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

VentMaster Ignition Sequence
Sequence of Operations

Action	What to check or look for	Service Remedy
Tank is cold and full of water. Heater is wired to a 120 VAC source. Gas supply is connected to heater and valve is set to ON position.	Fill tank Check fuse or reset breaker at service panel Check Natural Gas pressure between 4.5 and 10.5 inches water column Turn gas valve to ON Turn ON/OFF switch to ON	All voltages are AC and can be measured to ground.
120V is extended from the switch to the 24V AC step down transformer. At the same time, 120V is passes to the #3 terminal of the relay.	Check for 120V at the transformer Check for 120 at the #3 terminal of relay	Replace switch Check wiring to ON/OFF switch Check wiring to relay
24V is extended from the transformer to the thermostat.	Check for 24V AC at the yellow wire on the thermostat	Replace transformer
Thermostat demands heat. 24V is extended through the blue wire to the relay switch.	Check for 24V at the blue wire on the thermostat	Turn temperature up Replace thermostat
24V is extended through the red wire to the relay switch terminal #6.	Verify 24V at red wire on the relay *Note: the blue wire from the thermostat is pigtailed behind the thermostat with a red wire. This is the wire that carries 24V from the t-stat to the relay switch.*	Check wiring harness
24V is passed via the #6 terminal at the relay to Pressure Switch 1 (PS1-normally open) along the blue wire	Verify 24V at the blue wire terminal of the Molex connection of the vent switch box. (The 'open' is the state between the blue and red wires. It will 'close' when exhaust is proven.)	Check wiring harness and Molex
24V power waits at PS1 blue wire for the blower motor to operate.	PS1 proves the ***exhaust*** side of the venting. If the exhaust is restricted, then PS1 will not allow power to the Ignition Control Module along the red wire.	Verify free and clear exhaust venting
24V power moves from PS1 to PS2 along a yellow wire	PS2 proves the ***inlet*** side of the venting. If the inlet is restricted when the blower comes on, then PS2 will not allow power to the relay switch	Verify free and clear inlet venting
Power flows thru PS2 (normally closed) and 24V is applied to the #5 terminal of the relay thru the yellow wire. 120V (hot side) passes to blower from terminal #3 to #1.	Blower motor should come on. Verify 24V at the #5 terminal of relay. Verify 24V at the yellow wire of the Molex connection on the pressure switch box. Verify 120V to ground at #3 on relay; then on #1 on relay. Verify 120V at the between the black and white wires on the Molex connection on top of the pressure switch box.	Check and replace relay. Verify 120V to blower.

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The blower motor operates and causes the entire venting to pressurize.	Verify blower motor is operating. If PS2 is not working, then the blower motor will not operate. Jumper blue and yellow wires at Molex to rule out PS2.	Check and replace blower Verify free and clear inlet venting
PS1 will allow 24V power to move to the control module thru the red wire.	Good blower motor and venting will allow PS1 to pass power from the blue wire to the red wire inside the switch. Power is passed to the control module thru the red wire. If there is no power on the red wire at the Molex, then PS1 switch or the exhaust side of the venting structure is at fault. You should hear the igniter sparking.	Check Molex and wiring harness Verify 24V at the red wire to the Molex Rule out the pressure switch and venting by jumping the red and blue wire on the Molex
24V is extended from the ignition control to the pilot electrode. You should hear it sparking. At the same time, 24V is extended to the ECO.	Verify 24V on the "24V" terminal of the control module. Spark generator in the ignition module produces a continuous 10,000V DC spark pulse through the orange wire. Visually check pilot electrode assembly for a spark. Check ignition cable for continuity. Check for 24V at the PV and GND terminal of the ignition module	Replace control module Replace pilot electrode. Test by removing the orange cable from the control module and allowing the module to spark to ground. That means the module is working and the igniter is at fault.
24V is extended to the ECO to the pilot side PV terminal of the gas valve.	Check for 24V at the left and right terminals of the thermostats ECO (brown wires) ECO may be tripped due to water too hot Check for 24V at the PV terminal of the gas valve Remember - At the same time there is power at the PV terminal of the gas valve, the pilot electrode should be sparking.	Cool water in tank to reset ECO Replace ECO
Pilot flame ignites and remains lit. Spark generator shuts off when flame is rectified.	Check gas control valve is turned on. Verify 24V at the PV terminal of the gas valve. Verify minimum gas pressure at the inlet and outlet sides of the gas valve. Check grounding of pilot electrode assembly Check pilot electrode for cracks Check gap of pilot electrode Pilot flame is rectified by the ignition control module	Check gas pressure Check pilot burner for obstructions Tighten or replace pilot electrode assembly Gap electrode to 1/8" Replace ignition module or gas valve

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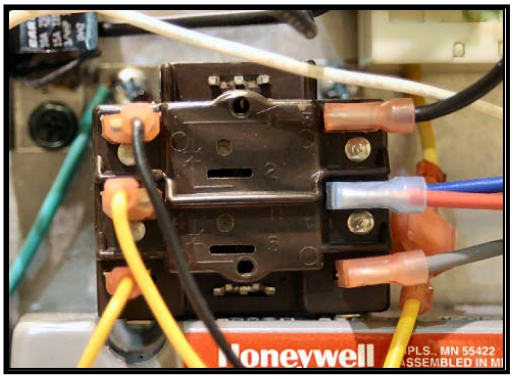
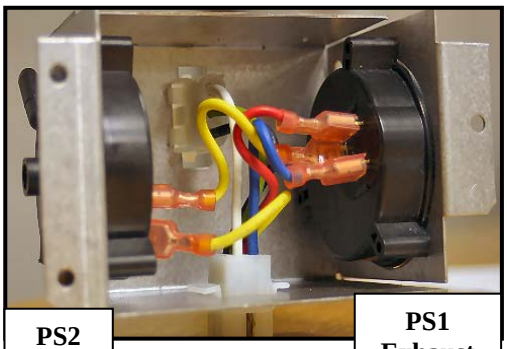
Control models sends 24V is to the MV terminal of the gas valve.	Check for 24V at the MV terminal of the ignition control module Check for 24V at the MV terminal of the gas valve Verify minimum gas pressure at the inlet and outlet sides of the gas valve.	Replace ignition module Replace gas valve Adjust gas pressure Clean or replace
Main burner ignites. Water is heated to thermostat setting.	Verify calibration of thermostat compared to water temperature	Replace thermostat
Water is hot. Thermostat opens and suspends power to blue wire and relay switch.	Check thermostat	Replace thermostat
Blower motor, main burner and pilot shut off.	Heater is in stand-by until the thermostat demands heat	

Sequence of Operations on the pressure switches & relay switch:

1. 24V is passed via the #6 terminal at the relay to Pressure Switch 1 (PS1) along the blue wire
2. 24V power waits at PS1 blue wire for the blower motor to operate.
3. 24V power automatically moves from PS1 to PS2 along a yellow wire.
4. If PS2 is OK, 24V is applied to the #5 terminal of the relay via the yellow wire. The connection inside the relay closes allowing120V to pass from terminal #3 to #1 and the blower motor.
5. The blower motor operates and causes the entire venting structure to pressurize.
6. Once blower comes on and exhaust side of venting is free and clear, PS1 will close between the blue and red wires. Power passes to the red wire side.
7. 24V power now passes to the control module thru the red wire.
8. If you hear blower motor and spark, then the venting structure, blower motor and pressure switches are OK.
9. If you hear blower motor and not spark, then trace the power flow thru the pressure switches. You should have 24V at the red wire on the Molex connection. If not, it could be a switch or the venting structure itself. You can also verify the igniter by removing the orange wire on the control module and see if the module shorts the ignition to ground.





PS2 Inlet

PS1 Exhaust

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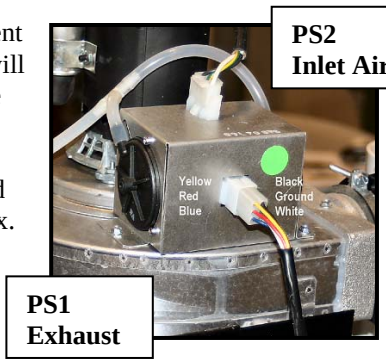
As long as the vents remains free and clear, are within standards from the vent tables of the Use and Care Manual and the blower motor is operating, you will have power to the control module and combustion. (Red wire has 24V at the Molex)



If this is not the case, rule out the blower motor, pressure switches, relay and venting structure by jumping the Molex connector to the pressure switch box. Jumper the blue and red wires with a jumper wire. If you go to main burner, then the problem is in the blower/pressure switch/venting structure.

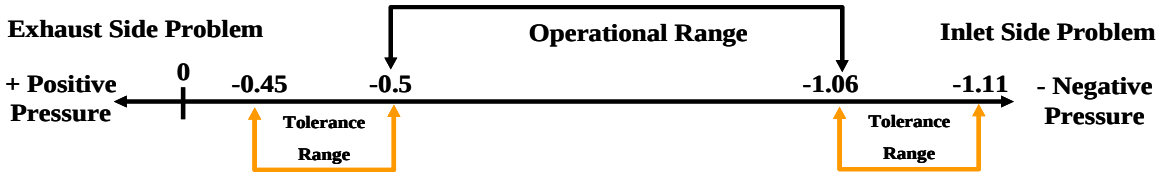
You can also verify the heater and the venting by removing the venting structure to see if the unit goes to main burner. If you disconnect the venting structure and the unit does not go to main burner, then the water heater needs to be looked at. Follow the power checks in the sequence of operations.

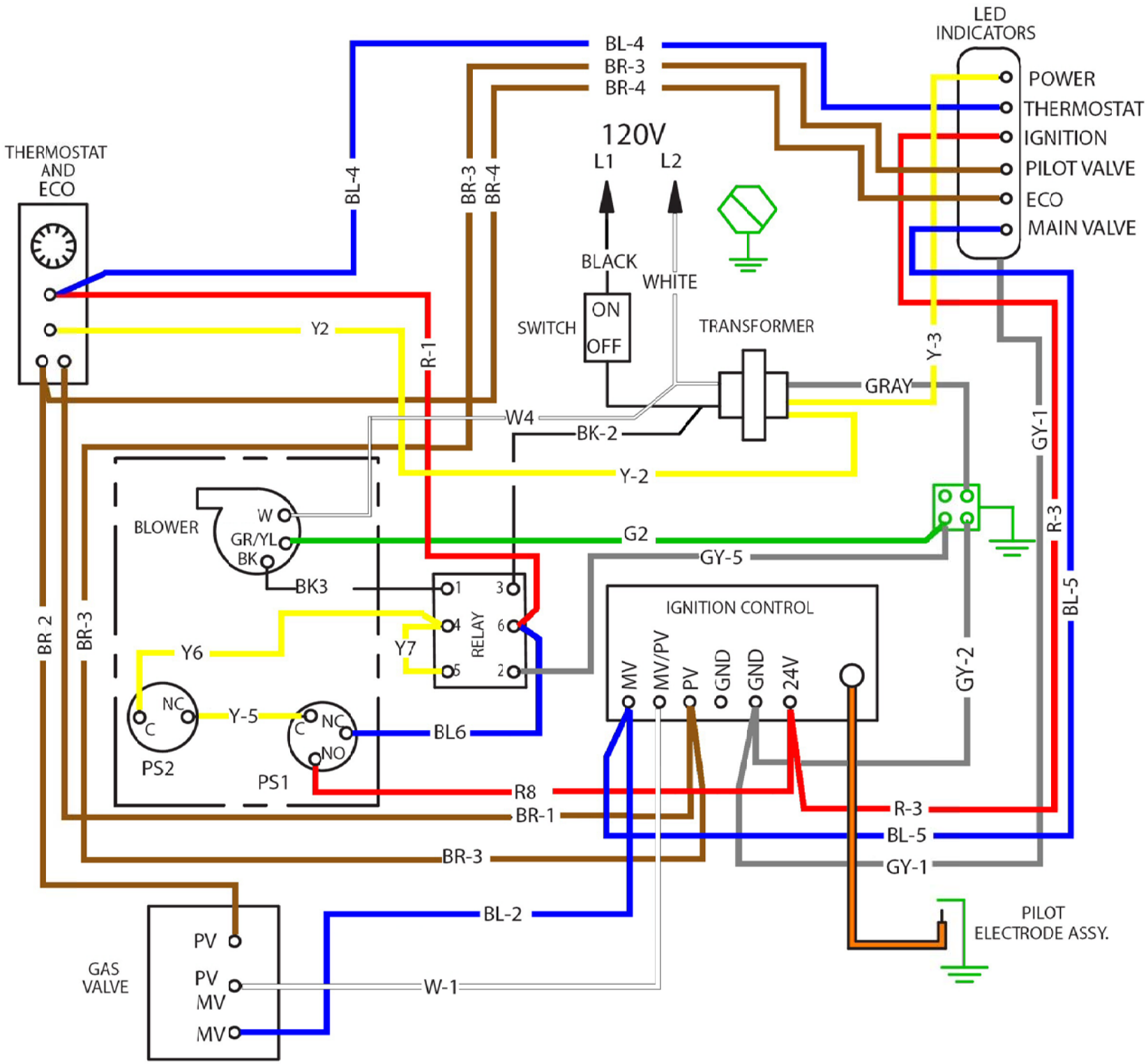
If you disconnect the venting structure and the unit does go to main burner, then there is something wrong with the venting structure. Use a digital manometer to find out which side of the venting is the problem:

1. Remove the venting structure to the water heater.
2. Check for the inlet and exhaust restrictor rings.

Model	Inlet Restrictor Ring	Outlet Restrictor Ring
GP100-150	Yes; stamped “965”	Yes; stamped “972”
GP100-200	Yes; not stamped	Yes; not stamped
GP100-250(A)	Yes; stamped “317”	None

3. Attach a digital manometer to the tubing at the blower motor using an in-line “T”. See photo below.
4. Without the venting attached, turn the water heater on and go to main burner. The nominal pressure should be about (minus) -1.01 inches water column. If you go to main burner, then the water heater is working just fine. The problem is somewhere in the venting structure.
5. Reconnect all of the venting. Turn the unit back on and attempt main burner.
    a. If the pressure on the digital manometer is greater than (minus) -0.5, then the exhaust side of the venting is the problem. (great than moves the reading toward zero)
    b. If the pressure on the digital manometer is less than (minus) -1.06, then the inlet side of the venting is the problem. (less than moves the reading away from zero)
6. The variance for the switches is between (minus) -0.5 and (minus) -1.06. The pressure switch verification system has a range of -0.45 to -1.11 inches w.c. This is a very small variance of negative pressure.





VentMaster Connection Diagram