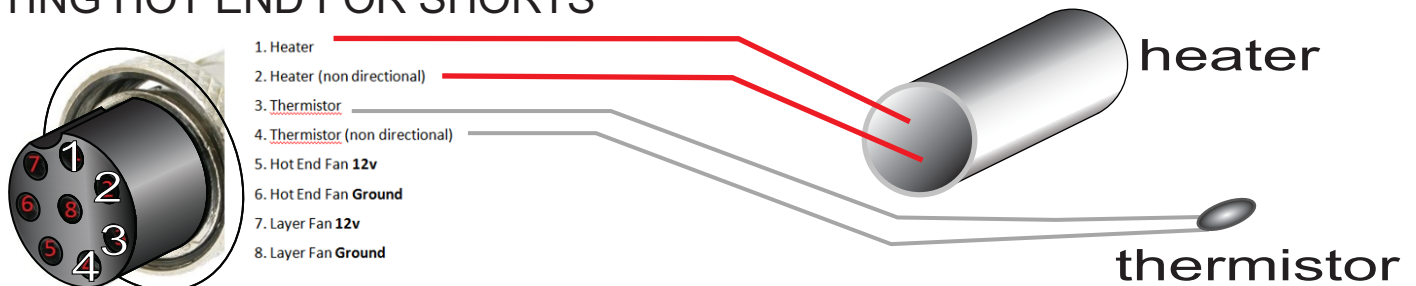


TESTING HOT END FOR SHORTS



Important. If your meter has removable leads. Make sure they are inserted into proper jacks in meter. Typically Black lead goes into COM - (common ground). The second lead must not be plugged into A (AMPS; labels usually 10A or 20A). Plug red lead into port labeled V (voltage +, Ohms, Beep). Unplug 8 pin aviation (hotend) connector from control box. We will be probing the female plug on the hotend cable. This test will inspect the heater cartridge, and thermistor for shorts to aluminum heater block, or wires.

1) Test Thermistor.

Set Volt/Ohm meter to 2K Ohm range (200,000 Ohm) Omega Ω represents Ohms. A reading of 0.00 means no resistance, or a short (two wires with touching conductors, or an object making short between two or more wires. If display reads 110.0 when in 200K Ohm range, then this indicates resistance of 110,000 Ohms or 110 K(or kilo)Ohms. A Thermistor of the 100K Type, will have a resistance of 120K to 90K Ohm at room temperature. You can watch the resistance drop as you warm the resistor, e.g. warming it in your hand, or by heating with cartridge. (Warm to touch would be about 80K to 70K Ohms.)

Probe the pins 3 and 4 on connector. This should indicate 120K to 90K Ohms between pins 3 and 4, when at room temp. (Number can be as low as 70K if block is warm, decreasing as block gets warmer.)

Checking for Short from Thermistor to Heater block: Set meter to it's lowest Ohm (resistance) range (e.g 200). Measure from pin 3 to aluminum heater block body. It should float around, or read O.L. (over limit) for very high, or infinite resistance. (this means there is no conductivity). Measure from pin 4 to aluminum heater block body. If you get a reading, of 0 or a low stable number, there is a short to the block with one of the thermistor leads. Most often this is a thermistor lead which has pinched insulation, as result of screw on thermistor being too tight. Try loosening screw, and pushing insulation under the head of screw. Measure resistance of thermistor (see above). It should be 120K to 80K (Use 200K Ohm range on meter) if at room temp, or slightly warm. Repeat test for short to aluminum block.

2) Test Heater Cartridge.

Set Volt/Ohm meter to 200 Ohm range (200 Ohms) Omega Ω represents Ohms. A reading of 0.00 means no resistance, or a short. If display reads 4.3 when in 200 Ohm range, then this indicates resistance of 4.3 Ohms. A range of 3-5 Ohms is OK for this sort of test. Exact reading isn't critical for this test.

Probe the pins 1 and 2 on connector. This should indicate about 4.3 Ohms between pins 1 and 2. The heater element makes heat by using a low resistance, to turn current into heat. Now, lets check for a short between any of the heaters wires and the aluminum block. Probe between pin 1 on connector and aluminum heater block. Resistance should be infinite (or O.L.) Probe between pin 2 and aluminum heater block. Again, resistance should be infinite (or O.L.) between pins and aluminum heater block. If any of these reads under 1 Ohm or Zero (using 200 Ohm range on meter), you have a short between one of the wires on heater element cartridge, and the aluminum heater block. This can usually be physically fixed with application of Kapton tape. I like to apply kapton tape, wherever risk of metal contact, or pinching of wires is possible. Kapton (also called polyamid) tape is high temp and high insulation material. It doesn't melt. Wrap any exposure points of bare wire, and add a small piece on metal surfaces which can touch wires, or pinch it's insulation. Do not use shrink tubing close to heater block, it will fail.

QUICK FINAL TEST:

Set meter to 200K Ohm range.

Confirm thermistor reads about 90-120K Ohms when cool, by probing pins 3 and 4.

Probe pin 3 and pin 2. This should be open, and read O.L

Probe pin 3 and pin 1. This should be open, and read O.L.

Set meter to 200 Ohm Range.

Confirm Heater Cartridge reads about 3.7-4.4 Ohms by probing pins 1 and 2.

Probe pin 4 and pin 2. This should be open, and read O.L

Probe pin 4 and pin 1. This should be open, and read O.L

Probe pin 3 and pin 2. This should be open, and read O.L

Probe pin 3 and pin 1. This should be open, and read O.L

TYPICAL ERROR MESSAGES:

MIN TEMP ERR:

Disconnected wire to thermistor, or break in thermistor.

MAX TEMP ERR:

Short in thermistor wires to block, or short in thermistor wires, or bad control board. If you have a MAX TEMP error, unplug hotend connector at control box. Turn control box OFF, and ON. If it still reads MAX TEMP error, you may have a bad control board, or pinched thermistor wires in control box.

