



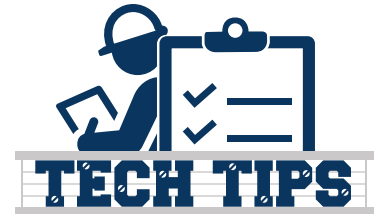
WE MAKE IT EASY®

TECHNICAL SUPPORT CALLS - FURNACE

With pressure switch related calls being our #1 furnace call, we'd like to offer some suggestions on how we can isolate, test, and diagnose the components relating to the venting system and furnace.

Furnace Fault #3 - The "Three" Flash

This code will generate when the inducer cannot maintain a proper negative vacuum on the heat exchanger and vent system. This will provide a 3 flash and not allow the unit to operate. There are a few scenarios that can cause this internally and externally of the furnace.



Dual Port Manometer

If you don't have a dual port manometer, you're not able to properly diagnose the pressure switch safety circuit! This tool will connect to the sealed combustion chamber and heat exchanger front plate for a 90% furnace and reference your combustion air and heat exchanger on an 80% furnace. You will need to use tees to tap into the existing vacuum lines.

This will read a differential across your switch. This is the only way to properly verify the pressure switch is or isn't doing what it's designed to do.

Example Purpose Only:

If your switch is rated -1.5", it will open at -1.3" and close at -1.7". You must read higher than the close rate of the switch (-1.7")

See attached pictures for proper connection of manometer

External of Furnace

1. Is the exhaust vent blocked?
 - a. Be sure the exhaust is clear of leaves, critters, water, ice, tennis balls, and GI joes!
2. Is the intake clear?
 - a. Check for the same items listed above and more.
3. Is the venting system within the manufacturer's specifications? Take note to the installation guide for the allowable size, lengths, and elbows.
4. If you checked the switches with your manometer before you cleared your pipes, you should see a greater negative pressure if there were debris in the pipes.
5. If the manometer readings did not change before and after you checked and cleared your pipes, the problem may be internal to the furnace

Be sure to replace the intake and exhaust pipes if you tested the unit with the pipes removed to avoid any safety issues.

Internal of Furnace

1. The pressure switch must be open when a heat call is provided to the furnace control.
 - a. Use your meter to confirm the switch only has 24VAC on one terminal of the pressure switch
 - b. You can also remove the normally open side of the switch and provide a fresh heat call.
 - c. This confirms the switch is not providing a closed signal to the board without the inducer running. The board will recognize this voltage and not allow the inducer to activate.
2. Once you've confirmed the switch is open you will need to reference your manometer readings. If reading a pressure that is at or below the rated switch, you have an issue internal to the furnace.
3. Since you've confirmed your switches are open, your vent system is clear, and you're reading at or below the rated switch, you will need to locate and inspect components in the furnace
 - a. Inducer seal/gasket
 - i. 90% 40" furnaces will have a high-temp RTV silicone seal behind the inducer. This needs to be sealed 100%
 - ii. S-Series 90%+ furnaces have a high-temp gasket that seals the inducer to the cold header. This must be intact and properly sealed.
 - iii. 80% furnaces will have a high-temp fiber gasket. This must be in good shape.
 - b. Is the transition receptacle in good shape? This is the fitting between the inducer and the cold header on the 90%+ 40" furnace platform. Check for fractures, water staining, etc.
 - c. Do you see any water spots or rusting of the heat exchanger screws? Inspect the furnace for these signs.
4. If the inducer is well sealed, no signs of moisture, and nothing else is obvious, you will need to inspect the heat exchanger.

Combustion Air Pressure Switch Check – Measurement

The combustion air pressure switch proves operation of the induced draft motor and that adequate air is provided to ensure complete combustion of the fuel being supplied to the burner.

The induced draft motor and vent system performance can be checked by connecting an inclined manometer to the pressure switch hose and measuring the operating static pressure.

The direct vent furnaces have differential pressure switches and require two connections to the manometer. See figure below.

The measured static pressure reading should be compared to the pressure switch specifications. If the measured static pressure meets or exceeds the specifications and the switch contacts will not transfer the following items should be checked:

1. Switch out of calibration
2. Defective pressure switch
3. Moisture in pressure switch tubing
4. Condensate trap or drain restricted (90% furnaces)
5. Incorrect switch installed

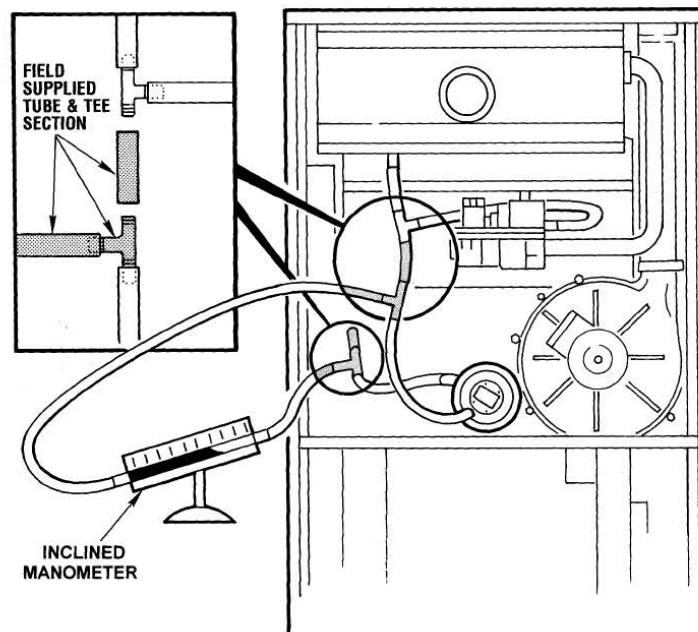
If the measured static pressure reading does not meet the switch specifications, the following items should be checked:

1. Pressure switch hose/tubing for cracks or loose connections.
2. Inducer wheel for corrosion or loose blades.
3. Inducer for tight bearings or loose inducer wheel.
4. Vent system design (oversized/undersized/long lateral runs)
5. High altitude switches required at 4,000 ft. or more above sea level.
6. Crack in heat exchanger or leak in cold header.
7. Flue box gaskets leaking.

Note:

The switch setting and the last three digits of the factory drawing number are stamped on the switch. Example: "PO1"; - .50" WC.

The "PO1" and "PO2" must not be interpreted as "PS1" and "PS2" on two stage models.



40" Legacy 90%+ furnaces

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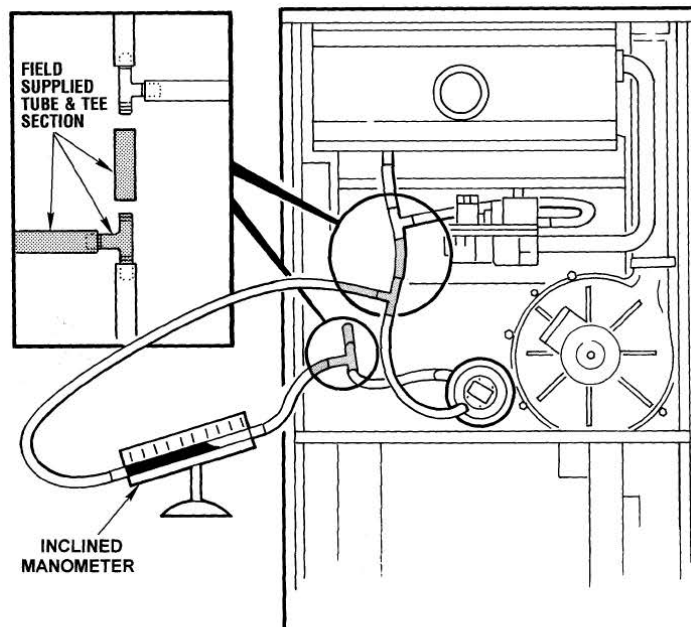
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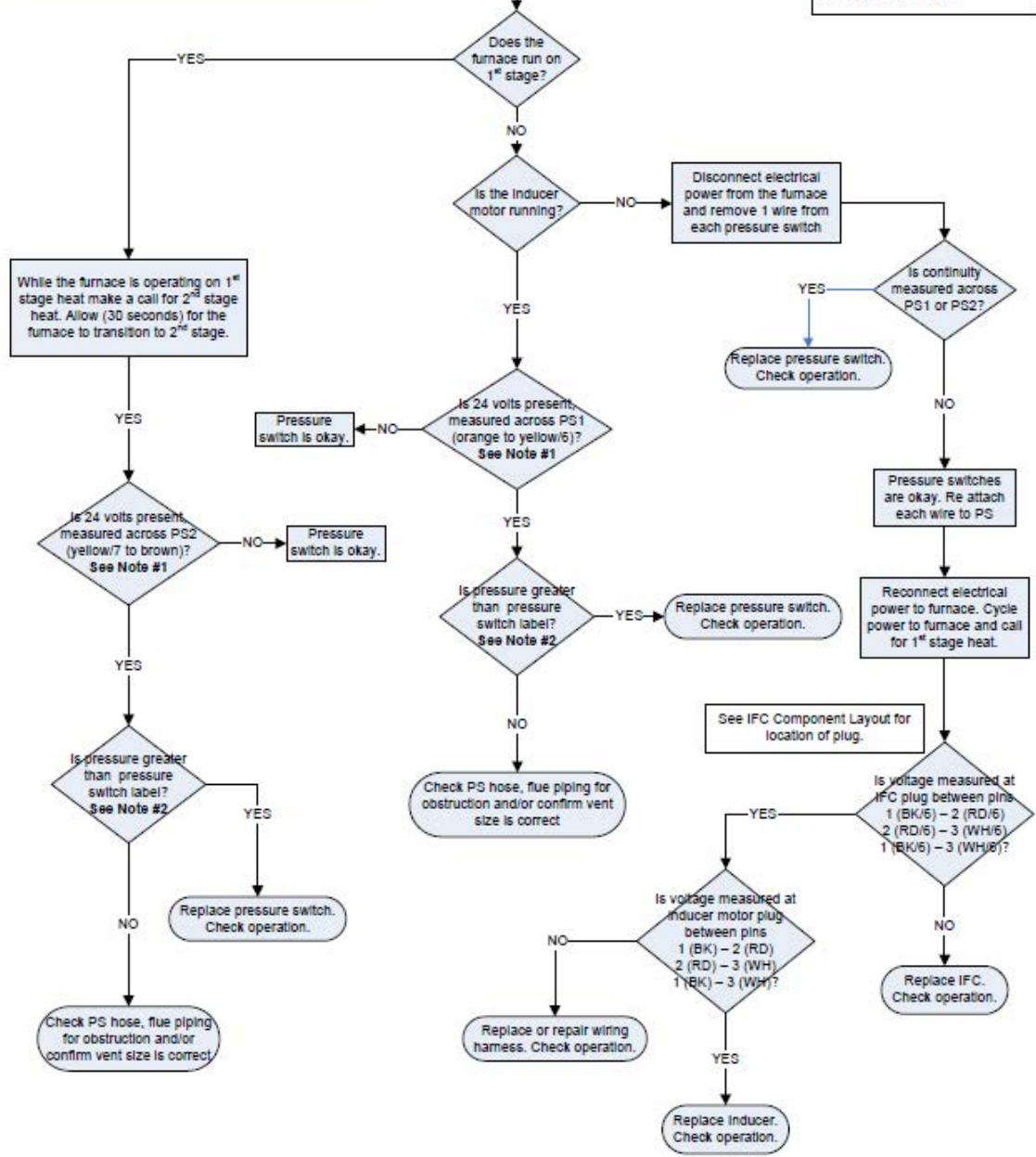
DEFINITION
 An error has occurred with the PS1 or PS2. The error will be reported, indicating that the pressure switch is either opened or closed, contrary to normal operating sequence.
 In most cases, the pressure switch is not the problem.
 Note: Verify all wiring to pressure switch is correct per wiring diagram

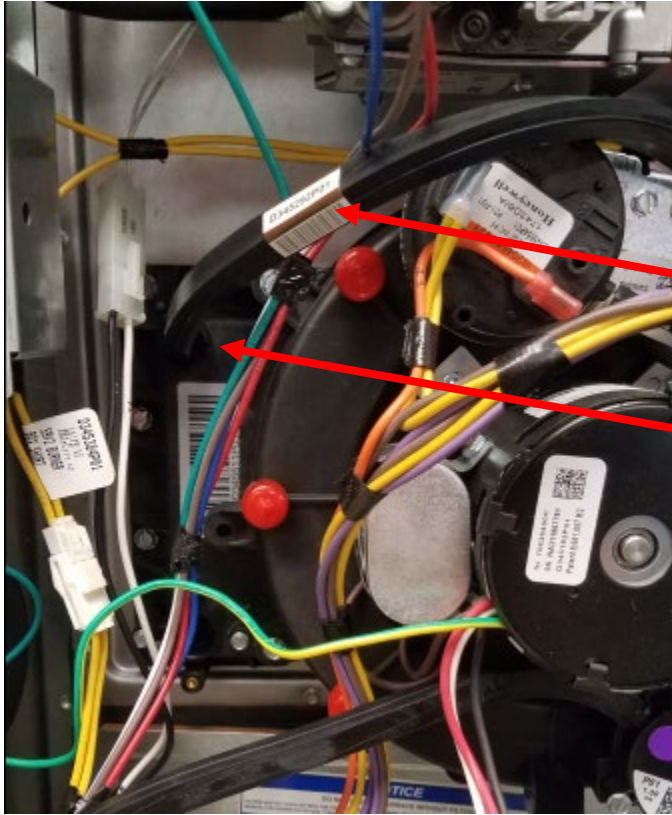
3 Flash Fault LED

Cycle power to the furnace and call for 1st stage heat.

Note #1
 24 volts = Open Switch
 0 volts = Closed Switch

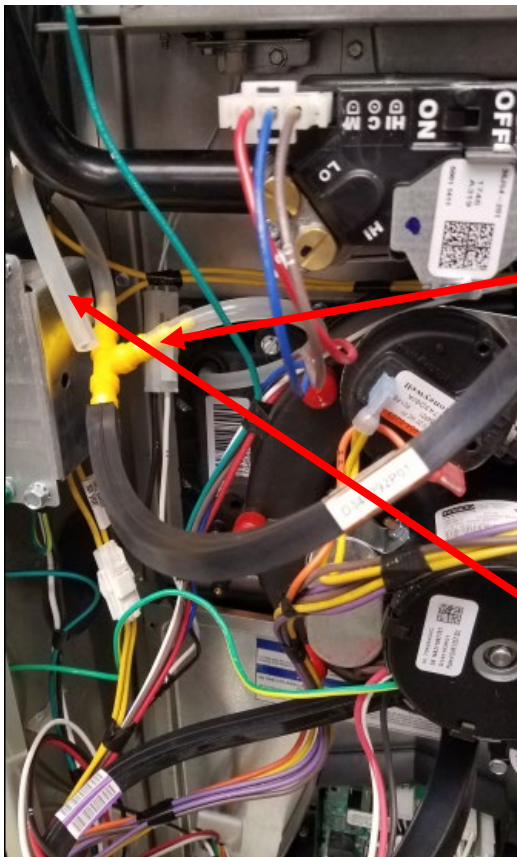
Note #2
 Measured pressure is negative, greater than refers to magnitude only.





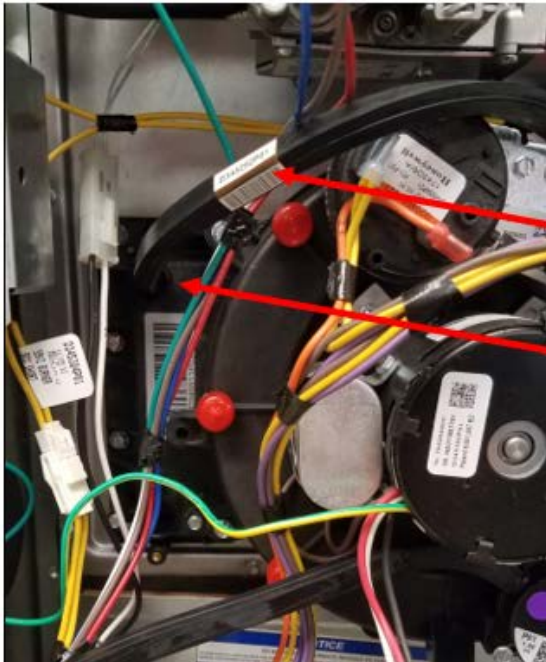
S9 Series

4. Locate the pressure tube landing on the cold header and remove from cold header. This should have a label with a brown sticker



S9 Series

1. Install the tee and route the two tubes from your manometer to the outside of the unit
2. Install the door and take your measurements
3. Your second tube must reference your intake air. The tube will not have a connection point inside the S9 furnace as the combustion air is within the front vestibule. You still must reference this for a proper measurement.
 - Notice the Tee and open hose for reference for combustion air.



S9 Series

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Residential Comfort Systems

Troubleshooting



Vent Pressure Safety Switches

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Vent Pressure Safety Switches

Checking for a shorted pressure switch

Step 1

Remove power to the furnace.

Step 2

Disconnect the wires from the vent pressure safety switch.

Step 3

Using an ohmmeter, check for continuity across the pressure switch terminals. Infinite ohms should be measured. If resistance is measured, the switch is shorted. Replace the switch.

Step 4

When finished, replace wires onto switch terminals and restore power to the furnace.



Vent Pressure Safety Switches

Checking pressure switch calibration

Step 1

Read the pressure switch label to determine the open setting of the switch.

Step 2

Disconnect power to the furnace.



Vent Pressure Safety Switches

Checking pressure switch calibration

Step 3

Tee into pressure switch tubing and connect tubing to the LOW port of a differential pressure gauge. If the furnace is a direct vent 90% efficient model, connect the HIGH port of the differential pressure gauge to the tubing leading to the burner box enclosure.

Step 4

Restore power to the furnace and call for heat.



Vent Pressure Safety Switches

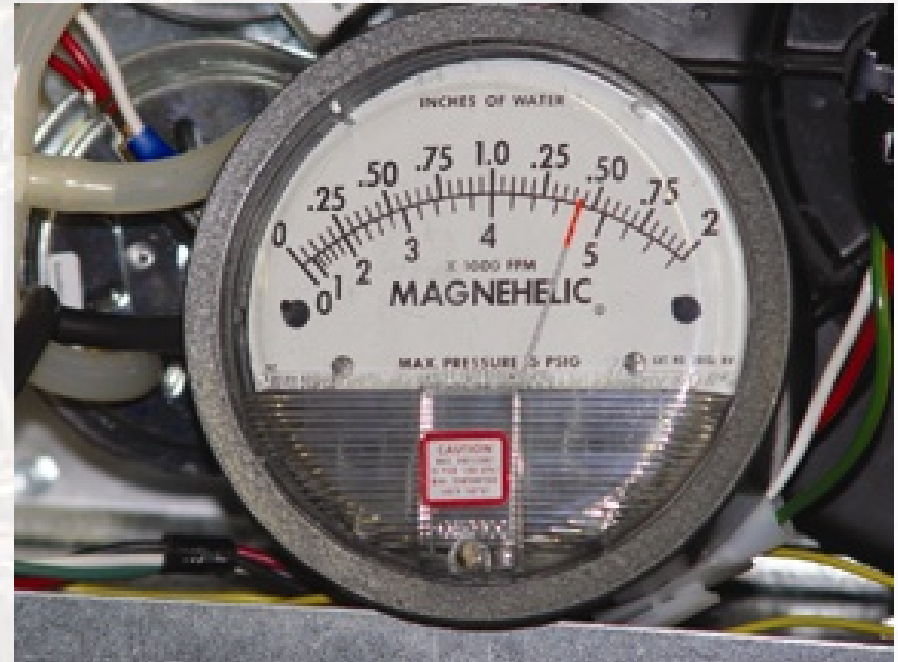
Checking pressure switch calibration

Step 5

With the induced draft blower running, the gauge will indicate the pressure being sensed by the pressure switch. This pressure should be higher than the switch open setting indicated on the switch label. If the pressure is not above the switch setting, there is a problem with the furnace.

If the differential pressure gauge indicates higher pressure than the pressure switch open setting indicated on the switch label, yet the switch does not close, replace the pressure switch. (LED will flash three times and igniter will not glow.)

If the pressure switch closes, the furnace will begin an ignitor warm-up period. Continue to Step 6.



Vent Pressure Safety Switches

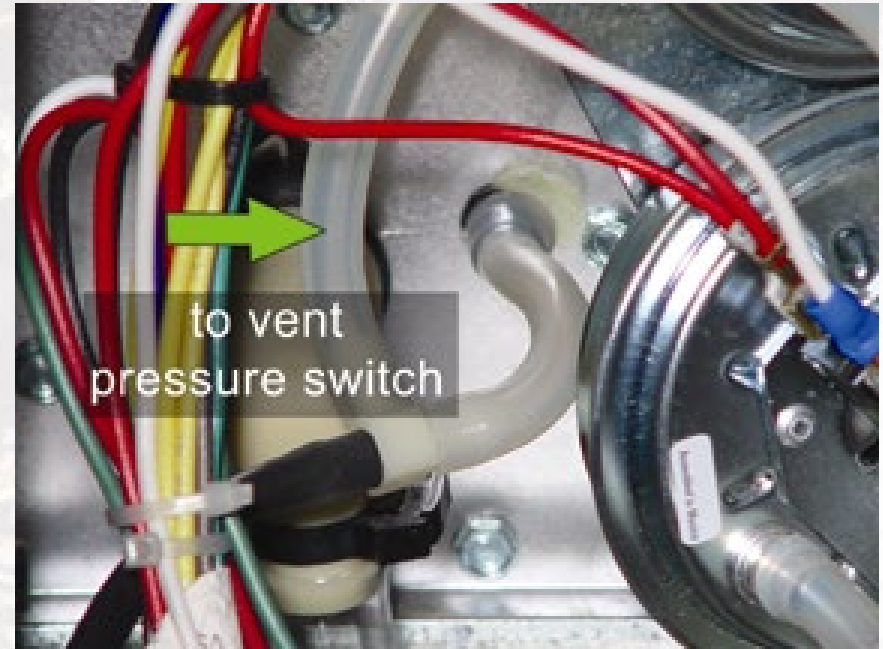
Checking pressure switch calibration

Step 6

Allow the burners to light and the furnace blower motor to energize. Continue to Step 7.

Step 7

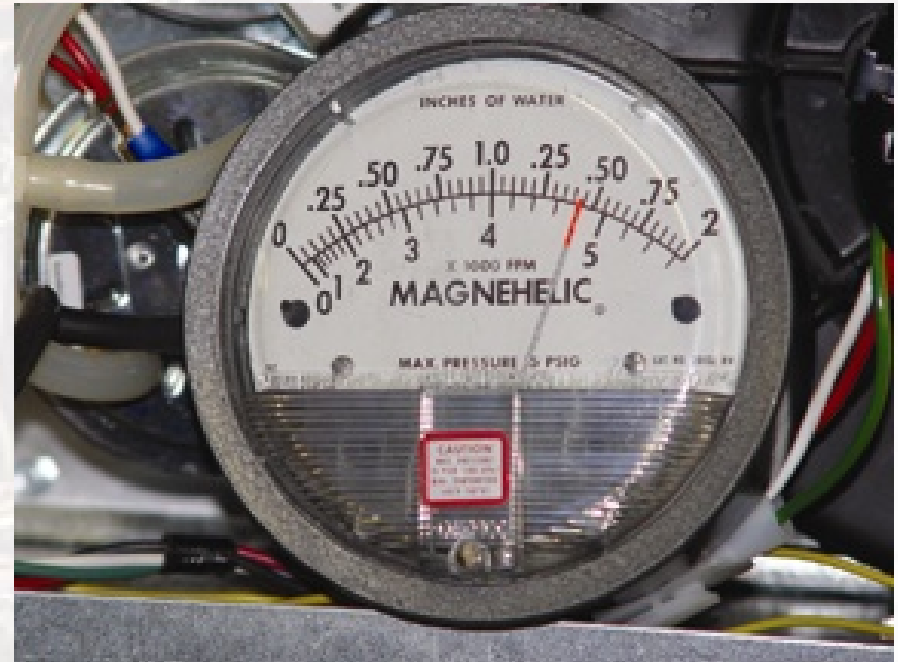
Slowly pinch the tubing that leads to the pressure switch at either the induced draft blower housing, or the secondary heat exchanger area (not the tubing connected to the burner enclosure.) The pressure reading on the differential pressure gauge will begin to fall.



Vent Pressure Safety Switches

Checking pressure switch calibration

When the pressure on the differential pressure gauge drops below the open setting on the switch, the burners should shut off. If the burners do shut off, the switch is properly calibrated. Release the tube and the furnace control should begin another retry for heat. If the burners do not shut off, the pressure switch is out of calibration and should be replaced.



Vent Pressure Safety Switches

Checking for a closed pressure switch during a call for heat

Step 1

Furnace should be calling for heat.

Step 2

Set multimeter to read AC voltage.



Vent Pressure Safety Switches

Checking for a closed pressure switch during a call for heat

Step 3

Place one meter lead to 24-volt common.

Step 4

Measure the voltage from 24-volt common to each pressure switch terminal (there are two.)

Step 5

Twenty-four volts should be present between each switch terminal and 24-volt common. This condition indicates the switch is in the closed position. If voltage is present on one terminal but not the other, the switch is open. Continue to Step 6.

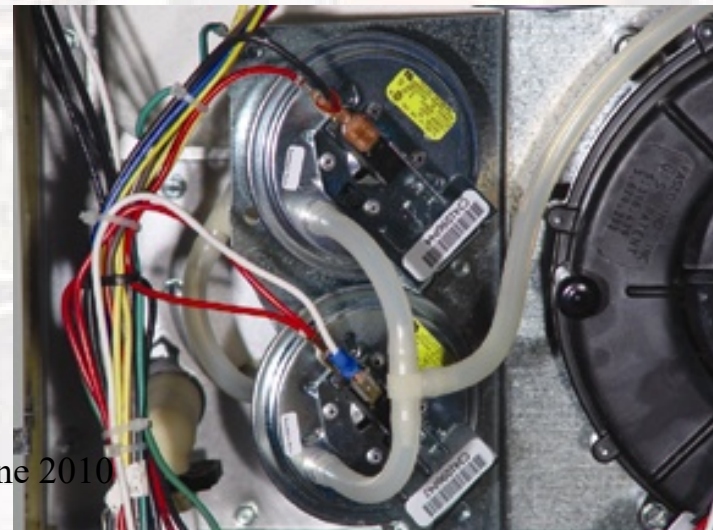
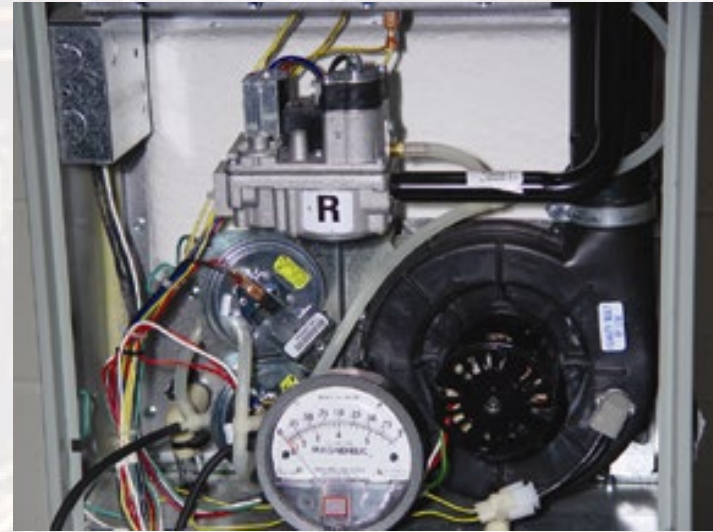


Vent Pressure Safety Switches

Checking for a closed pressure switch during a call for heat

Step 6

Disconnect power to the furnace. Connect a differential pressure gauge to the pressure switch tubing. Read the close pressure setting on the switch.



Vent Pressure Safety Switches

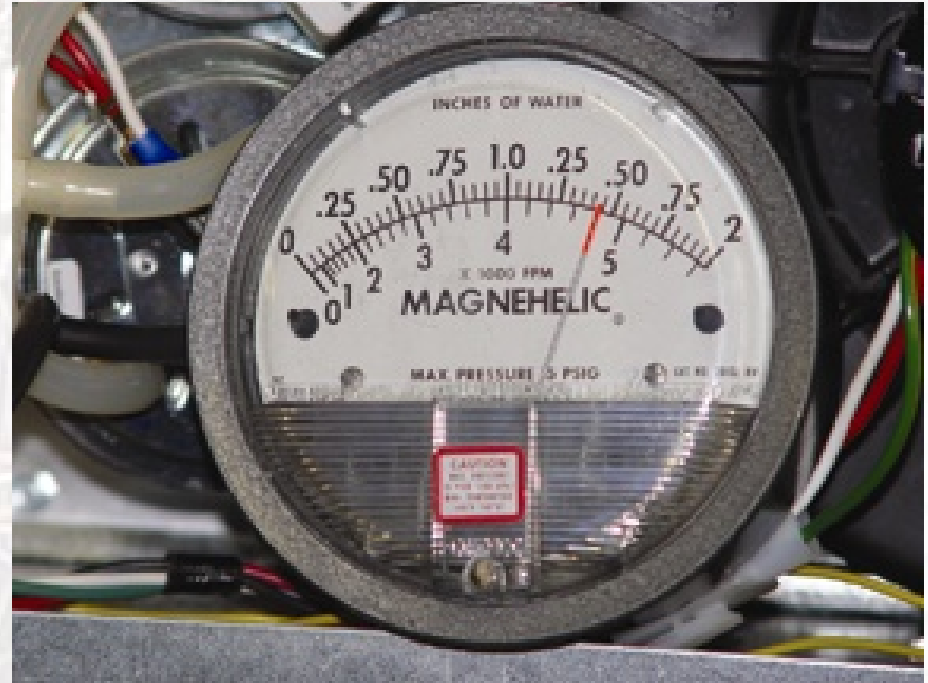
Checking for a closed pressure switch during a call for heat

Step 7

Restore power to the furnace and call for heat.

Step 8

With the induced draft blower running, read the pressure indicated on the differential pressure gauge. The pressure should be higher than the switch close setting. If the pressure is below this level, the switch will remain open. Find the cause of the low pressure (See “Causes of pressure switch open during a call for heat”.) If the pressure is above the switch close setting, continue to Step 9.



Step 9

Replace the pressure switch.