

# Troubleshooting HD Direct Spark Units



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Revisions: NA

# Troubleshooting HD Direct Spark Units

**Attention!!**

All installation and service of Modine equipment must be performed by a qualified service agency.

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[Application](#)

## **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 acid 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.

## **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 can not reach your gas supplier, call your fire department.



## HOW TO USE THIS APPLICATION

- This Application Contains Embedded Links in blue text
- Follow the instructions on the page
- Where appropriate, select the best answer

[Yes](#)

[No](#)

- This will bring you to the correct page
- Continue until the problem is solved
- Select “Start Over” to return to the Table of Contents

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## TABLE OF CONTENTS

- Definitions and Basic Operation
- Call for heat and units does nothing - Green Light ON
- Call for heat and units does nothing - Green Light OFF
- Troubleshooting Codes for Ignition Control
- Unit starts but does flame does not ignite
- Flame lights and shuts down within 10 seconds
- Main fan / air mover does not operate
- Replace control board ONLY after completing these steps
- FOR ADDITIONAL HELP & LIVE OPERATORS

## DEFINITIONS & BASIC OPERATION

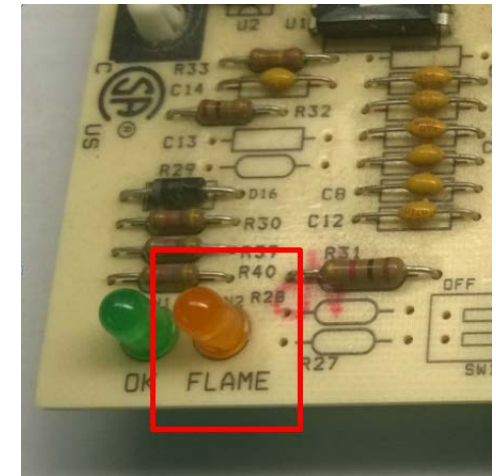
- **Soft Lockout of Control** - The control does not initiate a call for heat or call for continuous fan while in lockout. The control will respond to an open limit and undesired flame. Lockout shall automatically reset after 1 hour. Lockout may be manually reset by removing power from the control for 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 LED** (Yellow LED labeled “FLAME”) is provided to indicate flame status
- **Call for Heating Sequence of Operation**
- **End of Call for Heating Sequence of Operation**

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## FLAME STATUS - YELLOW LED LABELED “FLAME”

- Flame Status LED is Lit - When flame is sensed, the flame LED is lit.
- Flame LED flashes slowly - Flame current is below 1.0 uA (+/-50%), the to indicate “weak” flame.
- Flame LED flashes fast - Flame is present with gas valve off. If flame is sensed longer than 4 secs 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. The Flame LED shall flash rapidly when lockout is due to undesired flame.



Yellow Flame LED

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## **HEATING SEQUENCE OF OPERATION**

- **Call for heat**
- **T stat contact close T stat on terminals R & W of board**
- **24 volts from R to W terminal on board**
- **Power exhauster cycles on. 115 VAC at IND and Neutral on board.**
- **Starts pre purge cycle**
- **24 volts through limits and pressure switch from board**
- **Short delay and then 24 volts to gas valve from board**
- **Igniter sparks**
- **Flames carries to sensing probe and proves**
- **Yellow light turns on, burner stays lit.**
- **50 to 60 seconds later, fan motor cycles on.**
- **115 volts at EAC and Neutral terminals.**

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## **END OF HEATING SEQUENCE OF OPERATION**

- **Call for heat ends**
- **Thermostat contacts open**
- **Burner flame off**
- **Yellow light turns off.**
- **Post purge on power exhauster**
- **Power exhauster cycles off.**
- **Fan motor cycles off.**
- **Green light on board stays on.**

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## CALL FOR HEAT – UNIT DOES NOTHING

- **Green Light on Control Board is ON**
  - Verify that the thermostat is wired correctly & there is a call for heat
  - Thermostat should be wired between R & W
  - If the thermostat is wired correctly and the unit still does not operate. Turn power off. Remove tstat 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!**
  - Did installing the jumper wire resolve the issue?

Yes

No

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## CALL FOR HEAT – UNIT DOES NOTHING

- Green Light on Control Board is ON. Unit operates correctly when a jumper wire is installed between terminals R & W on the board
  - Check field wiring to the thermostat
  - Potentially a bad thermostat (verify and replace if needed)

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## CALL FOR HEAT – UNIT DOES NOTHING

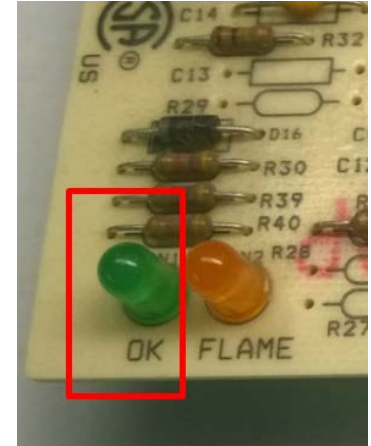
- Green Light on Control Board is ON. Unit DOES NOT operate correctly when a jumper wire is installed between terminals R & W on the board
  - Check for loose connections. Disconnect and reconnect all Molex plugs.
  - Check to make sure there are NO troubleshooting codes
  - Turn the switch to the gas valve off and on. Then leave on
  - Potentially a bad control board (verify and replace if needed)

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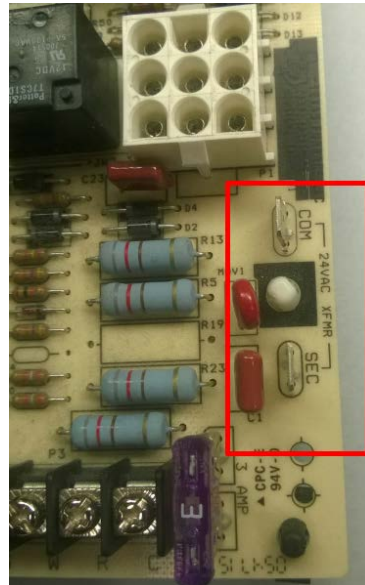
## CALL FOR HEAT – UNIT DOES NOTHING

- Green Light on Control Board is OFF
  - There will not be a flash code
  - Is there 24 VAC between Sec & Com on board?



Green Light

Yes



Sec & Com Terminals

No

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## CALL FOR HEAT – UNIT DOES NOTHING

- Green Light on Control Board is OFF. 24 VAC NOT present between Sec & Com on board

### Possible Causes

Check for loose connections

Check incoming power (115 VAC)

If incoming power is correct, check for 24VAC at the secondary of the transformer. If incoming voltage is correct and no voltage at the secondary,

[replace transformer](#)

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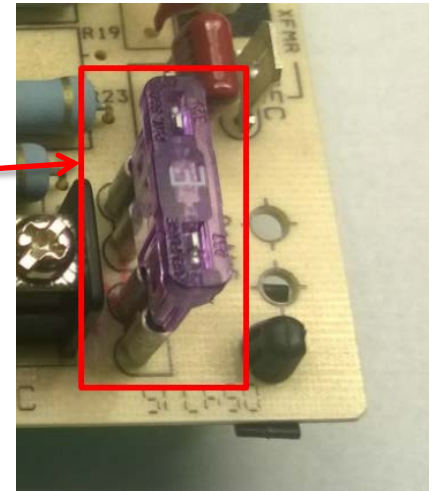
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## CALL FOR HEAT – UNIT DOES NOTHING

- Green Light on Control Board is OFF 24 VAC IS present between Sec & Com on board

### Possible Causes

-Check fuse for blown element. Remove the fuse. Check for continuity. **Do NOT just inspect element. Check for continuity.** If the fuse is bad, replace fuse.



-Check for loose connections

-If fuse is not blown, terminal board is not letting 24 VAC through the board. Replace board.

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## TROUBLESHOOTING FLASH CODES

- **No Flashes** See Green Light is off
- **One Flash** Pressure switch does not close within 30 seconds of inducer energized.
- **Two Flashes** Pressure switch is closed before inducer is energized
- **Three Flashes** Open in the safety switch circuit (limit switch or flame roll out switch is open)
- **Four, Five, Six or Seven Flashes**

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## TROUBLESHOOTING FLASH CODES

- **Four Flashes** In lockout from failed ignition or flame loss
- **Five Flashes** Twin communications fault
- **Six Flashes** Open in the safety switch circuit 5 times during heat cycle (limit switch or flame roll out switch)
- **Seven Flashes** 5 Flame losses during one heat cycle

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## NO FLASHES – TROUBLESHOOTING CODES

- **No Flashes Go To:**

[Call for heat – unit does nothing](#)

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## ONE FLASH - TROUBLESHOOTING CODES

- Does the power exhauster cycle on?

Yes

No

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## ONE FLASH – NO POWER EXHAUSTER

- Pressure switch does not close within 30 seconds of inducer energized
- Unit sequence:
- Green Light on, call for heat, 24 volts at R & W on board. Nothing happens. Green light will give One flash. Fan motor will not cycle on.
- Possible cause:
- Defective exhauster motor. Receiving 115 volts from IND and NEUTRAL terminals on board, but will not run. Replace exhauster.
- Defective board. Not sending 115 volts from IND and NEUTRAL terminals to exhauster. [Replace board](#)

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## ONE FLASH – PRESSURE SWITCH WON'T CLOSE

- Pressure switch does not close within 30 seconds of inducer energized
- **Unit sequence: Green light on, call for heat, 24 VAC at R & W , power exhauster cycles on, after approx. 30 seconds, Green Light will give One Flash**
- **Possible cause:**
- **Blockage in tubing to pressure or venting not allowing for a proper vacuum to pull pressure switch contacts closed. [Troubleshoot Venting](#).**
- **Wire off pressure switch**
- **24 VAC not coming from board.**
- **Defective pressure switch (verify and replace)**

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## TWO FLASHES - TROUBLESHOOTING CODES

- Pressure switch is closed before inducer is energized
- Unit Sequence: Green light on, call for heat, 24 volts at R & W terminal. Nothing will happen to unit operation except Green Light will give Two Flashes.
- Possible Cause:
  - Defective or damaged pressure switch
  - Showing continuity between terminals in non-heat mode
  - The two yellow wires are showing continuity in non-heat mode.
  - Defective board (verify and replace if bad)

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## THREE FLASHES - TROUBLESHOOTING CODES

- Open in the safety switch circuit (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, the control de-energizes the gas valve, runs the blower motor, and runs the power exhauster. The control will flash “3” on the LED until the limit switch closes. When the switch recloses 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](#)

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## THREE FLASHES - TROUBLESHOOTING CODES

- 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.
- Fan Motor Cycles on. Green light starts three flashes.
- Possible cause:
- Open or short in safety circuit (flame roll out switches some and some limit switches are manual reset).
  - Check for open contacts on switch in safety circuit. Reset flame roll out switches and manual reset limit switches
  - Check wiring. Wire off limit or flame rollout switch. Limit or flame rollout switch shorting to unit. Defective limit or flame rollout switch. Verify and replace if required.
- Defective board, not letting 24 VAC through limits.

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss
- Does the unit ignition spark

Yes

No

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss unit **DOES SPARK**
- Does the flame shut down within 10 Seconds

Yes

No

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **unit SPARKS and SHUTS DOWN within 10 seconds**
- Unit Sequence:
- Green Light on, call for heat
- Power exhauster cycles on, starts pre purge
- 24 VAC present through pressure switch, limits, and to gas valve
- Igniter sparks, burner cycles on for 10 seconds, then cycles off, no yellow flame light on board. Fan motor never cycles on.
- Possible Causes

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **unit SPARKS and SHUTS DOWN within 10 seconds**
- **Possible Causes:**
- **Reversed Polarity**
- **Wire off sensor. Check for loose wires**
- **Dirty or defective flame sensor, not sending micro-amps to board. Clean sensor with emery cloth. If the problem is not resolved, verify and replace sensor.**
- **Defective board, getting correct micro-amps from sensor, but not allowing ignition**

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **unit SPARKS and SHUTS DOWN within 10 seconds**
- **Reversed Polarity**
- To check for reversed polarity. (1) **Shut down all power to unit** (2) Switch main incoming power lines (black and white) to unit. (3) Carefully turn main power back on to unit.
- If issue is not resolved, shut off all power and return white and black wires to original positions.
- **More possible causes**

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **unit SPARKS and SHUTS DOWN within 10 seconds**
- Have eliminated Reversed Polarity
- Wire off sensor. Check for loose wires
- Dirty or defective flame sensor, not sending micro-amps to board. Clean sensor with emery cloth. If the problem is not resolved, verify and replace sensor.
- If issue is not resolved, shut off all power and return white and black wires to original positions.
- Potentially defective board.

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **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 sense light. Will cycle 5 times in this manner, then Green light will flash four times. Power exhauster will cycle off. Fan motor will never cycle on.
- Possible Causes

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss **unit SPARKS but DOES NOT IGNITE**
- **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 not allowing ignition

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## FOUR FLASHES - TROUBLESHOOTING CODES

- **In lockout from failed ignition or flame loss 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 approx. 6 seconds during this cycle, then cycles off, no yellow flame sense light
- Will cycle 5 times in this manner. Then Green light will give **four** flashes. Power exhauster will cycle off. **Fan motor does not turn on.**
- **Possible Causes**

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## FOUR FLASHES - TROUBLESHOOTING CODES

- In lockout from failed ignition or flame loss  
**unit DOES NOT SPARK**
- Possible Causes:
- Loose wires: Wire off Igniter
- Defective or damaged igniter. Examine, verify and replace if required.
- Defective board not sending voltage to igniter

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## FIVE FLASHES - TROUBLESHOOTING CODES

- **Twin communications 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 flashes "5" on the status LED. 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 terminate the call for heat 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, both controls shut blowers off immediately.

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## SIX FLASHES - TROUBLESHOOTING CODES

- Open in the safety switch circuit 5 times during heat cycle (limit switch or flame roll out switch). Control goes into a hard lockout.
- 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
- Does the fan (main air mover) cycle on?

Yes

No

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## SIX FLASHES - TROUBLESHOOTING CODES

- Open in the safety switch circuit (limit switch or flame roll out switch is open). **Main air mover CYCLES ON.**
- Unit sequence:
- Green Light on, call for heat. Power exhauster cycles on.
- Fan Motor Cycles on. Green light starts six flashes.
- Possible cause:
- Open contacts due to over-firing of unit (flame roll out switches some and some limit switches are manual reset).
  - Check gas pressure. Check to make sure nothing is blocking airflow out of unit.
  - Wire off limit or flame rollout switch. Limit or flame rollout switch shorting to unit. Defective limit or flame rollout switch.
- Defective board, not letting 24 VAC through limits.

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## SIX FLASHES - TROUBLESHOOTING CODES

- **Open in the safety switch circuit (limit switch or flame roll out switch is open). Main air mover DOES NOT cycle on.**
- Unit Sequence:
- Green Light on, call for heat Power exhauster cycles on, pre purge
- 24 volts power present through pressure switch, limits, and to valve
- Igniter Sparks, burner cycles on, yellow flame light on board is on.
- After 3 to 4 minutes , unit goes out on a limit switch, yellow light off, green light will flash **six** times.
- **Possible cause:**
- **Check all wiring, loose wire**
- **Defective motor, 115 VAC present at EAC & Neutral terminals on board, but motor does not run.**
- [Defective board](#), 115 VAC not present at EAC and Neutral terminals

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## SEVEN FLASHES - TROUBLESHOOTING CODES

- **5 Flame losses during one heat cycle**
- **Ignition Re-Cycle - The control will re-cycle up to 5 flame losses (4 re-cycles) within a single call for heat before going to lockout. The LED will flash “7” during this lockout.**

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# BEFORE REPLACING THE CONTROL BOARD

- Remove thermostat and use a temporary jumper wire to make a call for heat
- Check the supply power for correct polarity
- Recheck all wiring to the control board for loose connections. Disconnect and reconnect all Molex plugs
- Recheck 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. 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 power inducer 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 lockup 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 lock up point not above a 14" WC.
- Check setting of heat anticipator of t stat if applicable, and wire size and run
- Review troubleshooting codes.
- Check for any moisture or moisture marks on the board that may have occurred if checking for gas leaks with liquid solution.
- Check in-line regulators for BTU sizing and lock up point not above a 14" WC
- 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 setting of heat anticipator of T-Stat if applicable, also check wire size and run length

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**FOR ADDITIONAL HELP  
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**[HD Installation and Service Manual](#)**

**[Other Installation & Service Manuals](#)**

**Live Operators: 800-828-4328**

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