



PowerVent Hot Surface Ignition

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From April 1990 through January 1996, Rheem manufactured a 40 and 50 gallon PowerVent water heater with a hot surface ignitor. The hot surface ignitor is a ceramic assembly with a heating coil located inside the ignitor. When the heater demands heat, the ignition control module delivers 120V to the hot surface ignitor. The ceramic ignitor heats up; glows a bright red and ignites the gas at the main burner.



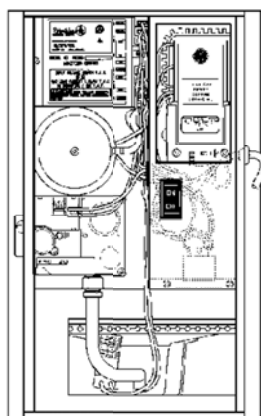
One of the major differences with the hot surface ignition is the Robert Shaw HS 780 Electronic Ignition Module. The module comes in a 'one try' and a 'three try' model. The HS780 ignition control is a direct main burner ignition system that provides the timing sequence, along with the ability to sense main burner flame.

Assuming all other load aspects of the heater are functioning properly, the control module sends 120V to the silicon carbide ignitor. The ignitor heats for 17 seconds and reaches a temperature of approximately 1800⁰ F. After the ignitor has been energized for 17 seconds, the gas valve is energized allowing gas to flow across the ignitor. After one half of the ignition time period a circuit is disconnected to the ignitor, and the ignitor becomes a flame sensor. The ignitor, in it role as a flame sensor, is position sensitive. Care must be taken to assure proper placement for proper ignition and also to allow the ignitor to properly sense the presence of the main burner flame.

The ignitor is used to sense the burner flame. In this case, the ignitor is referred to a local sensor (see model number above). PowerVent water heaters do not use a remote sensor. The correct position for the ignitor is with the flame covering 5/8" to 3/4" of the ignitor tip. The flame rectification is a safety feature of the PowerVent heater. If the ignitor is not in the proper position, the control module may lock itself out.

If the flame is not sensed during the 2 second sensing timing period, the HS780 control module enters a lockout stage. The HS780 is available in two different types with respect to the number of ignition cycles before lockout. One model will attempt ignition only once (1 try) and the other model attempts ignition three times (3 try). On the 3 try module, the whole cycle is repeated each time. After the requisite number of tries, the module goes into a lockout. Lockout is controlled by a holding circuit that keeps the module from attempting another ignition sequence. To get the HS780 out of lockout, power must be turned off to the heater for a minimum of ten seconds.

Normal Sequence of Operations for Hot Surface Ignition



1. Call for heat by thermostat.

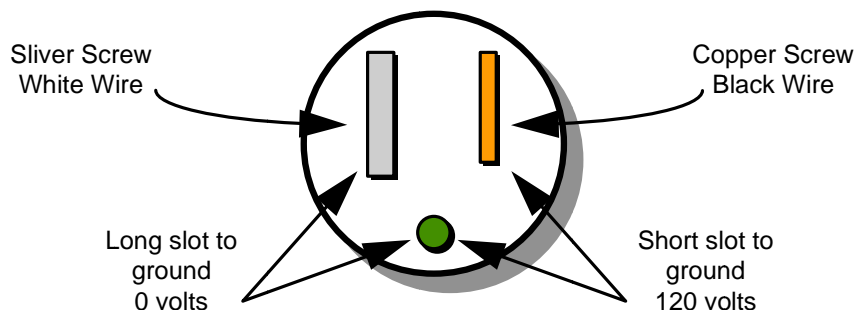


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2. Control module starts a 17 second ignition event.
3. Ignitor is energized for 17 seconds.
4. Ignitor glows red. Gas valve energized through “TH” and “TR” terminals.
5. Sensor circuit senses flame.
6. Flame sensor continues to monitor presence of flame throughout the call for heat cycle.
7. Call for heat ends; gas valve is de-energized and closes.

Hot Surface PowerVent and electrical polarity

Powervents and Polarity



An inexpensive LED polarity tester will immediately diagnose a polarity problem.

| If the polarity is..... | Then the heater will..... |
|--|--|
| Correct polarity and proper ground | Operation is normal |
| Correct polarity and no ground | Fires once for 2-3 seconds; then safety shut off |
| Reverse polarity and a ground | No ignition; ignitor will spark, then ignition shuts down |
| Reverse polarity and no ground | Fires once for 2-3 seconds; then safety shut off |
| Correct polarity with low gas pressure | Will ignite once and go out immediately; or will not ignite at all |



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PowerVent Ignition Control System – Hot Surface Ignition

