Power Vented Unit Heater Troubleshooting Guide

MODINE®
Engineering a Cleaner, Healthier World

Troubleshooting Hot Dawg® Direct Spark Units

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency.

FOR YOUR SAFETY

What to do if you smell gas:

1. Open windows.
2. Do not try to light any appliance.
3. Do not touch any electrical switch; do not use any phone in your building.
4. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call your fire department.

WARNING

1. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects, or other reproductive harm. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

2. Do not locate ANY gas-fired units in areas where chlorinated, halogenated or acidic vapors are present in the atmosphere. These substances can cause premature heat exchanger failure due to corrosion, which can cause property damage, serious injury or death.

Table of Contents

Introduction

The purpose of this handbook is to help you troubleshoot through any problems that might come up when installing or servicing your Modine Power Vented unit heater.

Definitions

Soft Lockout of Control: The control does not initiate a call for continuous fan while in lockout. The control will respond to an open limit and undesired flame. Lockout shall automatically reset after 1 hour. Lockout may be manually reset by removing power from the control for more than 1 second or removing the thermostat call for heat for more than 1 and less than 20 seconds.

Hard Lockout: If the control detects a fault on the control board, the status LED will be de-energized and the control will lockout as long as the fault remains. A hard lockout will automatically reset if the hardware fault clears.

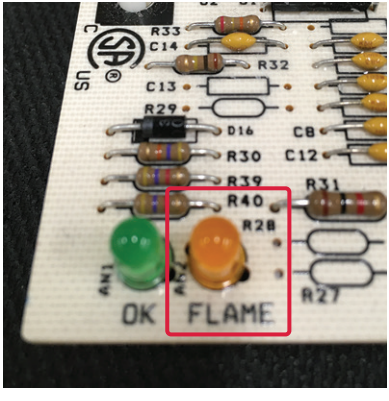
Flame Status – Yellow LED Labeled “Flame”

Flame status LED is lit when flame is sensed.

Flame LED flashes slowly when flame current is below 1.0uA (+/- 50%), to indicate a “weak” flame.

Flame LED flashes fast when flame is present with gas valve off.

- If flame is sensed longer than four seconds while the gas valve is de-energized, the control shall energize the power exhauster and indoor blower motor
- When flame is no longer sensed, the power exhauster will run through post-purge and the blower motor will run through fan off delay time
- The control will do a soft lockout, but will still respond to open limit and flame
- Flame LED shall flash rapidly when lockout is due to undesired flame



Heating Sequence of Operation

Listed below is the sequences of operation that occurs when there is a call for heat:

- The green LED will be on at all times. It only flashes during a fault.
- Thermostat contacts close board terminals R & W together
- The 24 VAC at terminal W goes through the limit string first
- Terminal IND sends 115 VAC to the power exhauster
- The air draft causes the pressure switch to close
- After a short delay, 24 VAC powers the gas valve open
- The igniter sparks when the gas valve opens
- Flame is detected when it carries electrical current from the flame rod
- The yellow LED is on, the igniter stops, and the gas valve stays open
- After 30 sec, terminal HEAT sends 115 VAC to power the fan motor
- When satisfied, thermostat contacts open between R & W
- The gas valve closes. The yellow LED is off. The power exhauster and fan purge for 60-90 sec, then shut off.

Thermostat Connections

Listed below are typical thermostat connections to the control board.

Consult thermostat manufacturer's instructions for more details.

- T-stat terminal R (required) - Connects to board terminal R for a 24 VAC source
- T-stat terminal W (required) - Connects to board terminal W to call for heat
- T-stat terminal G (optional) - Connects to board terminal G to call for fan
- T-stat terminal C (optional) - Required for some digital t-stats Connects to board terminal C for a ground/neutral

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is ON:

Step 1: Verify that the thermostat is wired correctly and there is a call for heat.

Step 2: Verify that the thermostat is wired between the R & W terminals on the terminal strip.

Step 3: Once you've verified that the thermostat is wired correctly and the unit still does not operate, then:

- Turn power off
- Remove thermostat wires
- Carefully install a jumper wire between terminals R & W directly on the control board
- Turn power on (Be aware that the unit may start!)

Step 4: If the installation of a jumper wire resolved the issue, then proceed to the next step. If, however, the installation of a jumper wire did not solve the issue, please turn to page 8.

Step 5: If unit operates correctly when a jumper wire is installed between terminals R & W on the board, check the field wiring to the thermostat and verify the wiring, replacing the thermostat if needed.

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is ON and the unit does NOT operate correctly when a jumper wire is installed between terminals R & W on the control board:

Step 1: Check for loose connections. Disconnect and reconnect all Molex plugs.
Step 2: Check to make sure there are no troubleshooting codes.
Step 3: Turn the switch to the gas valve off and on. Then leave valve on.
Step 4: If the unit still does not operate correctly, you may have a bad control board.

- If you suspect a bad control board, turn to page 23 and follow the additional troubleshooting steps before replacing the control board.

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is OFF:

Step 1: If the green light on the control board is off, verify there is not a flash code.

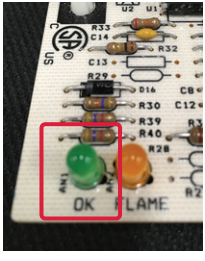
Step 2: Verify that there is 24 VAC between Sec & Com on the control board.

- If 24 VAC is not present between Sec & Com, turn to page 10 for further troubleshooting steps.

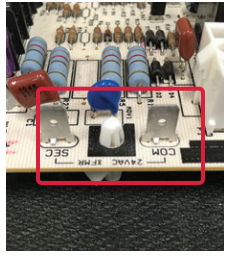
Step 3: Check the fuse for a blown element:

- Remove the fuse
- Check for continuity
- If fuse is blown, replace fuse
- If fuse is not blown, then the terminal board in not letting 24 VAC through the board. If this is the case, please refer to page 23 to see troubleshooting steps to take before replacing the control board.

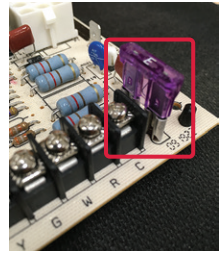
Step 4: Check for loose connections.



GREEN LIGHT



SEC & COM TERMINALS



FUSE

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is OFF and 24 VAC is NOT present between Sec & Com on board:

Step 1: Check for loose connections.

Step 2: Check incoming power (115 VAC).

Step 3: If incoming power is correct, check for 24 VAC at the secondary of the transformer.

- If incoming voltage is correct and there is no voltage at the secondary, then replace transformer.
- For more information on how to replace transformer, please visit www.youtube.com/modineHVAC.

No Flashes – Troubleshooting Codes

The below troubleshooting information is related to situations where there are NO flashes:

- If there is no flash code, please refer to page 8, and follow the troubleshooting steps.

One Flash – No Power Exhauster

The below troubleshooting information is related to situations where the power exhauster does not cycle on:

- When there is a ONE flash troubleshooting code, the unit is indicating that the pressure switch is not closing within 30 seconds of the power exhauster being energized.
- To determine the cause of the issue, check to see if the power exhauster is cycling on. If the power exhauster is NOT cycling on, then continue to the possible causes listed below. If, however, the power exhauster IS cycling on, go to page 13.

Possible Causes:

- Defective exhauster motor
  - This occurs when the exhauster motor is receiving 115 volts from IND and NEUTRAL terminals on the board, but the exhauster will not run. To solve this issue, the exhauster needs to be replaced. Verify and replace if necessary.
- Defective control board
  - Not sending 115 volts from IND and NEUTRAL terminals to exhauster. To solve this issue, replace board.
  - Before replacing the board, review page 23 on control board troubleshooting steps.

One Flash – Pressure Switch Won't Close

The below troubleshooting information is related to situations where the power exhauster DOES cycle on:

Unit Sequence: Green light on, call for heat, 24 VAC at R & W, power exhauster cycles on after approximately 30 seconds, Green light will give one flash.

- When there is a one flash troubleshooting code, it is indicating that the pressure switch is not closing within 30 seconds of the power exhauster being energized.

Possible Causes:

Blockage in tubing to pressure or venting is not allowing for a proper vacuum to pull pressure switch contacts closed. To solve this issue, troubleshoot the units venting.

- Wire off pressure switch
- 24 VAC not coming from board
- Defective pressure switch
  - If this is the case, verify the switch is defective and replace.

For more information, visit www.youtube.com/ModineHVAC and watch the video on venting.

Two Flashes – Pressure Switch Closes Before Power Exhauster Energizes

When there is a TWO flash troubleshooting code, the unit is indicating that the pressure switch has closed before the power exhauster is energized.

Troubleshooting Steps:

1. Pull one of the yellow wires off the pressure switch. If the power exhauster turns on and the code goes away, replace the switch. If the code persists, go to step 2.
2. Check the yellow wires to see if they are shorted together. Make sure the connector for the safety harness is seated correctly on the board.
3. If there are no wiring faults, then there is a defective board (verify and replace if bad).

Three Flashes – Open in the Safety Switch Circuit

When there is a THREE flash troubleshooting code, the unit is indicating that the limit switch or flame roll out switch is open.

- **The limit switch is ignored unless a call for heat is present (R to W energized).**
- If the limit switch is open and a call for heat is present, then:
  - The control de-energizes the gas valve, runs the blower motor and runs the power exhauster.
  - The control will flash three times on the LED unit the limit switch closes.
  - When the switch re-closes or the call for heat is lost, the control runs the power exhauster through post-purge and runs the blower through the fan off delay.
  - The control will return to normal operation after the blower off delay is completed.

Possible Causes:

- Open or short in safety circuit (flame roll out switches some and some limit switches are manual reset):
  - Check for open contacts on switches in safety circuit. Reset flame roll out switches and manual reset limit switches.
  - Check wiring for loose connections.
  - Replace defective limits if they will not reset automatically or manually after the unit heater has cooled.
  - Defective board, not letting 24 VAC through limits.
    - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit Sparks, Lights Flame and Shuts Down After 10 Seconds

The information below is related to situations where the unit DOES SPARK and then SHUTS DOWN within 10 seconds:

This usually occurs as a result if the safety switch circuit is open:

- Pressure switch is open

Unit Sequence:

- Green light on, call for heat
- Power exhauster cycles on, burner lights, no yellow flame light on board, burner shuts down after 10 seconds. Fan motor never cycles on.

Possible Causes:

- Reversed polarity:
  - To check for reversed polarity:
    1. Remove the call for heat
    2. Measure voltage across terminal L1 and case. It should be 115 VAC
    3. Measure voltage across terminal NEUTRAL and case. It should be 0 VAC
    4. If the readings are backwards, shut off power, then reverse LI and neutral wires coming from the panel to the unit
- Loose flame sensor wire
- Dirty or defective flame sensor, not sending micro-amps to board:
  - Clean sensor with emery cloth
  - If issue is not resolved, verify and replace sensor
- Defective board
  - Getting correct micro-amps from sensor, but not allowing unit to ignite
  - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit in Lockout From Failed Ignition/ Flame Loss – Unit Sparks but Doesn't Ignite

The information below is related to situations where the unit is in lockout from failed ignition or flame loss. The unit sparks but DOES NOT IGNITE:

Unit Sequence:

- Green light on, call for heat, 24 VAC at R & W terminals
- Power exhauster cycles on, start pre-purge, 24 VAC through pressure switch and limits
- Igniter sparks, no ignition, no yellow flame sensor light
- Unit will cycle five times in this manner, then the green light will flash four times. Power exhauster will cycle off and fan motor will never cycle on.

Possible Causes:

- Gas valve in "off" position
- No 24 VAC from board to gas valve
- Loose wires
  - Wire off gas valve
- Excessive inlet pressure
- Low or no gas pressure to inlet of valve (purge lines)
- Defective gas valve
  - Verify and replace if required
- Defective board
  - Now allowing ignition
  - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit Doesn't Spark

The information below is related to situations where the unit is in lockout from failed ignition or flame loss and the unit DOES NOT SPARK:

Unit Sequence:

- Green light on, call for heat
- Power exhauster cycles on, starts pre-purge
- 24 VAC power present through pressure switch, limits and to valve
- No spark at igniter. RAW gas is going through orifices for approximately six seconds during this cycle. Unit then cycles off, and there is no yellow flame sense light.
- Will cycle FIVE times in this manner. Then, green light will flash four times, power exhauster will cycle off and the fan motor does not turn on.

Possible Causes:

- Loose wires
  - Wire off igniter
- Defective or damaged igniter
  - Examine, verify and replace if needed
- Defective board
  - Not sending voltage to the igniter
  - For more information on fixing or replacing a defective board, reference page 23.

Five Flashes – Twin Communication Fault

The information below is related to situations where the troubleshooting code flashes FIVE times:

Twin Communication Fault:

- Occurs if the 24 VAC supply to the twins are not in phase with each other or power is removed from one of the twins.
- While a twin fault exists, the control does not respond to thermostat commands, and the green light will flash five times.
  - Open limit and undesired flame response are still operational
  - The control continually tries to establish communication and automatically resumes normal operation when communication is re-established
  - If a twin fault occurs during a heat cycle, both furnaces will terminate the call immediately
  - The only chance for blower mis-synchronization is if the blower off delays are set differently on the twins
  - If a twin fault occurs during high speed fan or continuous fan operation, both controls will shut the blowers off immediately.
  - If a twin communication terminal is not in use and the unit is showing a troubleshooting code of five flashes, the board may be defective.

Six Flashes – Main Air Mover Doesn't Cycle On

The information below is related to situations where the main air mover DOES NOT cycle on:

This usually occurs as a result of an open in the safety switch circuit:

- Limit switch or flame roll out switch is open

Unit Sequence:

- Green light on, call for heat, power exhauster cycles on, pre-purge
- 24 VAC power present through pressure switch, limits and to valve
- Igniter sparks, burner cycles on, yellow flame light turns on, board is on
- After three to four minutes, unit goes out on a limit switch, yellow light turns off, green light then flash six times

Possible Causes:

- Loose wires
  - Check all wiring for a loose wire
- Defective motor
  - 115 VAC at heat and neutral terminals on board, but motor does not turn on
- Defective board
  - 115 VAC not present at heat and neutral terminals
  - For more information on fixing or replacing a defective board, reference page 23.

Six Flashes – Main Air Mover Does Cycle On

The information below is related to situations where the main air mover DOES cycle on:

Unit Sequence:

- Green light on, call for heat, power exhauster cycles on, fan motor cycles on, green light flashes six times

Possible Causes:

- Open contacts due to over-firing of unit (flame roll out switches and some limit switches are manual reset)
  - Check gas pressure
  - Check to make sure nothing is blocking the airflow of the unit
  - Wire off limit or flame rollout switch
    - ¨ Limit or flame rollout switch shorting to the unit
    - ¨ Defective limit or flame rollout switch
      - Verify and replace
- Defective board
  - Not letting 24 VAC through limits
  - For more information on fixing or replacing a defective board, reference page 23.

Seven Flashes – Five Flame Losses During One Heat Cycle

The information below is related to situations where there are five flame losses during one heat cycle. If this occurs, you will see a troubleshooting code for SEVEN flashes:

Ignition Re-cycle:

- The control will re-cycle up to five flame losses (4 re-cycles) within a single call for heat before the unit goes into lockout.

Before Replacing a Control Board

- Remove thermostat and use a temporary jumper wire to make a call for heat
- Check the supply power for correct polarity
- Re-check all wiring to the control board for loose connections:
  - Disconnect and reconnect all Molex plugs
- Re-check that the wiring to the control board matches the wiring diagram
- If the control board has a fuse, remove and test continuity of the fuse
  Important: Do not just do a visual inspection of the fuse – check continuity
- Make sure the pressure switch is not opening during the call for heat cycle
- Check limits and rollout switches for an open circuit
- Turn the switch on the gas valve to off and then to on several times
- Make sure the power exhauster is running when there is a call for heat
- Check for a proper micro-amp signal from the flame sensor to the control board:
  - A proper signal is 1-5 micro-amps
- Check for proper supply gas pressure:
  - Excessive gas pressure can/will lock up the main valve
- Check for limit and/or flame sensor shorts:
  - Make sure they are not touching metal
- Check for any moisture on board that may have occurred if checking for gas leaks with a liquid solution
- Check in-line regulators for BTU sizing and lockup point not above a 14" WC
- Review troubleshooting codes
- Check to make sure external regulator is not right next to the unit so that the regulator "fights" the regulator inside the combination gas valve
- Check settings of heat anticipator of thermostat if applicable, making sure to also check wire size and run length

For Additional Help

For additional help, visit
www.ModineHVAC.com

To find installation & service manuals, visit
http://www.modinehvac.com/resources/product-literature/

In addition, Modine has live operators
That can be reached at:
(800)-828-4328

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