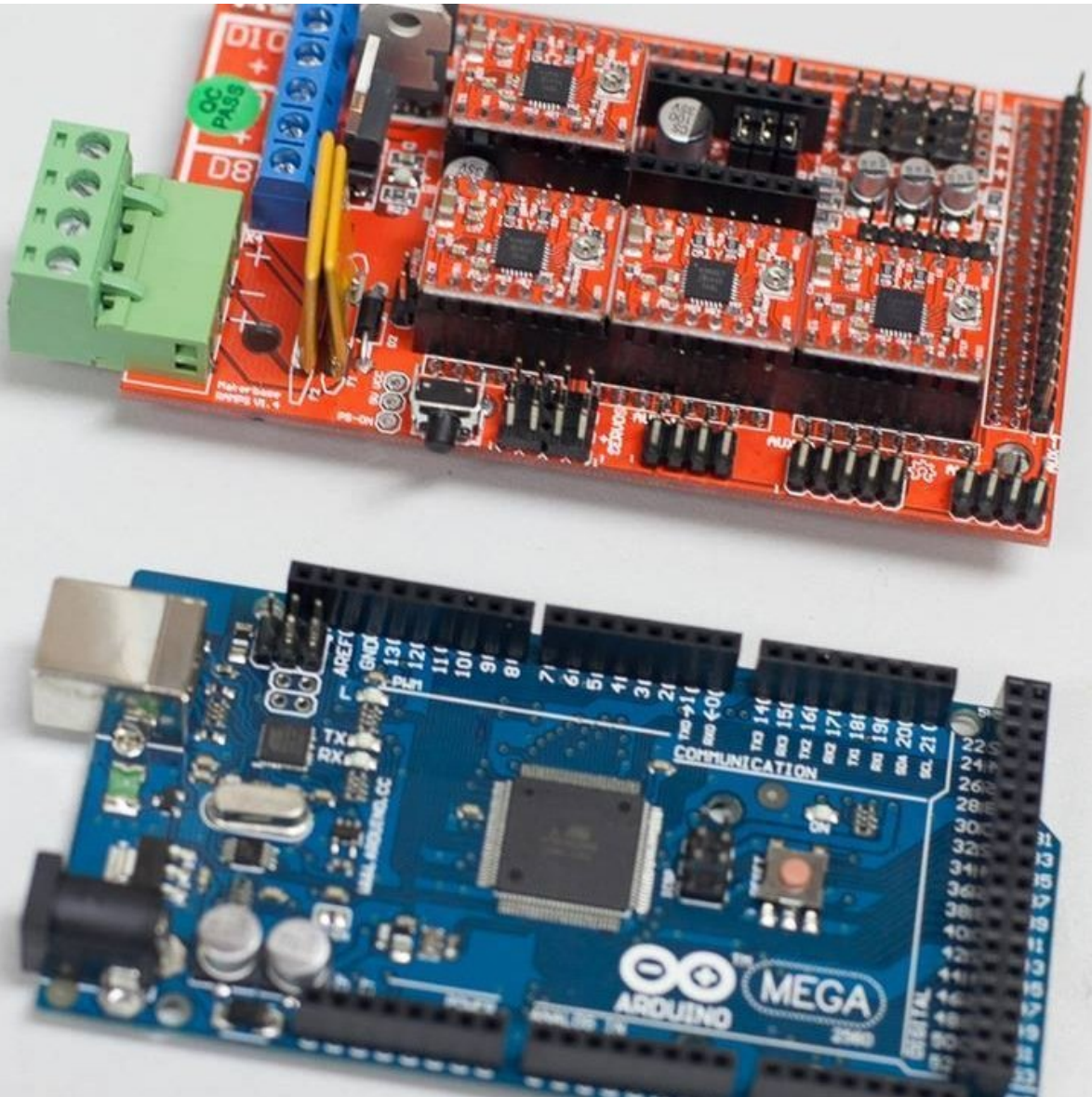


# HKBay.com

## K – Wiring and Electronics

Written By: HKBay





## TOOLS:

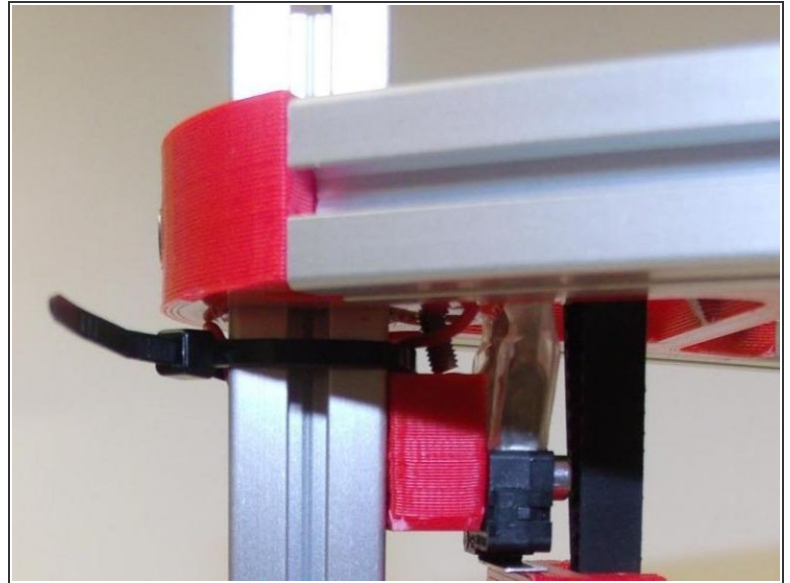
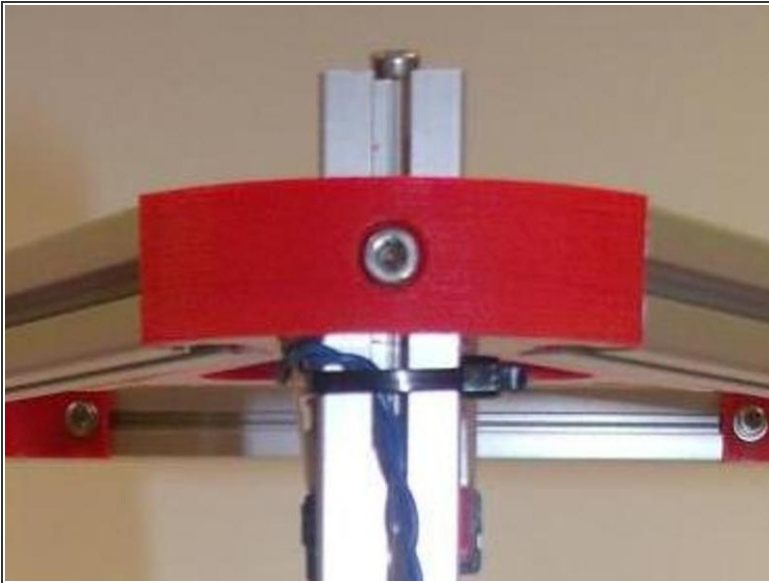
- [Hex key; ball ended, long arm, 2.5mm](#) (1)



## PARTS:

- [Arduino Mega \(blue\)](#) (1)
- [RAMPS board \(red\)](#) (1)
- [glass tabs](#) (3)
- [retractor](#) (1)
- [M3x8 screws](#) (4)
- [t-slot nuts](#) (4)
- [LCD Display assembly](#) (1)
- [LCD ribbon cable \(already in the base\)](#) (2)
- [LCD frame](#) (1)
- [LCD holder](#) (2)
- [M3x16 screws](#) (4)

## Step 1 — Secure endstop cables



- Route the endstop cables around the towers and into the channel on the outer or side face of each tower. Make sure you don't accidentally break the soldering points! Zip-tie in place.
- Tighten the X, Y and Z endstop cables and zip-tie at the bottom of the towers.
- ① Optional: If you want, you can later print these cable holders:  
<http://www.thingiverse.com/thing:655787>

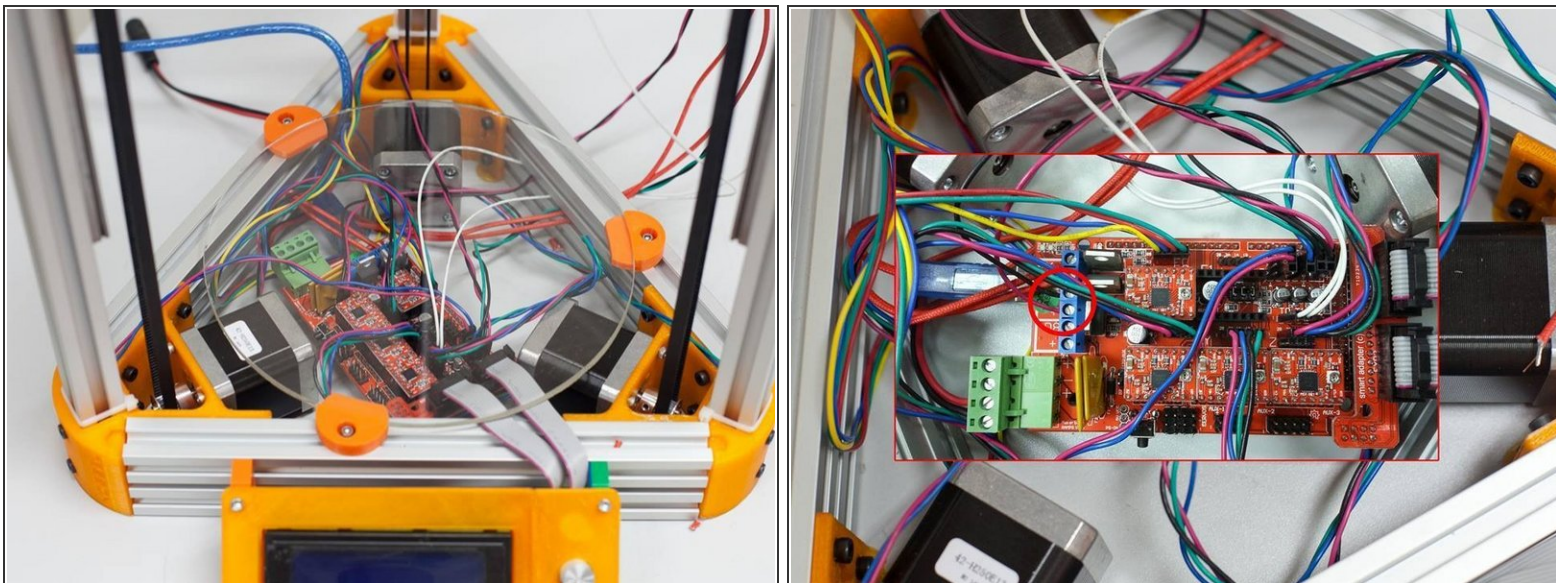
## Step 2 — Fit Glass tabs and Z-probe retractor



- Before routing the cables the rest of the way to the electronics, you need to fit the printed support tabs for the glass print-bed and the Z-probe retractor.
- Fit the 3 glass tabs and retractor loosely to the base.
- ⓘ Retractor should be on the left of the Z tower.
- ⓘ Do not yet tighten; you will measure this exactly later!



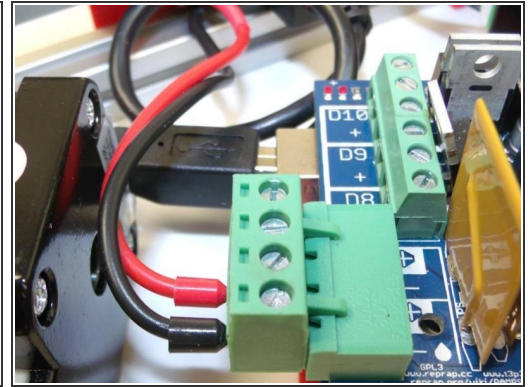
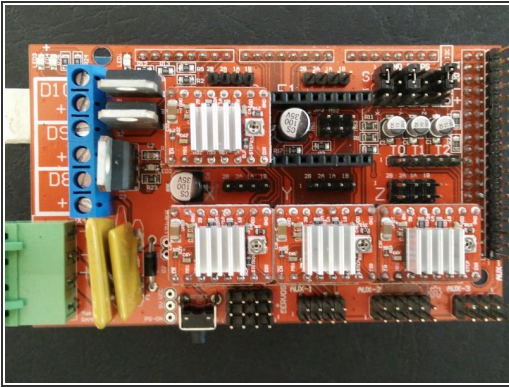
### Step 3 — Hot-end wiring, spool holder and LCD screen



- Zip-tie the cables and PTFE tube from the effector at equal intervals and route them to the RAMPS board in the bottom frame.
- Zip-tie the extruder/hot-end/endstop cables at the base of the Z-tower and divide the cables, routing the fan, Z-probe, thermistor and Z-endstop cables along the Y-Z channel and the motor and hot-end resistor cables along the X-Z channel - these can only go as far as the Z-probe retractor. Zip-tie in place and route into the base of the printer.
- Fit spool holder to the top frame between Y and Z tower.
- Connect the two flat cables with the LCD screen and assemble the screen, frame and the two LCD panel holders with the help of 4 M3x16 screws.

**⚠ Note which of the cables is EXP1 and which is EXP2!**

## Step 4 — Electronics installation



**i** Make sure you take precautions not to build up electrostatic charge while handling the electronics

- Check if there are 3 jumpers under each of the motor shields, and then carefully fit the 4 motor shields onto the X, Y, Z and E0 sockets on the RAMPS. E1 Socket remains empty.

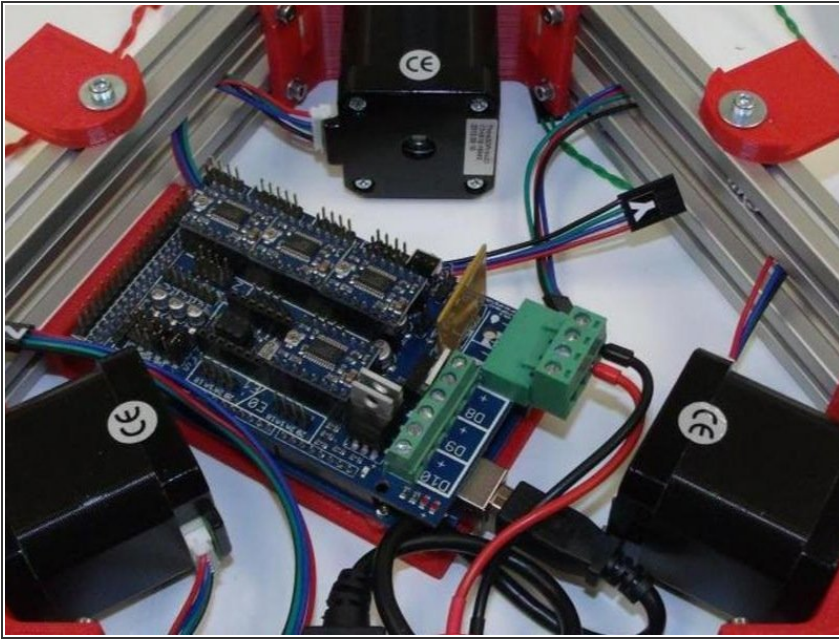
**!** Make sure the small silver potentiometer face **AWAY** from the green power connector of the RAMPS! Also make sure that all the pins are properly aligned with the RAMPS sockets.

- Add the cooler grills to the motor shield ICs.
- Now connect the RAMPS with the Arduino Mega, checking that all the mating pins are properly aligned. Push down firmly and progressively to seat it fully.
- Screw the power cable into the RAMPS.

**!** Note the polarization! Red cable goes into (+) and black cable goes into (-) connector of the RAMPS board.

- Plug the USB cable into the USB socket on the Arduino Mega.

## Step 5 — Motor wiring

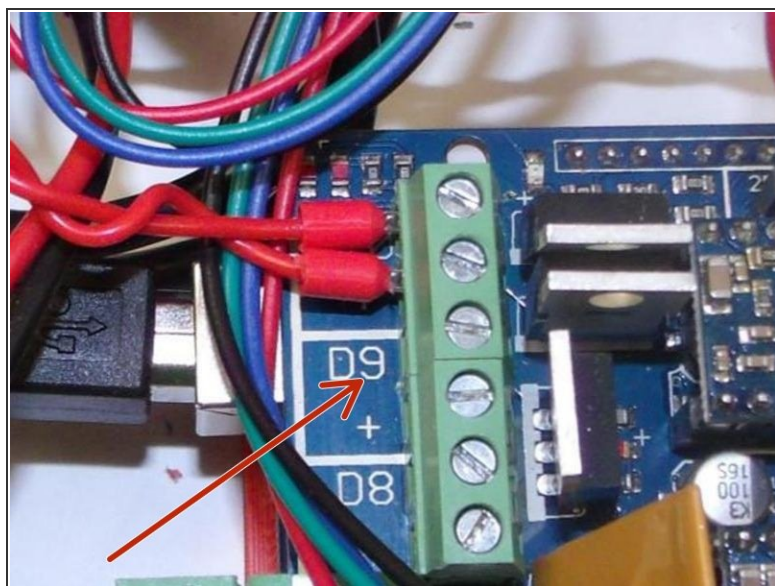
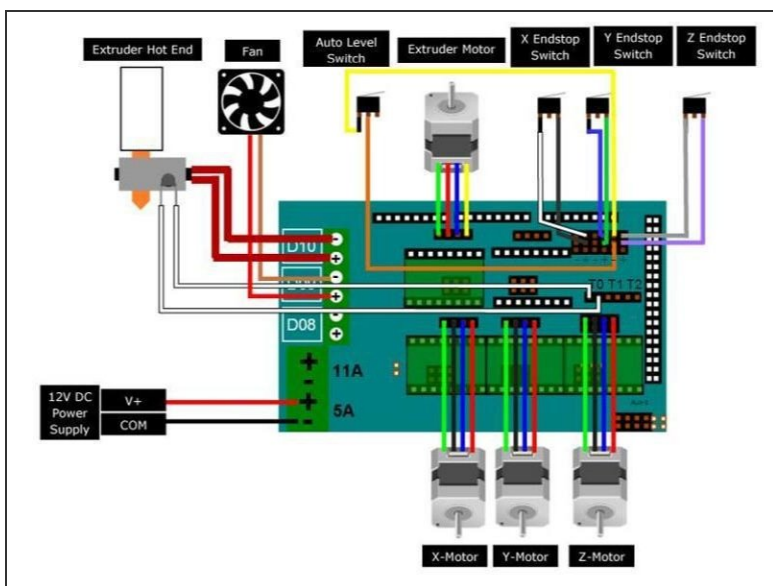


- Fit the motor cables from the X, Y Z and extruder motors, ensuring the correct cables match the right pins next to the X, Y, Z and E0 Shields. For the Z-connector, there are two sets of pins; use either one.

⚠ The GREEN motor cables needs to face TOWARDS the green power plug on the RAMPS!



## Step 6 — RAMPS wiring

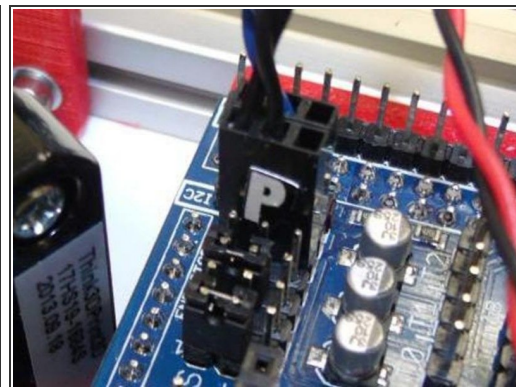
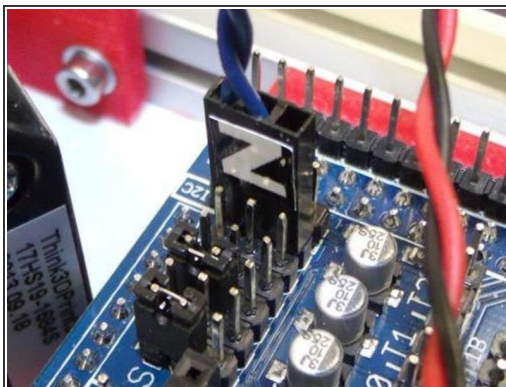
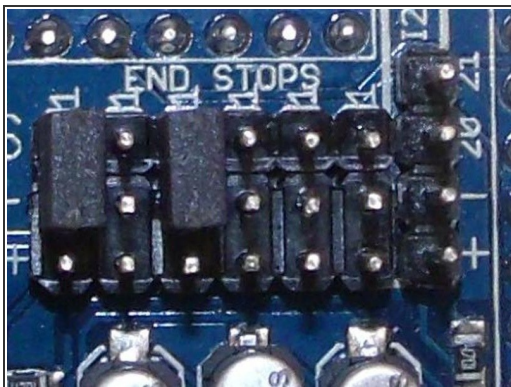


- Bring all the loose wires together around the RAMPS board.
- ❗ If in any doubt about the wiring, consult the official RAMPS wiring instructions and diagram shown opposite. The diagram is from [http://reprap.org/wiki/RAMPS\\_1.4#Pre-Fl...](http://reprap.org/wiki/RAMPS_1.4#Pre-Fl...) (click on the wiring diagram at that link to enlarge).
- ❗ Note that the diagram is for a conventional printer, not a Delta, so shows 2 Z-motors. It also shows a second extruder and a heated print-bed - just ignore these.
- Connect the hot-end fan to the D9 connector on the RAMPS.

⚠ Check for the correct polarization; red cable goes into (+), brown cable into (-)!

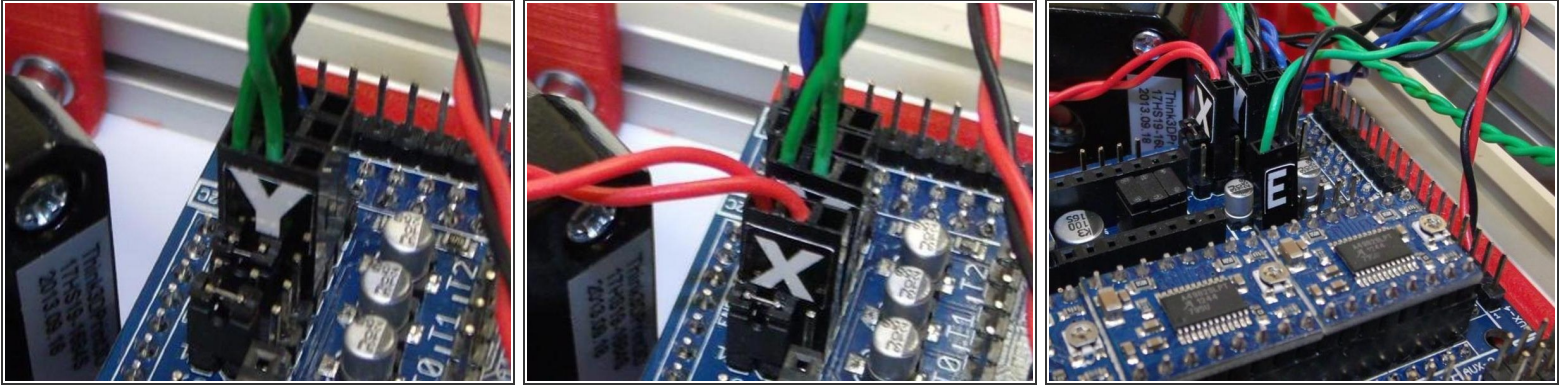


## Step 7 — Connect End-Stops



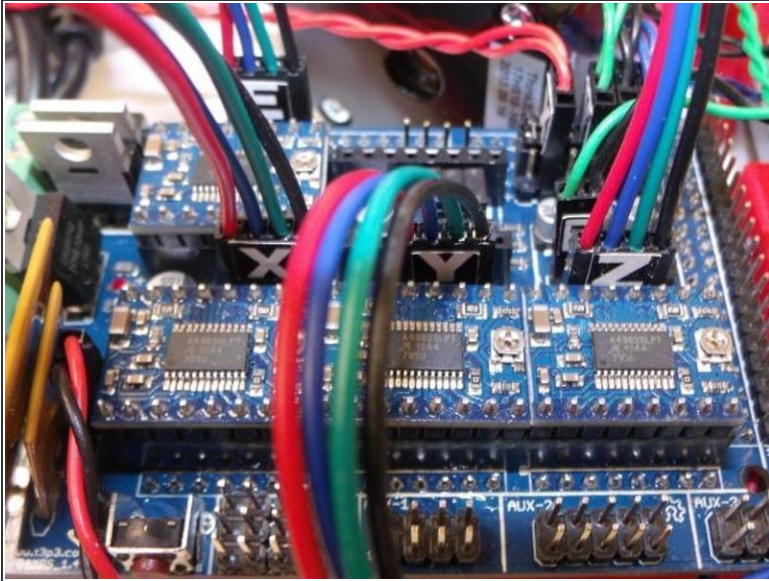
- Next connect the endstops. The RAMPS board has 6 three-pin headers labeled ENDSTOPS at the top right corner of the board next to the 4-pin I2C header, which is not used. The endstop headers are, from left to right: X-min, X-max, Y-min, Y-max, Z-min and Z-max.
- ⓘ Only the outer (S) and centre pin (-) of each 3-pin header are used with mechanical endstops. As the Kossel has maximum endstops only, the X-min and Y-min endstops are not used. The Z-min position is used for the Z-probe.
- ⓘ The jumpers on the picture are not needed.
- Begin with the Z-endstop on row 6 (Z-max), as shown.
- ⚠ If I2C header is present on your RAMPS, be careful NOT to put it on the 4-pin I2C header by mistake!
- Next the Z-Probe on row 5 (Z-min)

## Step 8 — Connect End-Stops (continued)



- Followed by the Y-endstop on row 4 (Y-max)
- Leave row 3 (Y-min) empty and finish with the X-endstop on row 2 (X-max).
- Connect the hot-end thermistor cable (white) to the first pair of thermistor pins labeled T0.

## Step 9 — Connect End-Stops (continued)



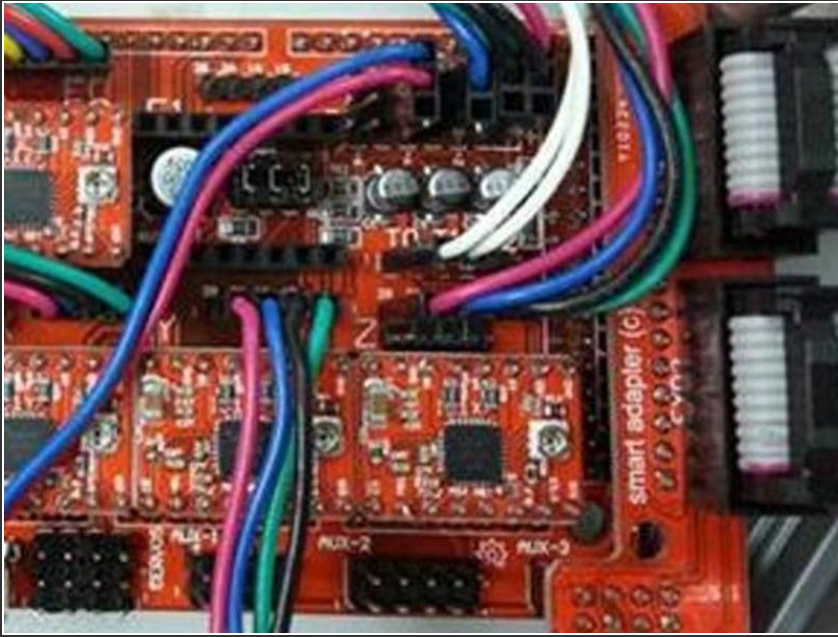
- If not already done in the step above, connect the X, Y, Z, and E motors as shown. There are 2 rows of pins for Z- you can use the either one.

**⚠ Unlike shown on the picture, the green cables from the four motors need to face TOWARDS the green power plug!**

- Connect the hot-end to the + and- pins Marked D10 on the RAMPS board.
- i** The hot-end wires are not polarized.



## Step 10 — Connect LCD Board



- Fit the LCD controller ribbon cables to the connector board and the board to AUX3 and AUX4 on the RAMPS board.

- ⚠ **Make sure EXP1 und EXP2 go into their respective connectors!**
- ★ This concludes the basic wiring. You can tidy it up later, after commissioning, once it is all confirmed as working.