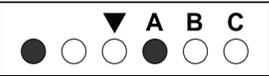
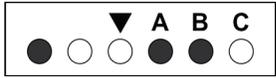
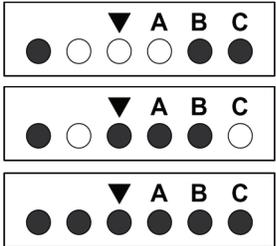


TB-A028-06 - A. O. SMITH - FVIR INTELLI-VENT TROUBLESHOOTING CHART

| # | LED STATUS | PROBLEM | SOLUTION |
|---|---|---|--|
| 1 |  | Inadequate or no earth ground sensed by the Intelli-Vent™ control. | <ol style="list-style-type: none"> 1 Ensure the wall outlet is properly grounded. 2 Ensure all ground connections/wires on the water heater are secure. |
| 2 |  | Power supply to Intelli-Vent™ control has reversed polarity. | <ol style="list-style-type: none"> 1 Ensure the wall outlet is properly wired. 2 Ensure all internal 120 VAC wiring connections and wiring harness have no reversed wires. 120 VAC "hot" wire must connect to the on/off switch. |
| 3 |  | <p>Pressure switch circuit remaining closed for more than 5 seconds after heating cycle begins.</p> <p>Blower does not start.</p> <p>Service Note: Secure power - disconnect one wire from the air pressure switch or the vent temperature limit switch. Turn power back on - blower should start.</p> | <ol style="list-style-type: none"> 1 Ensure air pressure switch circuit wiring is correct and the air pressure switch is not jumpered. 2 Secure power to water heater, check continuity of air pressure switch contacts with wires disconnected. <ul style="list-style-type: none"> A If pressure switch contacts show continuity (closed circuit) replace the pressure switch. B If pressure switch contacts are open and all wiring is correct - turn the power off for 10-20 seconds then on again to clear the error code - if the error code persists replace the Intelli-Vent™ control. |
| 4 |  | <p>Pressure switch circuit remains open longer than 5 seconds after the blower is energized.</p> <p>Blower may run continuously in this condition.</p> <p>Service Note: To learn more about performing Air Pressure Switch tests visit our web site www.hotwater.com to download technical bulletin TB-A023-06 Air Pressure Switches.</p> | <ol style="list-style-type: none"> 1 Ensure the blower is running - check for 120 VAC to the blower when the heating cycle begins, check the wiring. If the control does not energize the blower - replace the Intelli-Vent™ control. If the blower fails to start when energized - replace the blower assembly. 2 Ensure the air pressure switch sensing tube is properly connected - not kinked or damaged. 3 Check continuity of vent temperature limit switch - replace switch if contacts remain open under 160°F. 4 Ensure the correct size of vent pipe (2", 3", 4") was used per the installation manual for vent length. Ensure maximum number of elbows or equivalent feet of vent pipe has not exceeded maximum limits. 5 Ensure there are no obstructions in the vent pipe. 6 Check air pressure switch performance - check pressure with a digital manometer - check continuity of contacts. (see service note in left column) If the switch proves defective - replace the air pressure switch and/or the blower assembly as required. 7 If air pressure switch performance test results prove the air pressure switch is working properly and error code 4 persists - replace the Intelli-Vent™ control. |
| 5 |  | <p>The Intelli-Vent™ control has detected an open ignitor circuit.</p> <p>Service Note: Ignitors are wearing parts; the resistance (ohms) of a hot surface ignitor will increase over time. If the resistance at room temperature is near 18.8 ohms - consider replacing the ignitor as a preventative measure.</p> | <ol style="list-style-type: none"> 1 Check wiring to the hot surface ignitor - replace ignitor assembly if wiring is damaged or worn. 2 Check ignitor assembly plug and the socket on the Intelli-Vent™ body for good connection. Replace ignitor assembly and/or control if necessary. 3 Check resistance of ignitor at room temperature (77°F) at the plug end. Replace ignitor if resistance is not within 11.5 and 18.8 ohms at room temperature. 4 If results from the above tests were good and error code 5 persists - replace the Intelli-Vent™ control. |

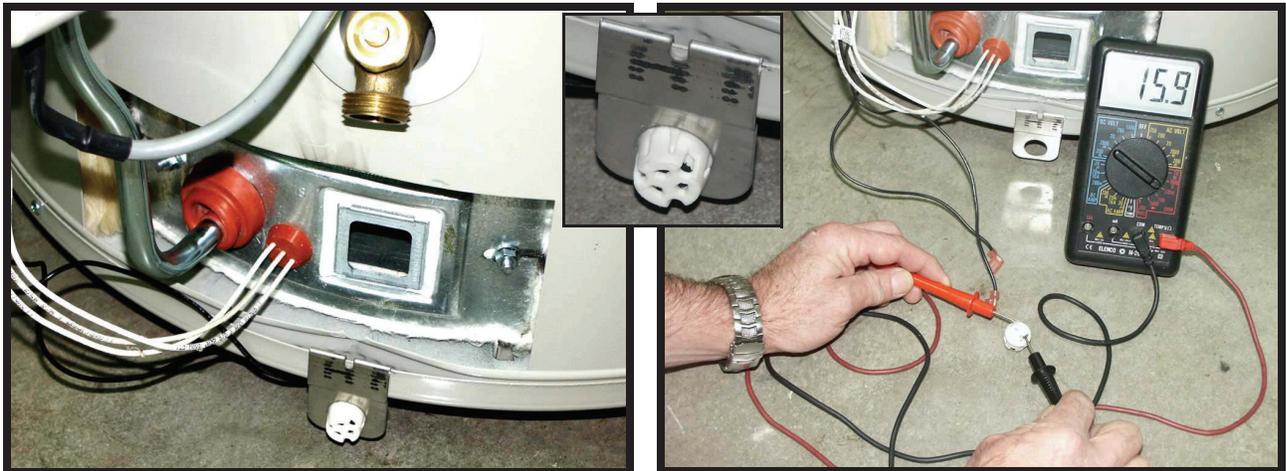
TB-A028-06 - A. O. SMITH - FVIR INTELLI-VENT TROUBLESHOOTING CHART

| # | LED STATUS | PROBLEM | SOLUTION |
|-------------|---|--|---|
| 6 |  | <p>Ignition/flame failure.</p> <p>The water heater has reached the maximum number of retries and is currently locked out for one hour.</p> <p>Cycle the power to the water heater off and on to reset.</p> <p>Service Note: Igniters are wearing parts; the resistance (ohms) of a hot surface ignitor will increase over time. If the resistance at room temperature is near 18.8 ohms - consider replacing the ignitor as a preventative measure.</p> | <ol style="list-style-type: none"> 1 Gas supply is turned off - pressure too low. Ensure supply and manifold gas pressures are within requirements in the installation manual. Manifold gas pressure is non-adjustable if pressure is off by more than 0.3" W.C. replace the Intelli-Vent™ control. 2 Low supply voltage - should be 115 - 125 VAC. 3 Ensure flame sensor is making good contact with the burner flame, ensure flame is steady see #8 below. 4 Ensure the flame sensor is clean - use ultra fine steel wool or Scotch-Brite™ pad to clean flame sensor. 5 Ensure the hot surface ignitor is positioned to provide consistent ignition. 6 Check for any cracks in ignitor assembly ceramic insulators - replace ignitor assembly if damaged. 7 Check resistance of ignitor at room temperature (77°F) at the plug end. Replace ignitor if resistance is not within 11.5 and 18.8 ohms at room temperature. 8 Ensure the correct size of vent pipe (2", 3", 4") was used per installation manual for vent length. Using larger pipe than required may cause excessive air turbulence in the combustion chamber. |
| 7 8 9 |  | <p>Self diagnostic tests have found a problem with the gas valve driver circuit, internal microprocessor, or other internal circuits.</p> | <ol style="list-style-type: none"> 1 Turn the power off for 10-20 seconds then on again to clear these error codes. 2 If any of these error codes persist or cannot be cleared - replace the Intelli-Vent™ control. |
| 10 |  | <p>Flame signal has been sensed out of proper sequence.</p> | <ol style="list-style-type: none"> 1 Turn the power off for 10-20 seconds and then on again to clear this error code. 2 Replace the Intelli-Vent™ control if this error code persists. |
| 11 |  | <p>Water temperature in the tank has exceeded 195°F and has activated the ECO.</p> | <ol style="list-style-type: none"> 1 Turn the power off for 10-20 seconds then on again to clear this error code. 2 Replace the control if the error code persists. |
| 12 |  | <p>The self diagnostic check detected one or both of the temperature adjust buttons are stuck.</p> | <ol style="list-style-type: none"> 1 Press and release temperature adjust buttons. If the above action does not clear the error, the control will continue to regulate water temperature at the last setting. However, settings will no longer be adjustable - the control should be replaced. |
| 13 |  | <p>The self diagnostic test has detected the water temperature sensor (thermistor) is either open or shorted.</p> | <ol style="list-style-type: none"> 1 Turn the power off for 10-20 seconds then on again to clear this error code. 2 Replace the Intelli-Vent™ control if this error code persists. |

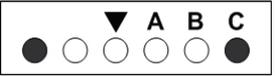
TB-A028-06 - A. O. SMITH - FVIR INTELLI-VENT TROUBLESHOOTING CHART

| # | LED STATUS | PROBLEM | SOLUTION |
|----|---|---|---|
| 14 |  | <p>The self diagnostic test has detected the flammable vapor sensor is either open or shorted.</p> <p>The Intelli-Vent control is programmed to lock-out and display this error code if the resistance value it senses from the FV sensor is below 5,000 ohms or above 1,700,000 ohms.</p> <p>Service Note: To perform this test the ohm meter used must be capable of reading up to 2,000,000 ohms.</p> | <ol style="list-style-type: none"> 1 Turn off power to the water heater. Ensure all FV sensor wiring, the ignitor assembly plug, and the ignitor assembly socket on the bottom of the Intelli-Vent™ control are making good contact. Repair or replace any worn/damaged components that are not making a good connection. 2 Restore power to the water heater - if the error code has cleared place the water heater back in operation and allow it to cycle several times to ensure the problem has been resolved. If the error code persists - continue to step 3 below. 3 Turn off power to the water heater. Remove the FV sensor from it's bracket on the base ring of the water heater and disconnect both wires to the sensor. Take a resistance reading between the two wiring terminals of the FV sensor and note the resistance value. <p>Service Note: Unless the ohm meter used has an auto-range feature the resistance should be checked twice. The first reading will be taken using an ohms scale above 1,700,000 ohms. The second reading is taken using an ohms scale just above 5,000 ohms.</p> <ol style="list-style-type: none"> 4 If resistance of the FV sensor is lower than 5,000 ohms - replace the FV sensor. 5 If resistance of the FV sensor is above 1,700,000 ohms - replace the FV sensor. 6 If the resistance of the FV sensor is above 5,000 ohms and lower than 1,700,000 ohms and all the above steps have been performed - ensure the wiring and plug between the sensor and the Intelli-Vent™ control are not damaged or worn - replace the ignitor assembly if the wiring and/or plug are damaged/worn. <p>If the wiring and plug are in good condition - replace the Intelli-Vent™ control valve</p> |

Flammable Vapor Sensor Location / Testing



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| # | LED STATUS | PROBLEM | SOLUTION |
|----|---|---|---|
| 15 |  | <p>The self diagnostic test has detected the presence of flammable vapors.</p> <p>The Intelli-Vent control is programmed to lock-out and display this error code if the resistance value it senses from the FV sensor is above 70,000 ohms but remains below 1,700,000 ohms.</p> <p>The Intelli-Vent control is in a hard lock-out condition that cannot be reset by cycling power to the water heater. See the instructions below for the reset procedure.</p> | <ol style="list-style-type: none"> 1 Turn off power to the water heater. Carefully check the surrounding area for any substances such as gasoline, paint, paint thinners, or cleaners that could emit flammable vapors. Remove anything that can potentially emit flammable vapors from the area and store it properly in a different location. 2 Ensure power to the water heater is turned off. Remove the FV sensor from its bracket on the base ring of the water heater and disconnect both wires to the sensor. Take a resistance reading between the two wiring terminals of the FV sensor and note the resistance values. Perform this test once in the area by the water heater and a second time outdoors after allowing the sensor to acclimate to the outdoor atmosphere for 5 minutes. Service Note: These resistance readings should be taken using an ohm scale above 70,000 ohms. 3 If the resistance of the FV sensor is above 70,000 ohms during the indoor test only and the resistance reading taken in the outdoor atmosphere dropped below 70,000 ohms. Re-check the area surrounding the water heater for substances that could be emitting flammable vapors. Remove any such substances from the area and store them properly in a different location. Repeat step 2. 4 If the resistance of the FV sensor is above 70,000 ohms during the indoor and outdoor tests - replace the flammable vapor sensor. 5 If the resistance of the FV sensor was below 70,000 ohms during the indoor and outdoor tests and all the steps above have been performed - replace the Intelli-Vent™ control. |

Flammable Vapors Sensed (FVS) Reset Procedure

After a flammable vapor lockout has been initiated, a manual reset must be performed to restore operation. The following should be done by a qualified service person after the hazard has been removed:

- 1 Manual reset is accomplished by first, turning off power to the water heater for 10 seconds.
- 2 Restore the power to the water heater.
- 3 Within 10 seconds of restoring power, press the two temperature adjust buttons simultaneously until the left (green) "Vacation" LED begins to blink (approx. 5 second delay). Once the Vacation LED begins to blink, release both buttons.
- 4 Again, within 10 seconds, press both temperature adjust buttons simultaneously until the Vacation LED is on steady (approx. 5 second delay).
- 5 Release the two buttons, the microcomputer will clear the FVS lock-out and normal operation will then be restored.

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| # | LED STATUS | PROBLEM | SOLUTION |
|----|---|--|--|
| 16 |  | <p>LDO (Lint, Dust, and Oil) lock-out condition.</p> <p>Air pressure switch circuit is opening repeatedly during one heating cycle. May be caused by the air pressure switch and/or the vent temperature limit switch (these two switches are wired together in a "series" circuit).</p> | <ol style="list-style-type: none"> 1 Check/clean intake air screen on the base ring of the water heater. 2 Check/clean the dilution air screen on the blower assembly. 3 Check/clean the flame arrestor - see the service note below. 4 Remove the blower assembly and check the flue baffle - ensure the flue baffle is in good condition and properly installed - reinstall as necessary and/or replace the flue baffle if worn or damaged. 5 Ensure water heater is not over-firing - check burner orifice size - ensure the correct orifice is installed - replace as necessary. 6 Ensure water heater is not over-firing - check manifold gas pressure - ensure manifold gas pressure is within 0.3" W.C. of the listed rating on the Intelli-Vent™ control valve. Manifold gas pressure is non-adjustable, if manifold gas pressure is off by more than 0.3" W.C. - replace the Intelli-Vent™ control. 7 Check the vent temperature limit switch - if it is determined that the vent temperature limit switch is opening its contacts at normal operating temperatures during the heating cycle - replace the vent temperature limit switch. <p>Service Note: the flame arrestor is accessible through the intake air opening in the base ring of the water heater with the intake air screen removed. Use a non-metallic household brush to clear away any lint or dust from the ceramic flame arrestor, then vacuum the surface of the flame arrestor and the base ring air chamber thoroughly with a household vacuum cleaner. A suitable vacuum hose attachment can be fabricated in the field using a short length of 1/2" PVC pipe with a short radius elbow on one end. Use tape to temporarily seal it to the vacuum hose.</p> |

Additional Recommended Service Publications

- Power-Vent service manual - part number TC-048 R6 (revision 6 or later)
- Intelli-Vent™ service manual supplement - part number GTC-070 R3 (revision 3 or later)
- Air Pressure Switches technical bulletin - number TB-A023-06

Visit our web site at www.hotwater.com to download the above service manual and supplement. Revision numbers for these service publications are designated by R3, R4, R6, R7, etc. as a suffix to the part numbers IE: GTC-070 R4