



# ***DETROIT RADIANT PRODUCTS CO.***

## ***Wiring Diagram for Suffix NSPI-8 120V***

*(Pilot Sensing Element - SPDT Mercury Element, Cycle Pilot Operation)*

### **120V System**

36C68A (120V) Redundant Gas Valve  
3049 Auto Pilot - SPDT Switch  
5059A- (120V) Ignition Transformer  
760-502 Spark-Trode

### **Normal Sequence of Operation**

1. Closing of the electrical circuit, upon demand for heat, the following happens simultaneously:
  - A) The systems capacitor discharge ignition transformer is energized, generating a spark at the pilot burner electrode assembly.
  - B) The pilot redundant gas valve is energized and opened supplying gas to the pilot burner.
2. The pilot burner is lighted and spark ceases. (Flame conduction at the electrode causes sparking to stop). The pilot burner flame heats up the mercury filled sensing element.
3. Heating of the sensing element causes the mercury to snap the SPDT switch to the hot side. This energizes the heater's main burner gas valve coil thus supplying gas to the main burner.
4. The pilot redundant-valve solenoid remains energized thru the initial closed circuit.
5. The system is now in run or operating mode.
6. When the thermostat is satisfied and opens the circuit, both electrically operated valves are de-energized and closed.

### **Note**

Normal time to heat up the sensing element to cause switching to the hot side (in step 2) is approximately 35-40 seconds.  
Normal time to cool down the sensing element to cause switching to the cold side is approximately 25-35 seconds.



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*(Pilot Sensing Element - SPDT Mercury Element, Cycle Pilot Operation)*

### **Abnormal Sequence of Operation**

#### **A. Power Failure**

If the power fails with the mercury switch still on the cold side, all electrical functions are de-energized. The pilot relite will not generate sparks and the pilot-redundant valve immediately closes. Normal sequence will resume when the power is restored.

If there is a momentary power failure while the mercury switch is in the “hot” position, both the pilot and main valve close.

If power failure exceeds 25-35 seconds the sensing element will have switch to the cold side and the normal lighting sequences will be performed.

If power failure is less than the time required to cool the sensing element (25-35 seconds), re-establishment of power will cause the following to occur:

- 1) Pilot redundant valve coil to energize, open valve and supply gas to the pilot burner.
- 2) The capacitor discharge ignition transformer to energize, generate a spark at the pilot burner, ignite pilot burner gas.
- 3) Energize the heater’s main burner gas valve coil, open gas valve supplying gas to the main burner.
- 4) Pilot burner flame will ignite main burner. (All sequences occurring with 4 seconds).

#### **B. Failure To Ignite Burner**

The pilot burner will never ignite if the electrode is grounded, or is not connected or if the electrode is not properly located with respect to the burner flame. Pilot gas will continue to flow with any of these malfunctions.

#### **C. Gas Failure At Start Up**

The pilot relite control starts sparking and the pilot-redundant valve opens with no gas flowing. The sparking will continue until the gas supply is re-established and the pilot burner is ignited. Normal sequence of operation will now resume.

#### **D. Gas Supply Failure During Cycle**

If the gas supply fails with the mercury switch still on the “cold” side, the pilot flame will extinguish and the pilot relite starts sparking. The pilot relite continues to generate sparks until the gas supply is re-established and the pilot burner is ignited. Normal sequence of operation will now resume.

