

HEAT

How to diagnose a reverse polarity, bad ground, etc

Why does it matter? It matters because that is what the maker of that machine designed it to work properly on. Most furnaces are designed to run on 115 volts a/c input. You are allowed a 10% plus/minus tolerance so basically if the voltage is between 104 to 126 volts you are good to go. There are also another couple of factors to consider here. That is, the polarity of that power, and does a proper ground circuit exist? These are critical to the proper operation of the control and in most cases are monitored by the on-board control diagnostics. A “reverse-polarity” flash code might come to mind. So how do we test that issue? First of all let’s check the on the wall plug outlet that is supplying the power to the furnace. My illustration below should help you visualize the situation.

(Illustration here)

Make sure the power is correct here before condemning the furnace control board. A common issue found in the field is a three wire outlet without a ground wire connected to it. The control will give a fault code for this if it’s equipped to do so. So measuring the outlet as illustrated above we see that there should be 115v between the narrow slot and the round ground slot. If not, check the wide slot to

the ground slot. If no power is still measured then no ground circuit exists. Stop here and have an electrician rectify the problem. Don't let your or your customer's body become the completion of the power to ground circuit. Ground circuits are important in that if there is a problem with the power circuit this ground will safely carry away the power and send it into the ground. Also this ground is important to controls that use igniters that operate on less than full voltage. These controls need a place to dump off the over-voltage that the igniter doesn't need. An 80 volt igniter can operate for a short time on 115 volts but not for long. A failure will soon follow. You want to know why it's going thru igniters so often. This might be the issue.

Next we want to check the polarity. The Black wire on the plug and outlet is the "hot" or power wire. The White wire is the "neutral" wire and is not supposed to have any voltage from it to ground. If voltage is measured, more than three volts, then there is a problem possibly with another appliance in the building that is inducing voltage into that neutral line. This must be remedied before continuing. Now just continue with your measurements in the machine. "Line IN" on the board should be "HOT" 115v to ground and "LINE N" neutral should be zero volts. Transformer in Black should be 115v and white (neutral) should be zero volts. Transformer out should be Red = 24v and Blue= 0 volts and this should also go to ground.

Now you have verified the power on the machine and if it's still giving a reverse-polarity/bad ground fault you probably have a bad control board.

If you have any further questions please feel free to contact us on the Blog provided or give me a call.

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