



PowerVent with Electronic Control Sequence of Operations

SEQUENCE OF OPERATIONS

This is a power vent water heater control that provides two way communications to a wired user display. The word ‘control’ in this sequence will refer to the gas control valve. Communication between the control and the user display is achieved through a communications port powered by a 24V transformer. Inputs include water heater set point, water heater mode of operation, error codes, and diagnostics. Outputs include status (mode, temperature, available hot water, diagnostics and error codes). User display will be packaged with the water heater.

The user display has a backlight that comes on during interaction with the display for a minimum of 8 seconds. The display is connected to the water heater with 3-wire thermostat wire with a maximum length of 100 feet.



Tank is full of water.
 Gas supply is connected.
 Unit is plugged into a 3-prong plug wall socket 120 VAC.

Fill tank.
 Connect gas at 7” w.c for natural; and 10” w.c. for LP.
 Electrical socket must be wired polarity correct with an earth ground. Black wire to brass screw; white wire to silver screw; green wire to ground.



Turn rocker switch on the blower to ON position.
 Slide gas control valve to the ON position.
 Each time the controls are powered up they test the random access memory (RAM), the program code and the non-volatile memory (EEPROM).

Blower motor rocker switch controls all power inputs to blower motor, gas valve and display.
 At power ON and a demand for heat, the control performs a self-test diagnostic routine. If the self-check fails, the control locks out with indications on the control and user display.





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“Unlock” the display by pressing the UP and DOWN arrow keys. Set the water temperature setting not to exceed 120⁰F.

Temperature is sensed electronically by the *Thermistor* in the sensing bulb.



Call for Heat –

Control checks for two things:

1. A closed blower thermal over temp switch and....
2. An OPEN EXHAUST pressure switch

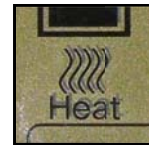
The control will attempt this sequence 5 times before entering into a hard lockout. The hard lockout will require a manual power cycle of the control to clear the hard lockout.

Heat icon display is on.

The normally closed blower thermal switch is wired in series before the pressure switch.

If the vent temp exceeds @180⁰F, then the over-temp switch will activate. IF the thermal switch is OPEN, you will get an error code.

In normal operation, the pressure switch is OPEN at the start of call for heat.



120V power is passed from the control to the blower motor on the yellow wire on the gas control.

Note: Primary power to the control is 120 VAC between the black and white wires on the four position moxex.

You will hear the blower running.





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With the blower running, the pressure switch will close.

The control logic prevents jumping this pressure switch for main burner.

Pre-purge may last up to 30 seconds.

The control will attempt this sequence 5 times before entering into a hard lockout.

IF the exhaust side of the venting creates too much back pressure due to blockage, the pressure switch will not close inducing a fault.

Exhaust pressure switch:
 Breaks on pressure fall;
 $-.45 \pm .05$ in w.c.

The hard lockout will require a manual power cycle of the control to clear the hard lockout



A signal is passed thru the pressure switch to the control valve.

(IF blower, venting, & pressure switch are all OK.)

This is the signal needed to energize the igniter. The igniter is energized and pilot valve is energized immediately after the spark begins.



Ignition attempt

Visually verify the igniter is sparking inside the combustion chamber.

Pilot flame and main burner immediately follow.





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Flame is rectified.

There is always a flame rectification circuit check while the main burner is operating.

If flame is not sensed during the Trial period, the igniter turns off, the pilot valve closes, the control runs the inducer through Post-purge then turns off the inducer and enters Soft Lockout and flashes the Soft Lockout error code.

After flame has been recognized (rectified), the igniter will turn off.

IF the main burner fails during heating, the unit will recycle and attempt ignition.

The control remains in Soft Lockout for 5 minutes before automatically responding to the Demand for Heat.

Control will cycle three times, then go into a Hard Lockout.



Water heats to thermostat setting.

Blower motor thermal safety switch is monitoring venting temperatures.

Flammable Vapor (FV) sensor is monitoring.

ECO is monitoring water temperature. Trips at 199°F.

Blower motor thermal safety switch trips at 180°F with automatic reset at 125°F.

FV Sensor is monitoring local environment for presence of flammable vapors



Water is heated.

Control shuts off all power to the gas valve.

Blower continues a post purge to vent excess heat and combustion gases.

Unit is in stand-by mode.

In stand-by mode, the gas control constantly monitors the water temperature via the thermistor to ensure the water inside the tank is within the user-selected range.

Safeties monitors control health, other fault conditions and the local environment for flammable vapors.

