

Trex-2+ Keenovo Header upgrade to PID Control

Safety Warning

You are working with 110/220v depending on what country you are in.

I NORE anyone else can be held responsible for your safty, this is something you are choosing to do on your own AND at your OWN risk.

FOLLOW the DIRECTIONS

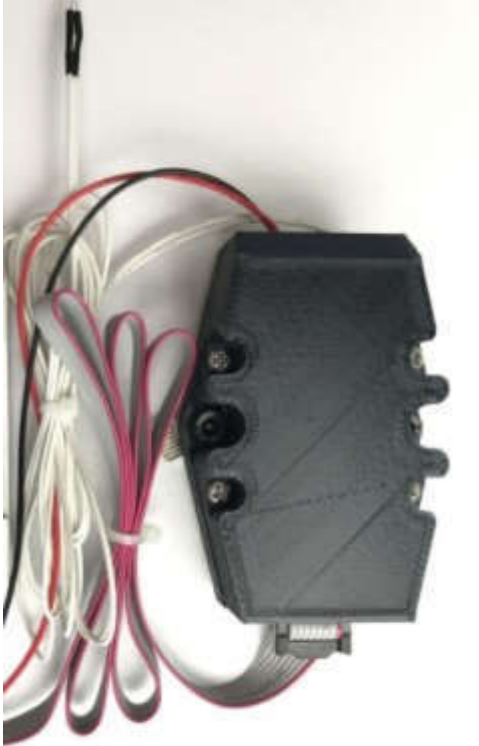
READ the whole thing before you turn on the printer or heater

PARTS

1. SSR (Solid State Relay) this came in your kit and will look something like this



2. Thermistors and Thermistor Driver, low current wire for relay control All of this is also in your kit and should look something like this



3. 12/2 or 14/2 SJ cord this is used between the Keenovo controller and the SSR

This is standard 110 electrical cord for those that live in the United States. I used an old power cord and cut the ends off

STEP 1 - Rewiring the Keenovo Controller

First unplug everything. Your heater and printer should not have power. Next pull back the cover on the Keenovo heater. NOTE: You will probably have to cut the zip ties to do this

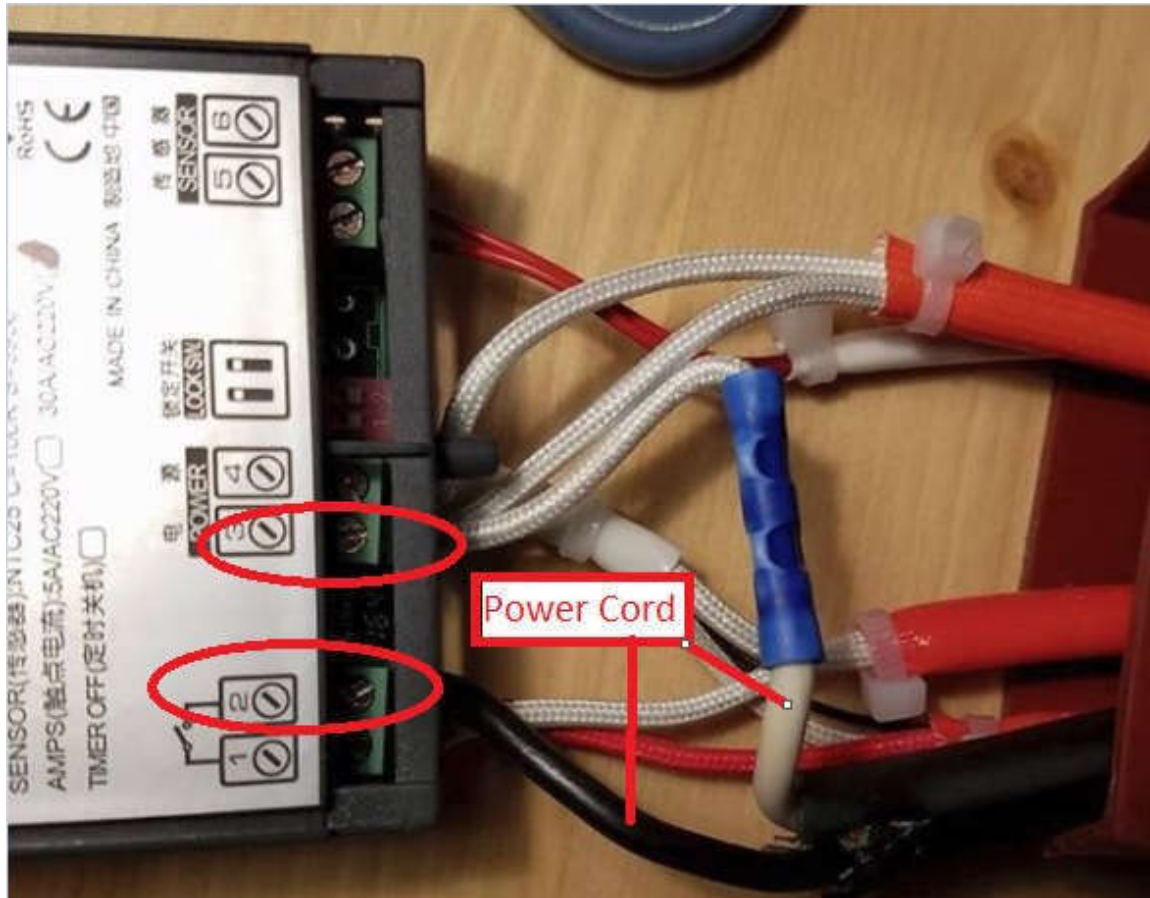
Take a picture of the wiring and where it is just in case you mess something up

We'll be using this as a safety and bed temperature display, so it will remain in the wiring. You'll want to punch a hole in the silicon cover and run your wire through. There will be a jumper connecting terminal 3 on power to terminal 2 on the switch.

REMOVE the JUMPER

Step 2 - Connecting the power to SSR power cord to the Keenovo controller

After removing the jumper above you will want to take 1 end of your 2 conductor wire strip back the insulation on both conductors and insert 1 into the #2 hole marked with a switch above it and tight it down then insert the other conductor into the #3 hole marked power (Make sure that the other wire that is in the number 3 is still in as well) and tighten Down
It should now look something like this

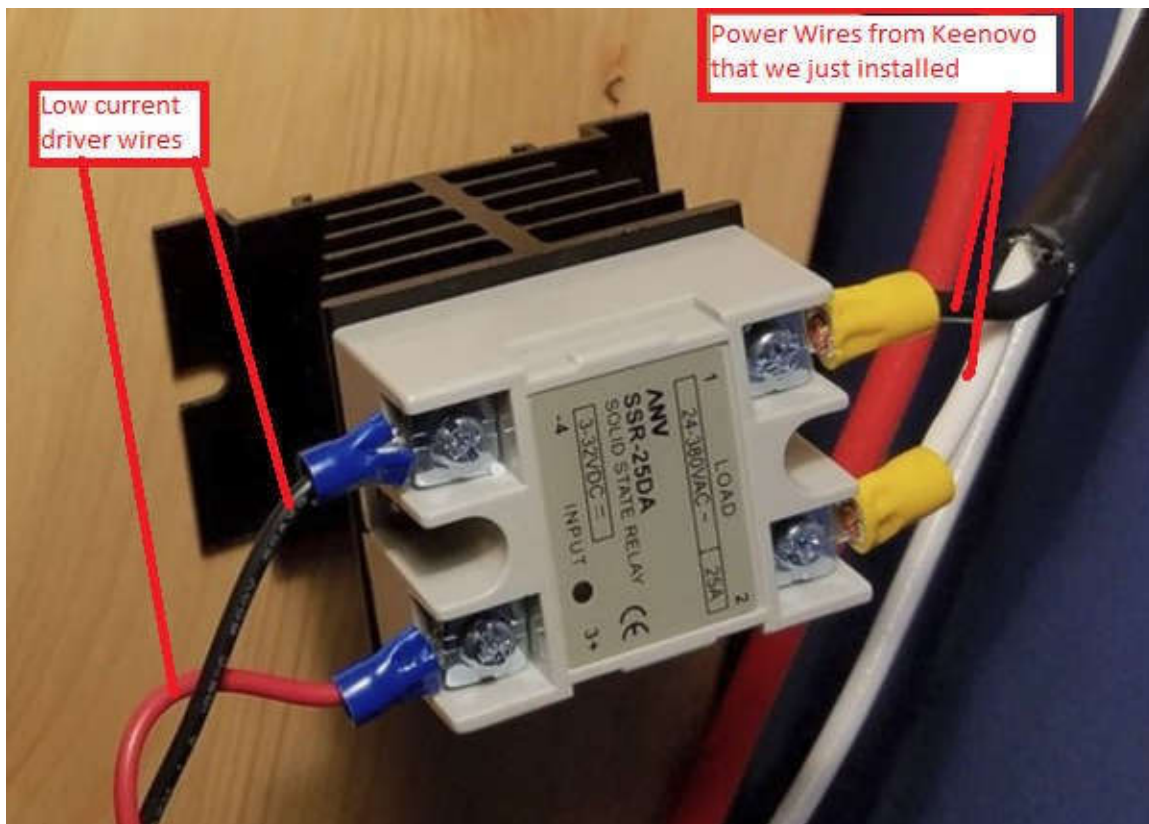


You can now put the cover back on the controller

Step 3 - Connecting the Keenovo and the thermistor driver to the SSR

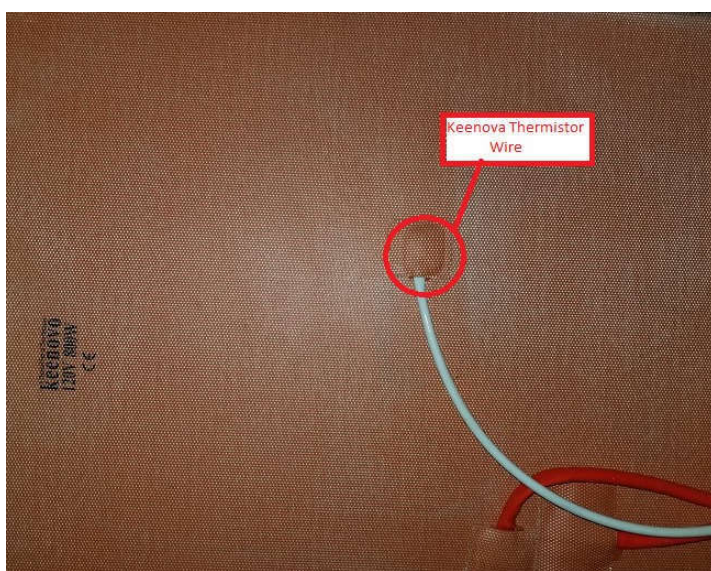
Connect the two conductor wire from the keenovo to the two ac/mains terminals marked, these are not polarity sensitive (they can go on either terminal)

Connect the low current (red and black wires from the thermistor driver) to the DC side of the SSR. These should be marked DC input and they are POLARITY sensitive Red goes to positive (+) and black goes to negative (-)



Now place the cover on the SSR, this is a MUST for SAFETY

Step 4 - Installing the thermistor in the bed (this is the most complicated part)



If you have the bed on the printer you can do this by first REMOVing any filament from the

printer then turning the printer on its side.

Of course it would be easier to do before the printer is assembled but most will have their machines already running when they get this upgrade.

Turn it over and locate where the Keenovo thermistor is on the heat pad, you want to get close to this so you have similar readings.

Once you locate the Keenovo thermistor you will need to make a small hole in the bottom of the heat pad to install the thermistor that goes to the driver. I use a SMALL drill bit, you could also use a SMALL allen wrench

Take your time as its already stuck to the bed you will have to go down and then in at an angle to get room to put the thermistor in.

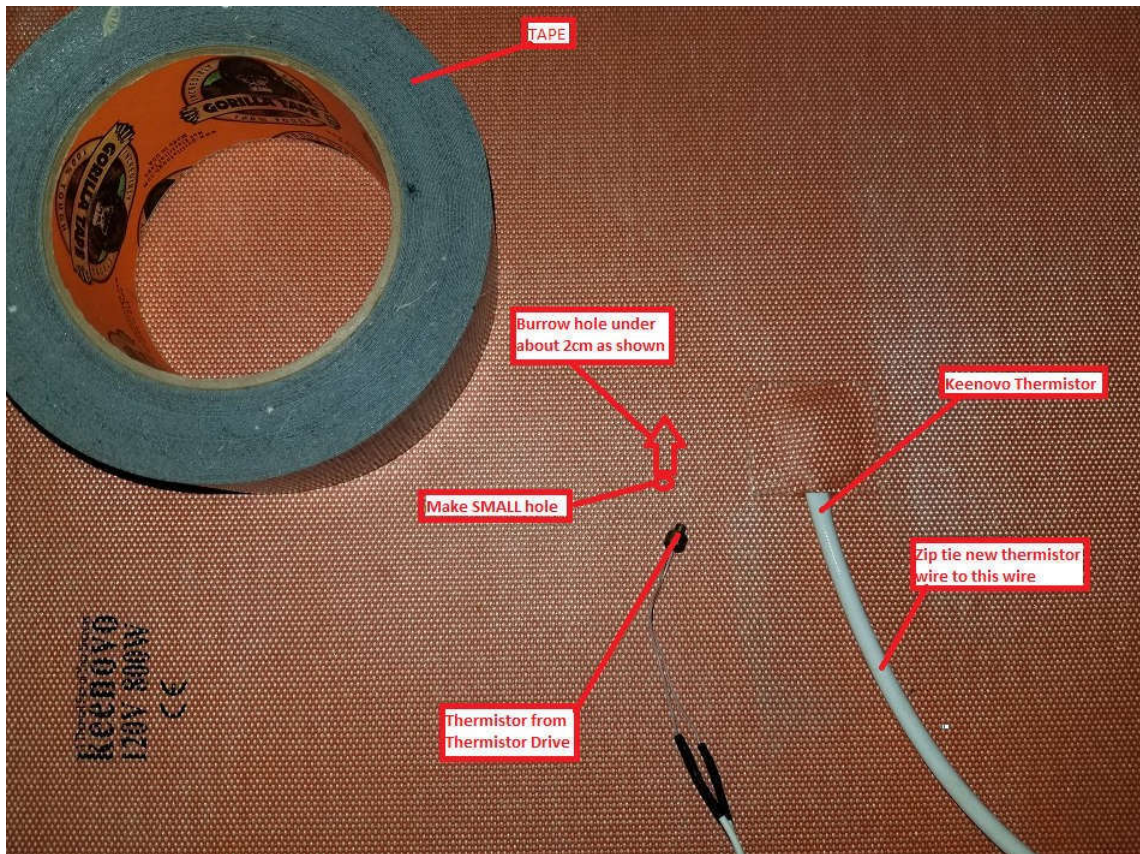
You will want to go back under the pad about 2cm, now you have to insert the thermistor into the hole and get it in as far as you can

I found a coffee straw works pretty good if you slit it down one side and cut the tip off at an angle, you can then insert it into the hole you made in the pad and slide it in with a little work. Then slide the thermistor thru the straw/tube till it gets to the end. Because of the angle cut on the tip of the straw you can now put your finger on top of the thermistor bulb, press down and pull the straw back out.

You can now remove the straw by pulling the thermistor wire out thru the slit you made down the side of the straw.

Secure the thermistor wire at the whole in the pad with some tape, Kapton, Gorila or as I did I used 3m outdoor VHB tape.

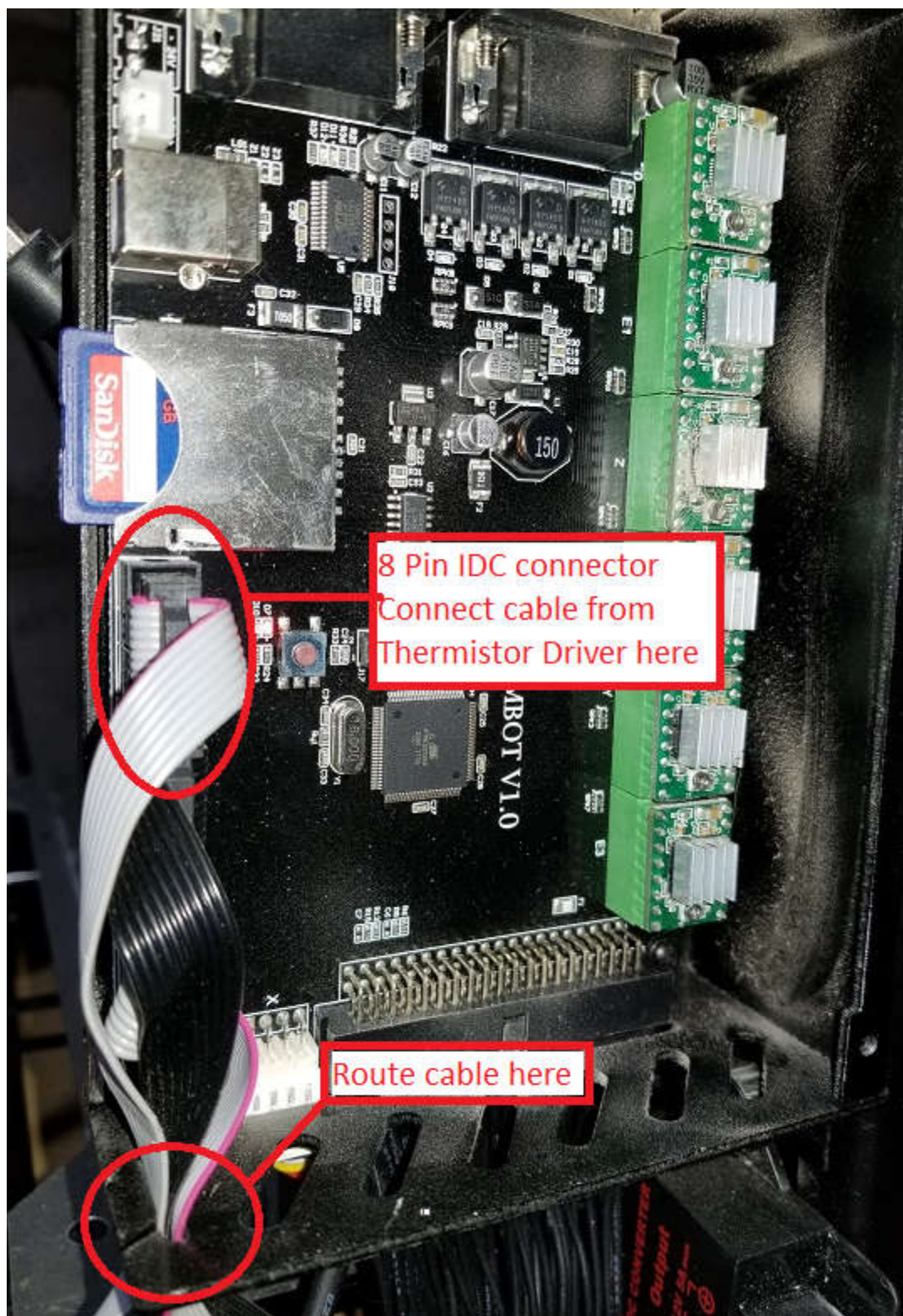
Now zip tie the thermistor to the other wires on the heater pad for extra security. When done it should look something like this:



Step 5 - Connecting the Thermistor drive to the controller

Open the lid on the controller on mounted vertical on the printer

Inside you will see a 8 pin IDC connector. Insert the end of the flat/ribbon cable from the thermistor drive into this IDC connector, route your wire out of the box and close the lid. Picture below shows connection and where to route cable:



Step 6 - Flashing new firmware to support the controlled heated bed You will have to turn on

power on your printer for this step

DO NOT plug in the bed heater at this time

You will need to install CURA if you have not already down so

you can download it from here : <https://ultimaker.com/en/products/cura-software/download-request/159>

Once installed load Cura and imported the config for the formbot into it you can Click on SETTINGS, PRINTER, MANAGE PRINTERS

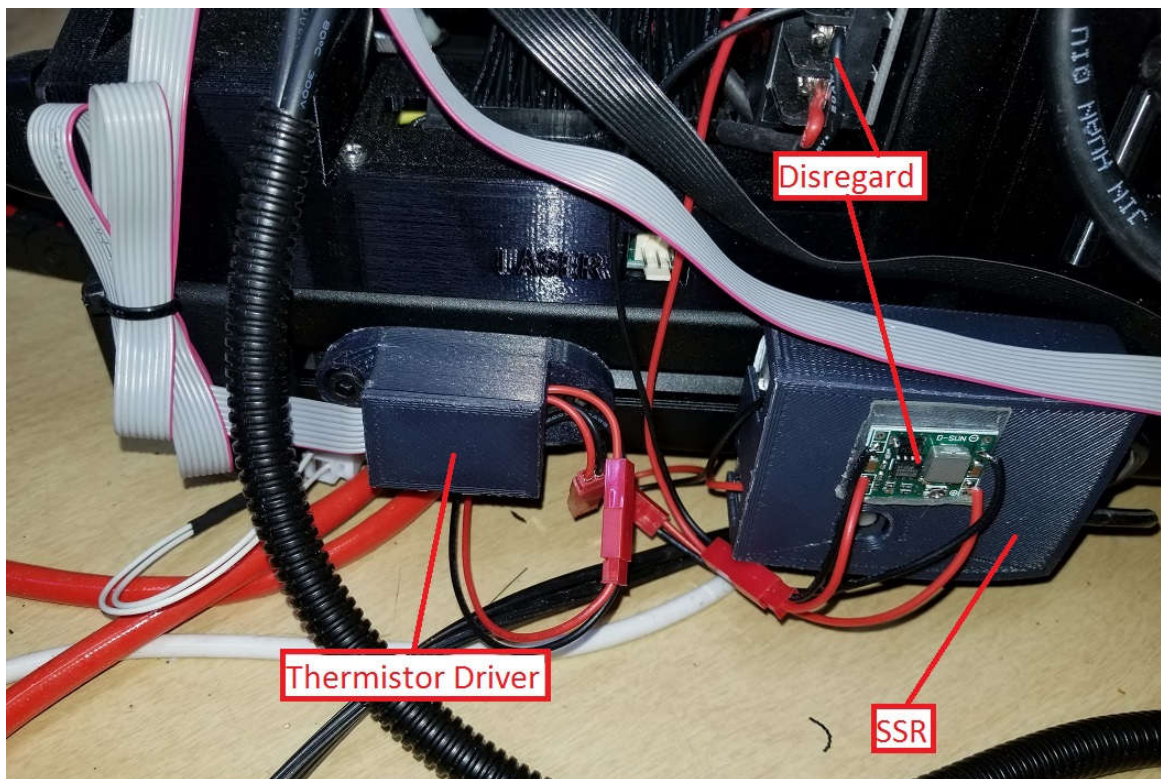
select your printer and click on the "Upgrade Firmware" tab Now click on "Upload custom Firmware"

If you have a OLDER version of CURA you goto the top

CLICK "Machine, Install Customer Firmware"

Then select the .hex file that came with this guide and write it to your printer

Mount the Thermistor Driver and SSR to your printer and route your wires accordingly



NOTE: Make sure that you have routed the thermistor wire from the bed so that you have full movement of the bed without any binding or snagging of the bed or the wire

At this point I recommend power cycling your printer and then plugging up the keenovo controller and then setting the temp to the Keenovo controller to 150c or as high as it will go up to 150.

The bed will not begin to heat until you set it from the LCD or tell it via Gcode commands.

You may notice that the temp reported by the printer is about 5-8c off from what is reported by the keenovo controller. I have verified this after doing 3 machines its always this way. The printer

will have the more accurate temp reading.

I do recommend leaving on the whole heating pad ON, Both Zones.

You can use it in zones but I tend to forget to turn on the other area if i'm doing a big print so I leave it on all the time.

At this point you need to setup your z-offset again and rerun your UBL (because of the firmware update)

You will have to edit your printer profile and add the bed heater to it.

In S3D its very easy :

Goto Edit Process Settings, then click on the Temperature tab

Once there click Add Temperature Controller and give it a name "BED"

This is how mine is setup up:

