Please Note:
The control continually monitors internal circuits and external sensors.
Apply Power to the Water Heater

- Is the field wiring correct?
- Polarity correct
- Must have earth ground
- GFI Circuits are OK

![Power outlet with wiring diagram]

Apply Power to the Water Heater

- Verify 120 VAC line voltage to control between 1 & 2

![Power outlet with voltage verification]

Request for Heat

- Control conducts self check for
  - ECO
  - Thermistor
  - Ignitor resistance
  - FV sensor
  - Self diagnostics
- Verifies venting is free and clear via the pressure switch

![Heat request with diagnostics]

1-800-432-8373
Turn on Inducer

- Verify 120V to inducer on yellow line between 1 & 3
- You should hear blower on

Inducer comes on

- Is the inducer running?
  - Pushes exhaust gas thru venting
  - Add dilution air to cool gas to work in PVC pipe

Verify Pressure Switch/ Temp Probe Works

- Verify power to over temp switch on blue line (you should hear inducer running) between 1 & 4
Verify Pressure Switch/Temp Probe Works

- Verify 120V from pressure switch on red line between 1 & 5
- Verifies venting is free and clear because switch operates properly

Proving the Inducer & Pressure Switch Works

- Vent tubing is not kinked
- Vent over-temp switch is not activated
- 0.75 inches w.c. on tube
- Pressure switch will not open
- Pressure switch will not close

Try for Ignition

- Is the hot surface ignitor present?
- Is the ignitor circuit with resistance limits? (11.5 to 18.8 ohms)
- Does the hot surface ignitor glow?
- Three attempts for flame rectification
- Then lock out on Max Ignition Attempts
**Ignitor Current**

- Verify voltage to the ignitor here
- Should be between 70 - 90 VAC

**Main Burner**

- Gas valve opens
- Main burner comes on
- Remember – there is no pilot of any kind with the White Rodgers system!
- Measure for @ 105 volts DC to verify power to the gas valve solenoid

**Main Burner Flame Performance**

- Water is heated to thermostat setting
- Flame probe monitors flame presence
- Flame is rectified at @ 4 microamps DC
- Clean flame probe with steel wool if needed
Monitoring Safety Performance

- Blower motor over temp switch is monitoring venting temperatures
- Flammable Vapor sensor is constantly monitoring ambient air for flammable vapors
- ECO is monitoring water temp

Thermostat is Satisfied

- Thermostat is satisfied
-Suspends power to the ignition circuit
-Blower motor conducts post purge
-Water heater in stand by

FV Sensor is constantly monitoring ambient air – even when the burner is OFF!

Agenda

- Invensys to White Rodgers Control
- Appearance and connections
- Control Specifications
- Sequence of Operations
- Troubleshooting Flash Codes
- Removal, Replacement, Conversions
Lockout and Resets

- Timed lockout resets after 1 hour
- 3 auto resets max; then hard lockout
- Hard lockout – must cycle power to the control to reset (human intervention)
- Permanent lockout – Flammable vapor sensor or control failure
- 7 of 15 errors caused by “Internal Diagnostics” failures

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<tr>
<th>Error Code</th>
<th>Description</th>
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<td>10</td>
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Diagnostic Code Map

- 15 error codes
- 11 of 15 are self-diagnosing
- You will need to work on:
  - (3) Pressure Switch stuck closed
  - (4) Pressure Switch stuck open
  - (6) Max Ignition Attempts
  - (10) Unsupervised Flame

Error 1 – Open Ground

Error 1:

Check Repair or Replace:

1. Check that the earth ground conductor is properly connected to the floor box or the earth ground cable at the meter base.
2. Verify that the grounding conductors on the water heater are properly connected and secure.
**Error 2 – Polarity Reversed**

**Indicates:** The self-diagnostic test detected a wiring error in a high resistance to earth ground.

1. Check, Repair, or Replace
   - 1) Check for proper wiring of the black and white wires.
   - 2) Verify that the appliance is properly connected to earth ground.

![Diagram of electrical outlet with red, black, and yellow wires connected]

**ERROR 2**

- Display Error Code 2
- Troubleshoot TIMES SELECT

**Verify**

- NO
   - Line Polarity Okay?
   - YES
   - GROUND OK?
   - YES
   - Display Error Code 1
   - Troubleshoot TIMES SELECT

**Error 3 – Pressure Switch will not Open**

(normal switch)

**Indicates:** The pressure switch remained closed longer than 5 seconds after the combustion burner.

1. Verify continuity of pressure switch.
   - If continuity present, then replace switch.
   - May also be caused by a jumpered switch.

**Error 4 – Pressure Switch will not Close**

(inducer will close switch)

**Indicates:** The pressure switch remained open longer than 5 seconds after the combustion burner was energized.

1. Verify plastic tubing to pressure switch
2. Recycle heater
3. If heater starts, then the venting is the problem
4. If the heater goes back into error code, replace blower and pressure switch

- May be caused by a blocked or restricted vent; pinched rubber hose to the pressure switch or a disconnected pressure switch.
**Error 5 – Hot Surface Ignitor Circuit Error**

*Hot Surface Ignitor (Silicon Nitride)*

**Indications:** The self-diagnostic test has detected an error in the Hot Surface Ignitor circuit.

**Error 5**

1. Unplug water heater from wall.
2. Common use the greater resistance to measure the greater resistance with an accuracy equivalent of between 1.1 and 1.9 ohms. If the readings is incorrect, replace the Hot Surface Ignitor.
3. If the above checks are passed, replace the INTELLI-VENT™ control.

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**Error 6 – Max Ignition Attempts**

*(3 strikes and you’re out)*

**Indications:** The maximum number of ignition attempts or attempts has been reached and the system is locked.

**Error 6**

1. Make sure all gas lines are tight and accessible.
2. Check that the flame sensor rod is visible and is located properly and the flame is burning blue over the sensor.
3. The Hot Surface igniter may be positioned incorrectly. Re-position as necessary.
4. No counter test is available. Self-diagnostic test takes precedent.

---

**Error 7 – Gas Valve Circuit Problem**

**Indications:** The self-diagnostic test has found a problem with the gas valve driver circuit.

**Error 7**

1. Cycle power to the water heater off for 10 seconds and then back on.
2. If the above step did not clear the error, the INTELLI-VENT™ control must be replaced.

---

*A broken or damaged hot surface ignitor will present its own unique fault code.*
Error 8 – Gas Valve Internal Problem

Check, Repair, or Replace:
1. Cycle the external power off for 10 seconds and then turn on.
2. If the above does not clear the error, the INTELLIGENT™ control must be replaced.

No counter test is available.
Self diagnostic test takes precedent.

Error 9 – Failed Self Diagnostic Check

Check, Repair, or Replace:
1. Cycle the external power off for 10 seconds and then turn on.
2. If the above does not clear the error, the INTELLIGENT™ control must be replaced.

No counter test is available.
Self diagnostic test takes precedent.

Error 10 – Unsupervised Flame

Check, Repair, or Replace:
1. Replace the INTELLIGENT™ control.

Recycle heater and observe combustion chamber for premature flame or flame once the thermostat is satisfied.
Error 11 – ECO is tripped

INDICATES: The high temperature cutoff is open.

Check, Repair, or Replace
1. Replace the INTELLIVENT™ Control.

Automatic High Temperature Cutoff
Single-Use Type: 195°F (90°C)

Error 12 – Temp Adjustment buttons stuck closed

INDICATES: The self-diagnostic test has detected one of the temperature adjustment buttons stuck closed.

Check, Repair, or Replace
1. Make sure that there are no objects leaning against the front of the control.
2. Loosen press-and-release tabs or release screws on rear side of control.
3. If the above actions do not clear the error, the control will continue to regulate water temperature at the last setting, but you will not be able to change settings unless you replace the INTELLIVENT™ control.

No counter test is available.
Self diagnostic test takes precedence.

Error 13 – Water Temp Thermistor Problem

INDICATES: The self-diagnostic test has detected that the water temperature sensor is either open or shorted.

Check, Repair, or Replace
1. Check that all wiring is correct and that there are no open or shorted circuits.
2. If no wiring problems are found the INTELLIVENT™ control must be replaced.

No counter test is available.
Self diagnostic test takes precedence.
Error 14 – FV Sensor Wiring Problem

1. Check all FV sensor wiring harness connections; and the connections to the back of the sensor.
2. Cycle power to the water heater off for 10 seconds and then back on.
3. If no wiring problems are found, the Flammable Vapor Sensor must be checked.
   a. Disconnect the FV sensor Molex and measure the resistance of the sensor between the two black wires 1 and 2. If the resistance is less than 9K OHMS or greater than 45K OHMS, then replace the sensor.
   b. If the FV sensor is between 9K and 45K and the code will not clear, replace the INTELLIVENT control.

Error 15 – FV Sensor Detected Flammable Vapors

1. Verify FV sensor is less than 45k Ohms between the two black wires #2 and #3
2. Replace sensor if greater than 45k Ohms
3. Apply reset code to valve