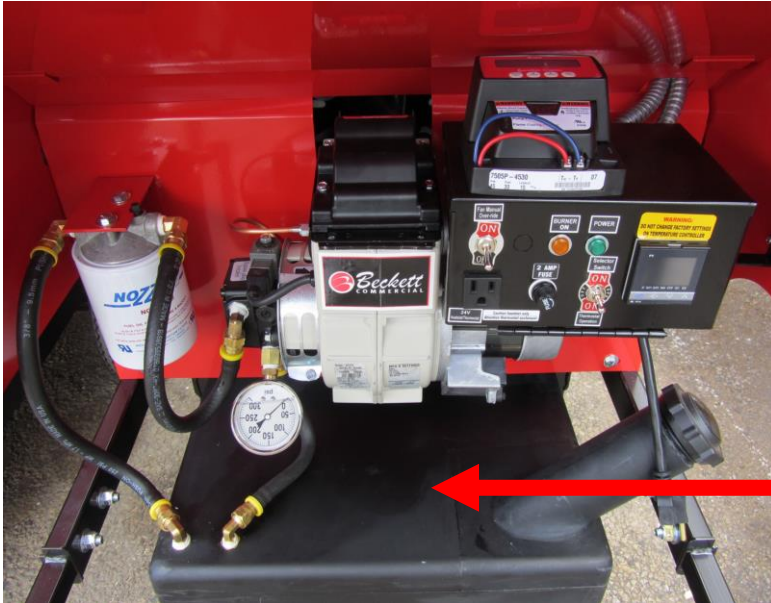


Plug

When replacing the fuel pump, install the bypass plug into the new pump.

Checking for fuel in the filter, fuel lines and fuel tank...

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- Check for fuel oil in tank

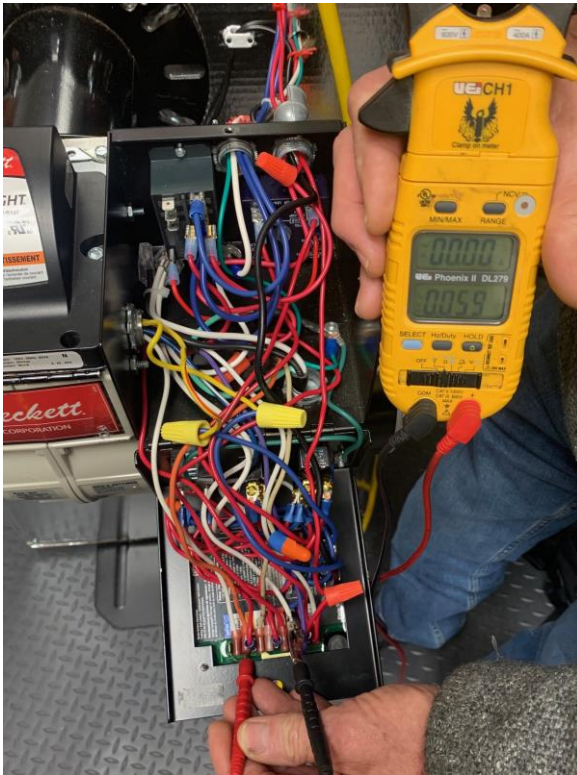


- Check for blocked filter or lines

Problem Solved

The burner motor did not start and locks-out on reset...

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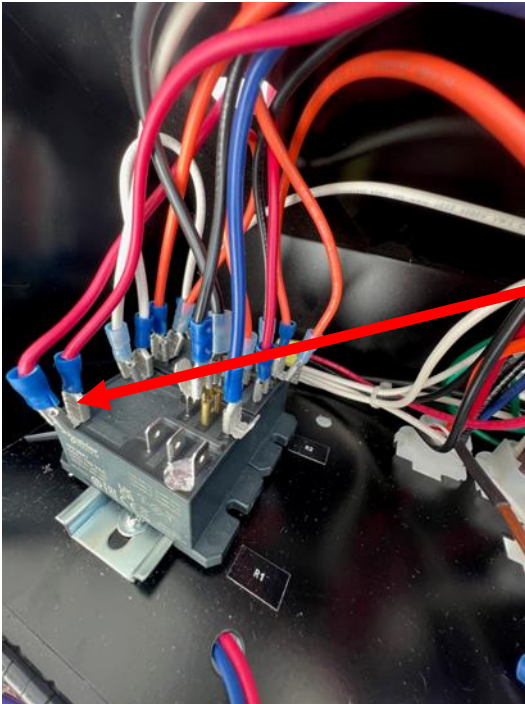
- ✓ Defective burner motor
- ✓ Defective Burner Control
- ✓ Defective Motor Relay



➤ Test the components...[Page 17](#)

Checking burner motor, motor relay and burner control...

“Field Assist Troubleshooting Guide”

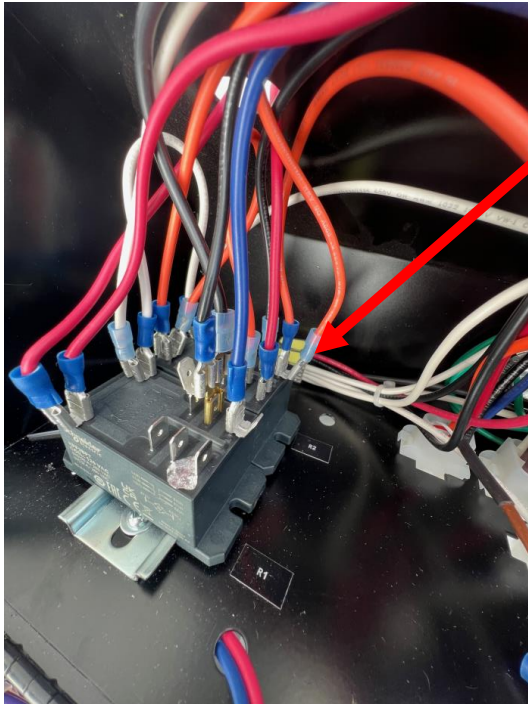


Reset burner control, check for **120 volts** on burner motor relay R2 coil.

- ✓ If **120 volts** is **NOT** present, defective burner control.
- ✓ If **120 volts** is present, defective burner motor relay **OR** burner motor.

➤ Test the components... [Page 18](#)

Checking burner motor and motor relay...



- Reset the burner control and check for **120 volts** on burner motor relay (R2) on the motor terminal. (orange wire)
- ✓ If **120 volts** is present, defective burner motor.
- ✓ If **120 volts** is **NOT** present, defective burner motor relay.
- Before replacing burner motor, make sure the fuel oil pump is **not seized...** [Page 19](#)

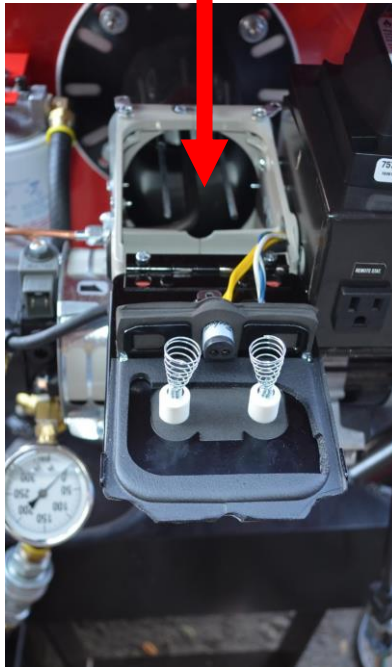
Special Note! Checking The Fuel Oil Pump

“Field Assist Troubleshooting Guide”



blower wheel

blower wheel
Location



Unplug the heater and open the igniter to access the blower wheel. Rotate the blower wheel by hand. If the blower wheel does not turn freely, it is likely the pump is seized

- ✓ Try freeing the pump by moving the blower wheel back and forth. **“Caution should be taken”** not to damage the blower wheel with excessive force.
- ✓ If the pump does not turn by moving it back and forth. You can use an adjustable wrench, placed on the pump shaft to unseize.

Problem Solved



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Flame Present' light is illuminated *BEFORE* the call for heat...



Flame Present Light



- ✓ Defective cad cell
- ✓ Defective cad cell harness



➤ Testing the cad cell or harness... [Page 21](#)

Testing the cad cell and harness...



Remove the cad cell from the harness.



- ✓ If the green light remains **ON**, the harness is defective.
- ✓ IF the **light goes out**, the cad cell is defective.



Problem Solved

If there is a flame present during the pre-purge...



- If there **is** a flame during the pre-purge this means the valve stem of the solenoid valve is stuck open in the fuel pump.
- ✓ Defective fuel oil pump



Problem Solved

If the Burner Control is NOT locked out on Reset and will not start...

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*Make sure there **is** 120 volts to the control panel and the 2-amp fuse isn't burnt.*

- If the Burner Control is NOT locked out on Reset and will not start...[Page 24](#)
- If the Circulating Fan Fails To start...[Page 31](#)
- If the fan is starting intermittently, erratically or inconsistently... [Page 32](#)
- Circulating Fan Does Not Shut Off...[Page 33](#)

If the Burner Control is NOT locked out on Reset and will not start...

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- Check for **120 volts** between Limit Terminal and Common (L2) on the burner control.

✓ If **120 volts** is present, [Page 25](#)

✓ If **120 volts** is **NOT** present, [Page 27](#)

If 120 volts is present on burner control between Limit Terminal and Common (L2)

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- ✓ Defective Bypass Switch
- ✓ Defective Burner Control



➤ Test the components. [Page 26](#)



- Check the selector switch by placing a jumper wire on terminals T-T



✓ If the burner **starts**, the bypass toggle switch is defective.

✓ If the burner does **not** start, the burner control is defective.

Problem Solved

If 120 volts is NOT present on burner control...



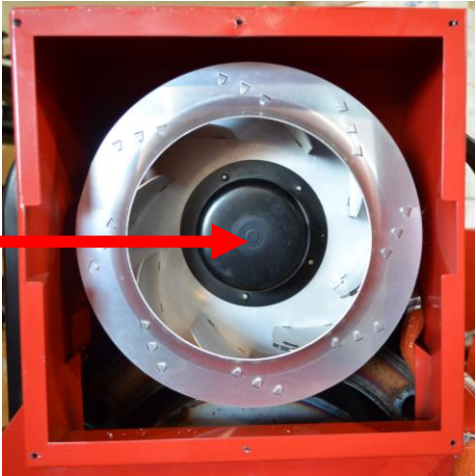
- ✓ Defective Thermal Limit Disc 150°F
- ✓ Defective Thermocouple
- ✓ Defective Temperature Controller
- ✓ Defective Fan Motor Thermostat Switch

Thermocouple

Thermal Limit Disc

Temperature Controller

Thermostat Switch Sealed Inside Fan Motor

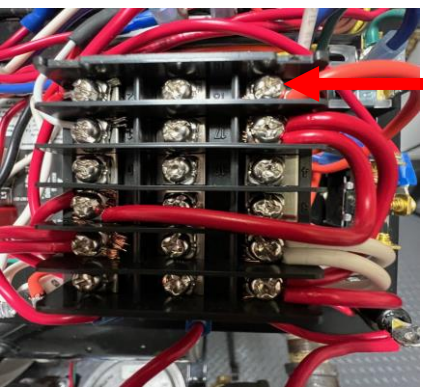


➤ Test the temperature controller... [Page 28](#)

Testing the temperature controller...

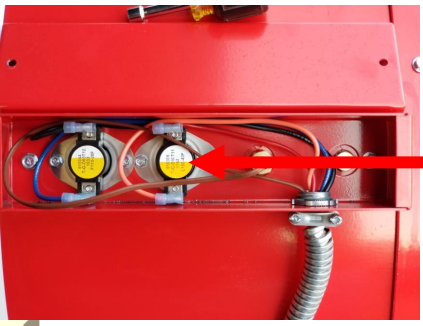


✓ If the display on the temperature controller is reading 000 (or other false reading), The thermocouple is defective.



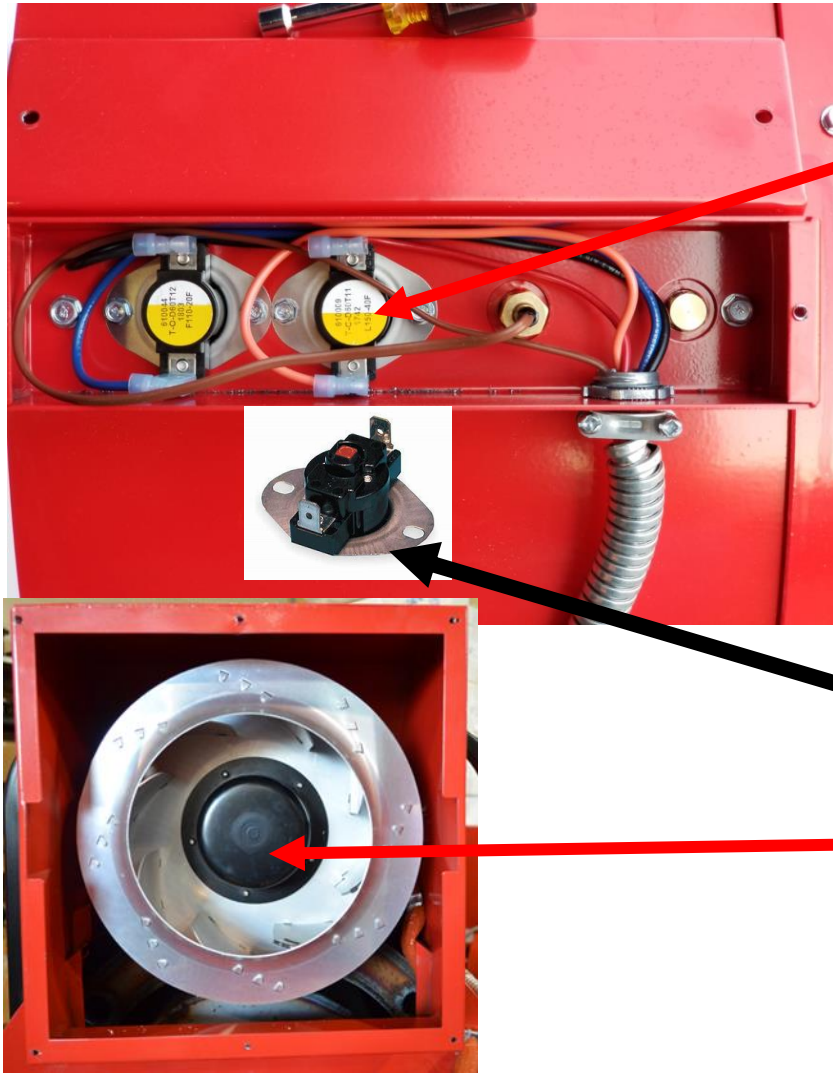
Check for 120 volts on the orange wire terminal #6 on the temperature controller.

✓ If 120 volts is NOT present, the temperature controller is defective.



✓ If voltage is present, the 150F thermal limit disc is defective OR the thermal heat thermostat in the fan motor is defective... [Page 29](#)

Test the high limit 150°F disc and motor thermostat...



Test for **120 volts** on each terminal of the disc to ground.

✓ If **120 volts** is **NOT** present, the fan motor thermostat switch is defective. Note the thermostat is located inside the motor and **is not** field serviceable.

✓ If **120 volts** **is** present on only 1 terminal of the disc, the disc is defective.

➤ **Note:** newer models have a manual reset limit disc.

➤ Test the motor thermostat... [Page 30](#)

Problem Solved

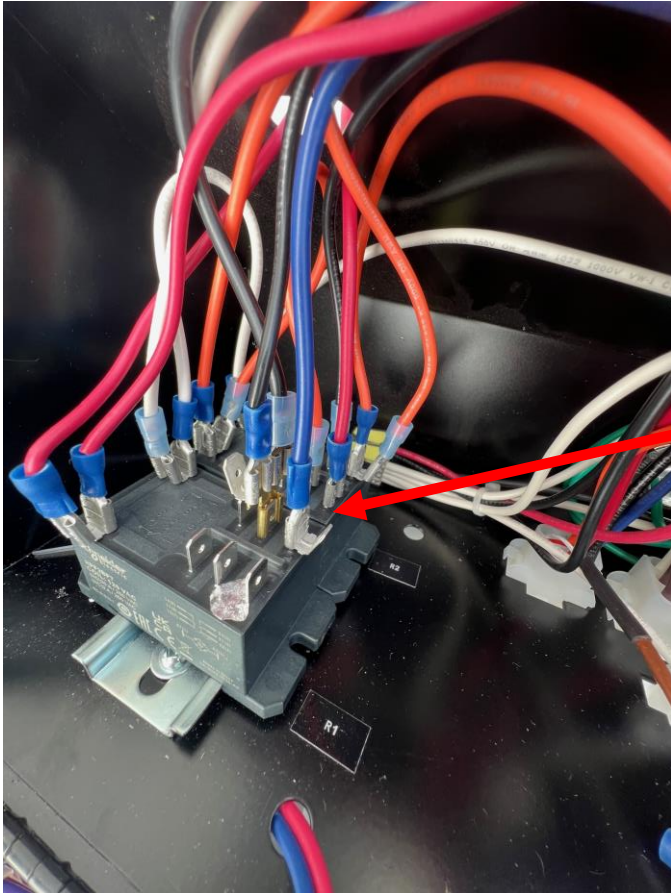


- On late model, Blaze construction heaters, the circulating fan motors are equipped with a thermal heat thermostat that is not serviceable.
- The motor thermostat is wired in series with the 120-volt limit and temperature controller circuit.

Check to ensure the thermal heat thermostat contact is closed by testing for continuity, using the 2 white or 2 grey wires leading to the circulating fan motor.

- If the contact is closed, the thermal heat switch is good.
- ✓ If the contact is open, the ‘Circulating Fan Motor’ is defective and needs to be replaced.

If the circulating fan fails to start...



With the Fan Override switch in the ON position, check for 120 volts on the fan relay (R1) on the fan motor terminal. (Blue wire)

- ✓ If 120 volts is present, the Motor is defective.
- ✓ If 120 volts is not present, defective relay



Problem Solved

If the fan is starting intermittently, erratically or inconsistently...



The **EB400D** is equipped with redundant controls to ensure **positive starts** for the circulating blower fan.

- ✓ If the temperature controller display reaches **90°F** and the fan does not start, the controller is defective.



- ✓ If the fan does not start within **90 seconds** of the burner starting, the fan timer is defective.



- ✓ If the temperature at the fan **110°F Disc is over 110°F** and the fan **does not start**, the 110°F fan disc is defective.



➤ **Note:** It is very unlikely that all 3 components would be defective at the same time. If the circulating fan fails to start, likely it would be the circulating fan motor or the (R1) relay

Problem Solved

Circulating fan does not shut off...



Fan Override Switch

- First, ensure that the ambient temperature at the 110°F fan disc is less than **80°F**.
- Ensure the Fan Override switch is in the off position.

✓ Defective 110°F fan disc



✓ Defective fan relay



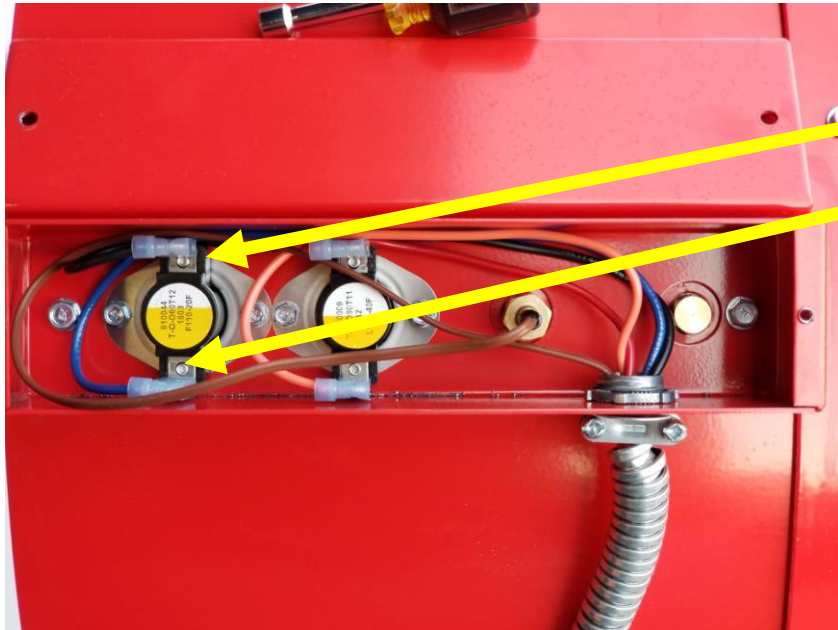
✓ Defective temperature controller



➤ Testing the components... [Page 34](#)

Circulating fan does not shut off

Checking – 110°F fan disc



- Check for **120 volts** between ground and each terminal.
- ✓ If **120 volts** is present, on **BOTH terminals**, the disc is defective.
- If **120 volts** is present on **ONE terminal** only, the disc is GOOD continue...[Page 35](#)

Circulating fan does not shut off...



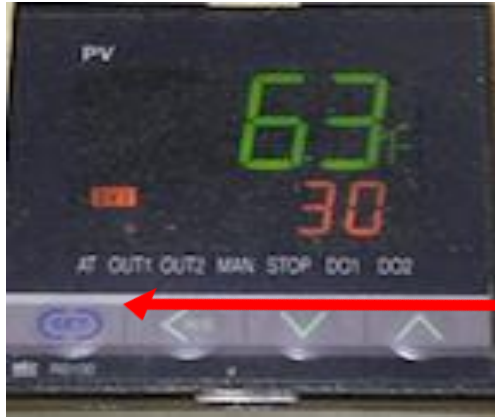
- Check for 120 volts on the relay coil terminals.

✓ 0 volts indicates a defective relay



- If 120 volts is present on the relay coil... [Page 36](#)

Circulating fan does not shut off...



If the circulating fan **110°F** disc is good AND there is **120 volts** on the circulating fan relay (R1) coil.

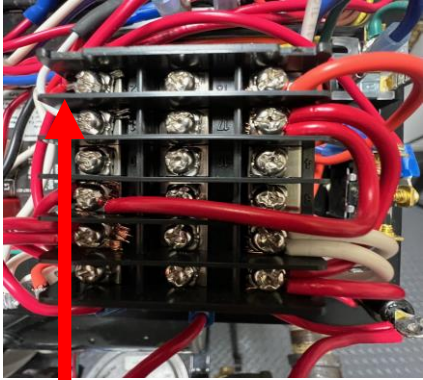
✓ Defective temperature controller

✓ Defective Thermocouple



➤ Testing the components... [Page 37](#)

Circulating fan does not shut off...



thermocouple wires

Testing the thermocouple...

- Remove the (small) red and white thermocouple wires from the back of the temperature controller
- Install a jumper wire between the two terminals

- ✓ If the fan stops running, the thermocouple is defective
- ✓ If the fan continues to run, the temperature controller is defective

➤ **Caution...** do not remove the wrong red and white wires

Problem Solved

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Choose the information you require and click on the Page

- Start-up procedure...[Page 41](#)
- Adjusting air settings and oil pressure...[Page 48](#)
- Electrical hook up...[Page 49](#)
- Adjusting the burner combustion...[Page 45](#)
- Venting the heater...[Page 45](#)
- Electrode Adjustments...[Page 50](#)
- Pre-season maintenance...[Page 51](#)

Instruments needed for Fuel Oil heater set-up and diagnostics.

“Field Assist Troubleshooting Guide”



What you need to commission the heater!



Combustion Analyzer



Voltmeter



Smoke Tester

➤ Start-up continued...[Page 42](#)

Start-up procedure Fuel Oil fired units. “Field Assist Troubleshooting Guide”



- Make sure the venting is properly installed...[Page 46](#)
 - Make sure the proper size wiring and proper voltage is supplied to heater...[Page 49](#)
 - Make sure all piping and fittings are tight and free from oil leaks.
- Start-up continued...[Page 43](#)



Start-up procedure Fuel Oil continued.



- With the switch for the burner in the off position, plug in the heater, turn the fan manual override switch to ON position and ensure voltage remains steady. Return fan manual override switch to OFF position.
- Place the toggle switch in bypass position to start the burner. Once the burner is running make sure that the oil pressure is adjusted to the manufacture’s recommendations **150 PSI**.

➤ Start-up continued...[Page 44](#)

Adjusting the burner for clean and reliable combustion

“Field Assist Troubleshooting Guide”



Clean & Reliable Combustion

Getting the most reliable performance out of an oil burner comes down to ensuring that it is properly set up. This can require some fine tuning, but the following steps should help you achieve the reliable combustion you are looking for...

➤ **No installation** is complete until the combustion of the heater has been performed.

Using a combustion analyzer... [Page 45](#)



Clean & Reliable Combustion

“Field Assist Troubleshooting Guide”



- While the flue-stack is still cold pre-drill $\frac{1}{4}$ ” hole in the flue-stack **18”** above the flue collar.

Set the air settings to manufacturer’s recommendations. Once you’ve done that, start the burner and let it operate for 10 minutes. Draw a smoke sample from the flue pipe. Adjust the air settings to achieve between trace and number 1 smoke.. Next, draw a carbon dioxide (CO₂) sample from the flue pipe. Adjust the air settings to achieve between **11.5% & 12%**. CO₂ Check the CO (Carbon Monoxide) level, it should not be higher than **50** PPM.



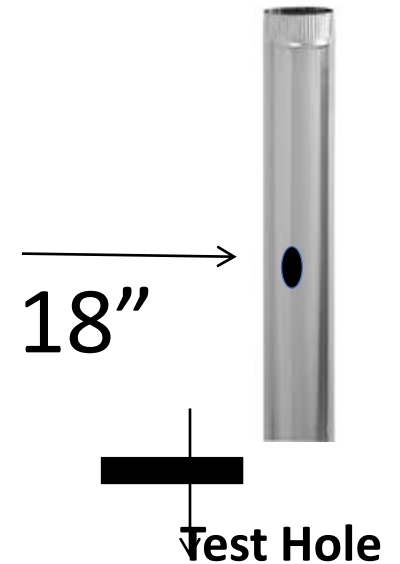
Air setting 4/2



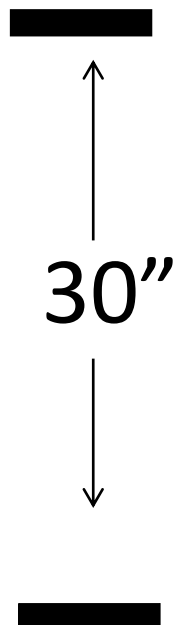
Smoke Tester



Combustion Analyzer



- [back to other technical information...Page 40](#)



- Make sure to install a stack minimum 30” on the flue. Make sure to install a rain cap on the flue pipe. Make sure that flue gases are not being circulated into by the cooling fan and pushed into the space you are heating.

WARNING: The appropriate measures must be taken to ensure there will be no positive pressures on the exhaust flue of the heater.

➤ Venting from inside a building...[Page 47](#)

Best practices for venting when heater is located inside a building

- Avoid using as many 90-degree elbows as possible
- Venting runs should be as short as possible
- Vertical rise minimum 3 feet, 5 feet is better outside the building.
- Always install a rain cap.

- Never decrease diameter of flue piping.
- Horizontal runs $\frac{1}{4}$ " per foot rise.
- Make sure all piping is properly secured.
- Make sure there is no negative pressure inside the building where the heater is placed.

➤ **Note:** where the vent pipe passes through a combustible wall a fireproof thimble must be used.

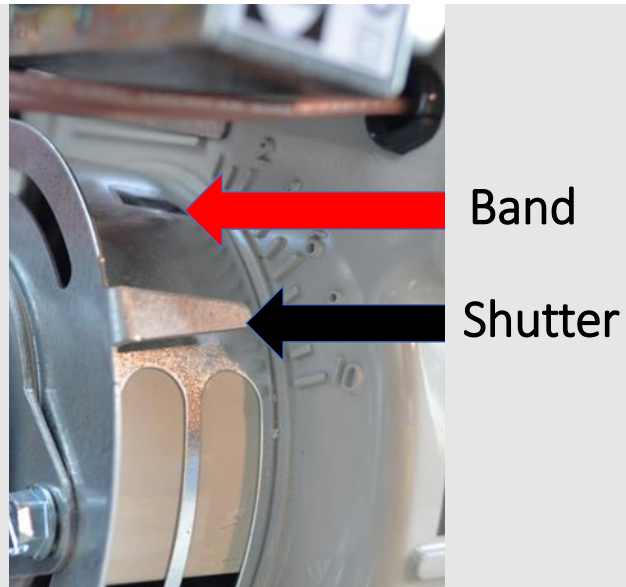
Back to startup procedure... [Page 42](#)



Combustion and adjusting the air settings.



Proper air adjustments must be preformed for reliable combustion



Air setting 2/2

- Recommended air settings are indicated in manufactures instructions as:
Example: 4/2 the first number being the shutter and the **second number** being the air band.
- **Note:** recommend air settings are approximate and will change with altitude and fuel oil temperature.
- **Using a combustion analyzer** will ensure clean burning and maximum efficiency.
- **EB400D** Air setting **2/2**, Oil pressure is **150 PSI**.
Head setting # 1

[Back to technical information...Page 40](#)



- **Only** extension cords that are CSA / UL approved should be used. Extension cords should be no less than **# 12** gauge up to **50** feet Over and up to **100** feet, no less than **#10** gauge should be used. Do not plug multiple extensions together.



Make sure extension cords are placed so as not to obstruct walkways and protected against traffic.

- **WARNING:** If the heater is going to be fed with power from a generator, always have the heater unplugged until the generator is running stable. Ensure the generator is sized to accommodate the heater voltage demand.

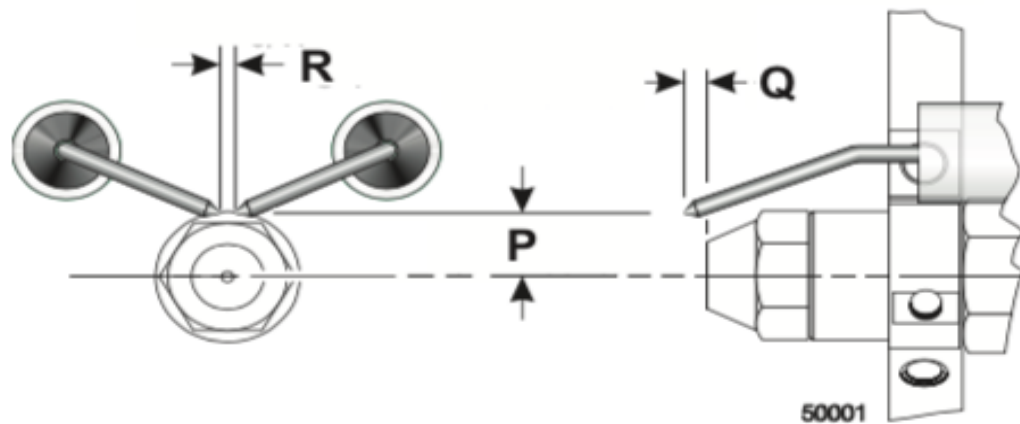
➤ **back to other technical information...**[Page 40](#)

➤ **back to start up procedure...**[Page 42](#)





➤ EB 400D... (P = 1/4") (Q = 1/8") (R = 5/32" gap



Legend (Figure 5)

- P Nozzle centerline to electrode tip = 3/16"
- Q Nozzle face to electrode tip = 1/4"
- R Electrode spacing = 3/16" gap

➤ EB400D Air setting 2/2, Oil pressure is 150 PSI.
Head setting # 1

back to technical information...[Page 40](#)

Pre-season checklist oil fired Heaters:



SERIAL NUMBER:	Test DATE:
Model	/ /
Tested By:	
Oil Burner	
Preform and Record combustion results:	
CO2 PERCENTAGE (carbon dioxide)	
CO parts per million (ppm carbon monoxide)	
Remove nozzle line assembly adjust electrodes and clean	
Replace nozzle (if necessary)	
Remove cad cell and clean glass eye	
Test igniter	
Start burner and check control lock-out	
Check and adjust oil pressure	
Clean blower wheel (remove dust)	
Continue Page 52	

Pre-season checklist oil fired Heaters:



Heater controls	
Test temperature controller Fan on at 90F / Fan off at 80F Burner off 10F above set high limit / Burner back on at high set temp	
Check circulating fan,(Fan timer, Fan 110F disk)	
Check wiring terminals inside control panel	
Clean heater casing	
Check for water in fuel oil tank. Remove if needed (important)	
➤ back to other technical information... Page 40	