



TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

New Robertshaw control valve was introduced in May 2008 as a replacement part. See last page for troubleshooting this replacement part.

All voltage inputs are 120V.

All electrical connectors are Molex and fit one way.

The word 'control' in this sequence will normally refer to the electronic control module on the gas valve.

The terminal location (i.e. #6 blue wire) refers to the position on the orange Molex connector to the control. It refers to the blue wire, which is in the #6 location when counting from the top to the bottom of the orange Molex

Blinking LED Indicator:

Diagnostic Flash Codes	A flashing red LED diagnostic code indicates that a sequence of events has forced a lockout condition and is in an external lockout state. Number of flashes indicates the type of failure. The flash code or number of flashes will occur followed by a pause before it repeats.
External Lockout	The control will lockout if it failed to ignite gas after the specified number of ignition attempts (3 times) or detected improper states of safety switch (ECO and vacuum switch). The red led will flash a code to indicate the type of failure. (See LED chart). The blower motor will be turned on if flame is detected and all other outputs will be turned off. The control must be manually reset with the ON/OFF switch.
Internal Lockout	The control performs a diagnostic self-check whenever it is reset (power off, then power back on) and with every call for heat. The control will lockout if a failure is detected within the control, or it recognizes flame (flame rectification circuit) when none should be present. The LED will be turned on and all other inputs will be turned off. The control must be manually reset by cycling the line voltage.

Before diagnosing this product, make sure all Molex connectors are in place and tight. Make sure the two green grounding wires are connected to the lower portion of the control valve and the two green ground wire inside the blower motor cover plate are connected.. Turn unit off, wait 5 seconds, then turn unit back on and allow to sequence again. Then read the LED flash code.

LED Indicator Flash	Explanation	Reasoning	Service Remedy
Slow Flash	Flashing LED indicates normal operation of the control.	Normal state. There is always a slow flash when power is applied.	If there is no LED, then check for unit plugged in. Check for power at the wall plug or other source of 120V. Verify 120V power at the red #4 wire.
Fast Flash	A fast flash indicates that there is a call for heat.	Normal state.	You should hear the blower motor operating at a minimum.
Solid Red LED	A solid red LED indicated the control recognized an internal failure and entered an internal lockout state.	A number of things could cause this, but mostly power fluctuations. Unit has failed its internal self-check. There will be no blower motor or ignition attempts.	Turn the unit off at the ON/OFF switch for 5 seconds. Turn back on and allow to sequence. If the solid LED light returns, then



TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

LED Indicator Flash	Explanation	Reasoning	Service Remedy
2 Flashes	Maximum ignition attempts made. Ignition failure. This failure occurs when the control does not see proper ignition (flame rectification) given the allotted attempts and ignition cycles. (3)	The control will lockout if it failed to ignite gas after three (3) ignition attempts. Each ignition attempt is a full cycle that will last about 2 minutes. You should be hearing the blower motor and spark ignitor during each attempt.	replace to control. Verify control valve is ON. Verify there is gas to the valve. Verify minimum gas pressure. Check for 120V voltage to the pilot valve (yellow wire) connection at the gas valve. If voltage is present, replace control valve. If voltage is not present then check for 120V at terminal #7 (yellow wire) and at #5 (yellow wire). If power at #5, but not at #7, then replace control. If power at #7, check yellow wire and Molex connector to valve. Listen for the spark ignitor. If you do not hear spark, verify 120V at the red #4 wire on the control. Replace the control module. If you hear spark, using insulated pliers, remove the orange cable from the control and reset heater. When you hear spark again, slowly move the orange wire terminal back to the control and verify spark with at least 1/8 inch gap. If there is no spark, replace the control. If there is spark, but not at the ignitor, the check for proper spark gap between electrode and pilot hood. Replace igniter. If there is spark, then check for a pilot



TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

LED Indicator Flash	Explanation	Reasoning	Service Remedy
			flame first. If there is no pilot flame, then check power to the pilot side (yellow wire) of the gas valve. Check for gas and gas pressure. If there is pilot flame, then check for 120V power at the #6 (blue wire) at the orange Molex; and the blue wire (main valve) of the white Molex at the gas valve. If there is power at the white Molex, then replace control. If there is power at #8 blue wire, but not at #6 blue wire, then replace control.
3 Flashes	Pressure switch fails to open. The control insures that the pressure switch is open before it turns on the blower. If the control cannot force the switch to open by cycling the blower, it will indicate this failure.	The vacuum switch is a safety device. Vacuum switch is normally open. The control checks to ensure the vacuum switch can open (safety position) before it starts its sequence. If the switch is closed and cannot be opened, the code will flash.	Vacuum switch is closed and cannot be opened. Turn heater off and remove wires to vacuum switch. Measure continuity thru the switch. If there is continuity, then replace switch.
4 Flashes	Pressure switch fails to close. When the blower is turned on, the control insures it that the vacuum switch is closed before continuing with the ignition sequence. If it cannot force the switch to close by cycling the blower, it will indicate this failure. (The vacuum switch may also fail or fault during main burner. If this happens, then you will get a flash code of four.)	If blower motor is operating at speed and there are no vacuum restrictions, a closed pressure switch will allow 120V power to pass between the red (inbound) wire and the blue (outbound) wire. Blocked venting will be a primary cause of this failure. If venting is blocked, then there is no power thru the vacuum safety switch to the control module and pilot valve. Venting over-temperature switch will be another cause of this failure.	Check for rubber vacuum hose. Verify motor is running. Verify PVC venting is free and clear of all obstructions. Verify termination vent is free and clear of all obstructions. Verify venting does not contain an excessive number of elbows. Verify 120V at the #8 (blue wire) on the control. If no power, verify 120V at the blue wire on the vacuum switch. Verify vacuum safety switch is operating. Reset heater. Remove blue wire from vacuum switch and measure for 120V. If



TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

LED Indicator Flash	Explanation	Reasoning	Service Remedy
			no 120V, then verify .75 inches w.c. with a magnahelic gauge. Replace vacuum switch. Verify over-temp safety switch is not open (too hot). If 120V at the blue wire on the vacuum switch, but not at the #8 position of the control, then over-temp switch may be tripped. Cool switch to less than 180°.
5 Flashes	Neutral polarity failure. If the control senses the neutral has a potential with respect to earth ground, it will indicate this failure.	On start up and power on, the control module looks for proper polarity. If polarity is reversed or not present, unit locks out immediately. There will be no blower motor or ignition attempts.	Correct polarity issue at the wall plug or power connection to the water heater. Remove power strip or other GFI circuit.
6 Flashes	ECO failure. If the control senses the ECO has opened, it will indicate this failure.	Water temp has exceeded 200° F. One time use ECO has tripped. Unit will cycle 3 times and then lock out with 6 flashes. During ignition sequence you will NOT have power to the yellow #7 wire to the pilot side of the gas valve.	Remove red Molex connector from control. Verify continuity thru the red wires of the ECO/Thermistor Molex connector. If there is no continuity, then ECO is tripped. Replace control. If there is continuity, replace Molex and reset heater.

Other indications:

No Power (meaning the control is not flashing a slow steady flash) is caused by a lack of 120V on the red #4 wire to the control.

Verify that:

1. ON/OFF switch is in the on position
2. Check circuit breaker or fuse to wall plug
3. Check for 120V at wall plug
4. Neutral polarity is reversed. See flash code of 5.

No hot water will be caused by flash codes # 2, 3, and 5.

No hot water may also be caused by a faulty thermistor (temperature sensor). If thermistor is damaged, unit will show a slow flash (unit is powered); but will never initiate a trail for ignition. Verify the temperature-sensing device by conducting a resistance test on the two white wires of the red Molex. To check, verify



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

OHMS resistance of at least 10,000 ohms at room temperature. Lack of resistance means the temperature-sensing device is not working. Replace control valve. (Continuity will NOT work on the thermistor.)

Flash code #4 will usually indicate a venting problem, but there may be some hot water.

Flash code #6 is a failed ECO. There may be some hot water left; but the unit will never relight.

When diagnosing, don't get wrapped up in no hot water or not enough hot water. Go to the flash code first. The most common code is going to be Flash 2. That means the unit went thru the maximum ignition attempts (3) and never got a flame rectification on the pilot.

Lack of ground will cause erratic sequence of operation and behavior. The blower will operate and the unit will spark; but you will never get a pilot flame. If no ground, you will not have 120V at the yellow #7 wire on the control; the actual voltage will be significantly less than 120V. The voltage will not be strong enough to engage the electromagnet in the gas valve and open the pilot valve side. No ground will produce a flash code of 2.

All other symptoms, indications and causes of a gas water heater fault will apply. For instance, sooting, condensation, flame roll-out.

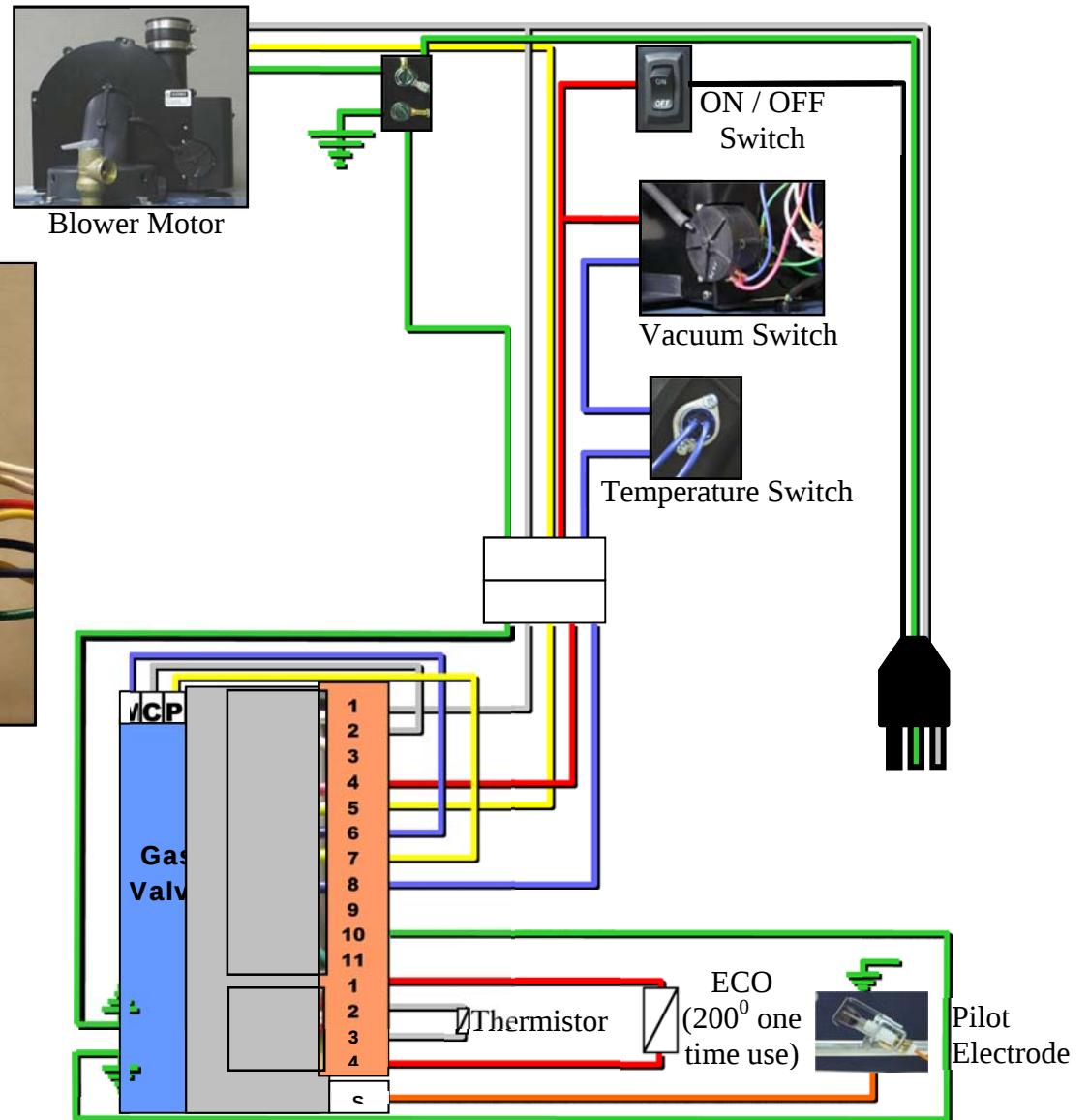
If a lockout occurs, it will occur in the following sequence:

- Steady on Control failed self-check
- 5 Flashes Polarity is reversed
- 3 Flashes Vacuum Safety Switch is closed and cannot be opened on safety check
- 4 Flashes Vacuum Safety Switch is open and fails to close on sequence
- 6 Flashes ECO tripped. Unit will make ignition attempts, but will lock out.
- 2 Flashes Maximum ignition attempts (3 times). The control never got pilot flame rectification to continue the ignition sequence.



2 Inch PowerVent LED Indicator Explanations & Troubleshooting Table

When troubleshooting the new replacement valve, conduct all electrical checks on the orange bus bar as outlined in this document.



Technical Competence, Product Confidence