STEPPER MOTOR, CONFIG, TS, AND SETUP

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***** THIS INFORMATION CAN ALSO BE USED TO DIAGNOSE ISSUES WITH STEPPER MOVEMENT TO DETERMINE WHETHER OR NOT THERE IS AN ISSUE WITH THE MOTOR OR SOMETHING ELSE *****

4 LEAD WIRING DIAG.

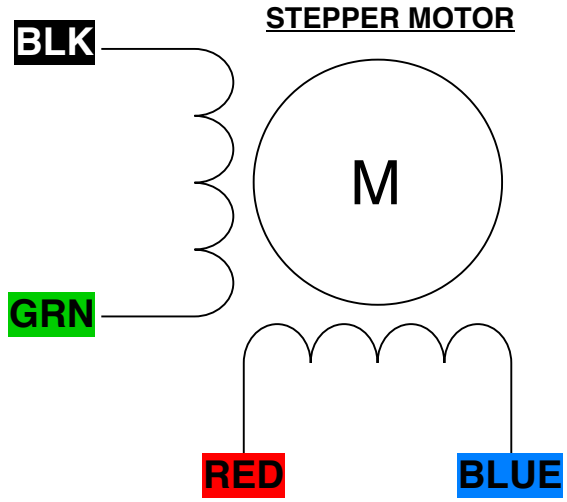
This is a detail mapping of the ender 3 motors and how to replace them with other know and unknown stepper motors.

MOTOR INFO CAN BE FOUND ON THE CREALITY GITHUB FOUND HERE:

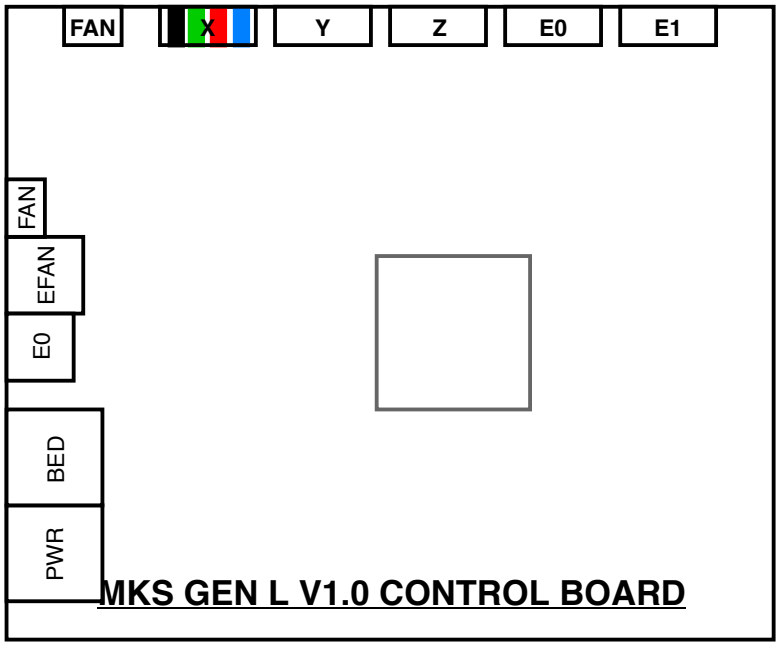
https://gist.github.com/knoopx/e6c40a009e796203b93a75a3ed6a5ab8

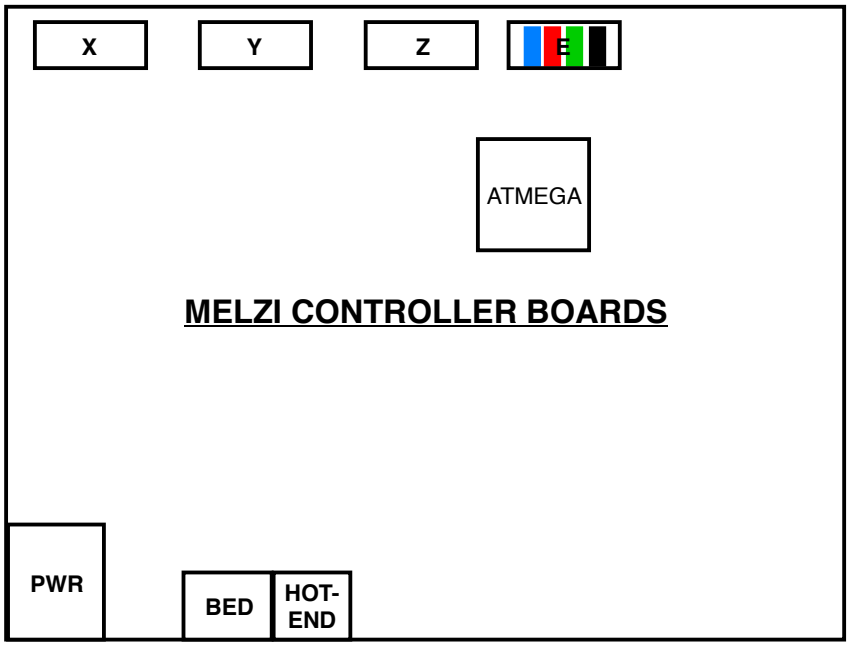
Motor pinout

So most have notice there are 4 wires coming from most it not all motors for FDM machines. But you notice they use 6 pin connectors with 4 wires. Generally these are color coded for easy identification, BUT the Ender 3 uses all black wires from a wire ribbon. So how do we know what wires are what. Here we will demonstrate that

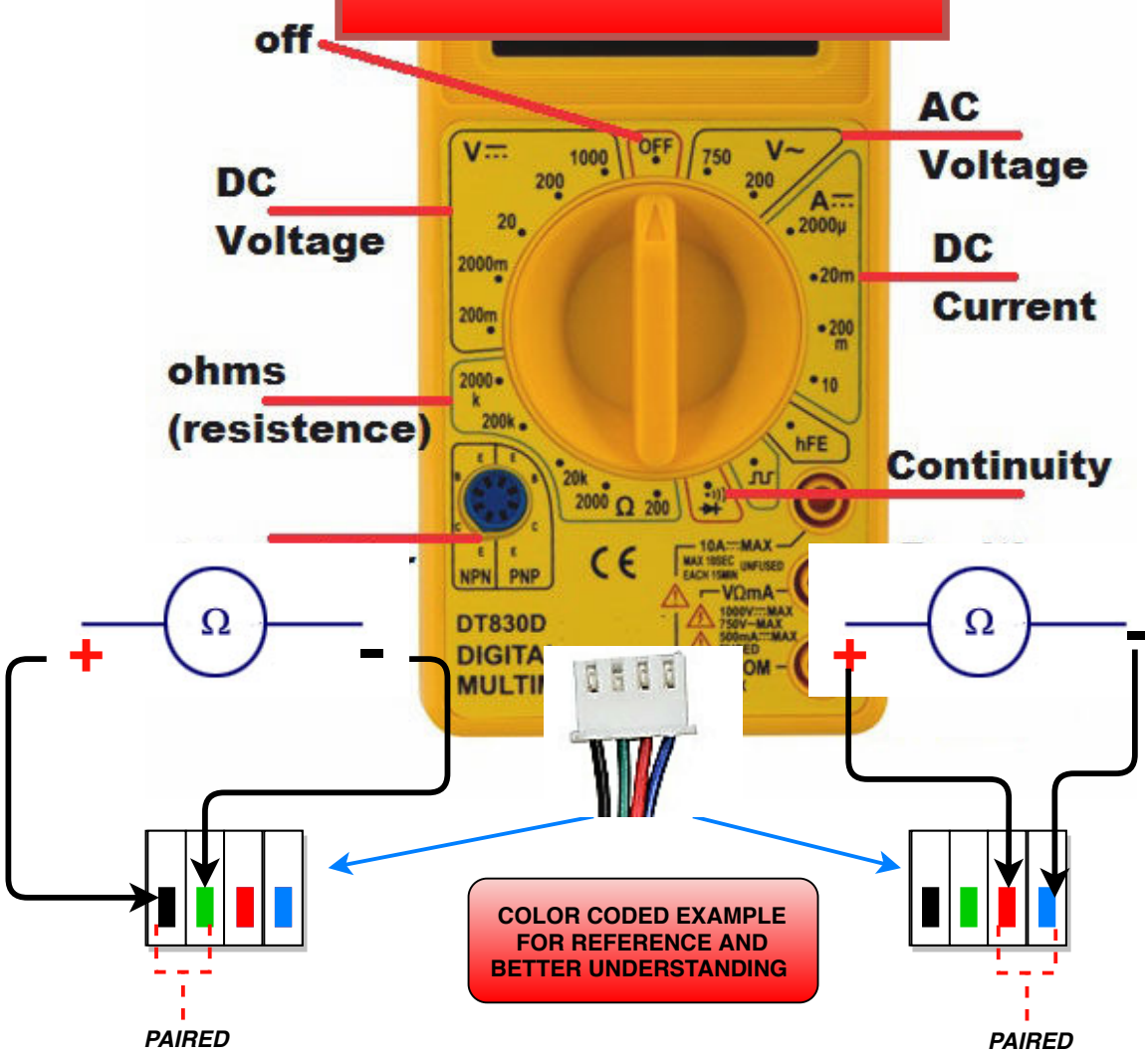


ON THE STOCK MELZI AND THE MKS GEN L THE WIRE COLORING ORDER *(I NAME THESE BOARDS AS THESE ARE WHAT I CURRENTLY USE, BUT IM SURE WHAT WE WILL BE REFERENCING IS THE SAME FOR ALL MOTOR PINS)*





Your preferred meter may differ slightly or significantly from the example



COLOR CODED EXAMPLE FOR REFERENCE AND BETTER UNDERSTANDING

PWR DOWN AND REMOVE PWR CABLE FROM PSU, THEN TURN ON THE PSU WILL IT IS DISCONNECTED TO FULLY DISCHARGE THE COMPONENTS OF THE MACHINE FULLY (WAIT 10 SECS).

SO SINCE THE WIRING ON THE ENDER 3 IS ALL BLACK RIBBON CABLE WE NEED TO IDENTIFY OR WIRING WITH A MULTIMETER.

TO DO THIS WE NEED TO:

1. CHANGE OUR METER TO TEST FOR OHMS. TURN YOUR SELECTOR TO THE SELECTION FOR 20K ohms

2. TAKE THE END OF THE CABLING (THE END CONNECTED TO THE CONTROL BOARD) AND REMOVE IT FROM THE BOARD

3. TAKE EITHER LEAD (DOES NOT MATTER EITHER + OR -) ON THE MULTIMETER AND PLACE IT ON ANY LEAD ON THE BACKSIDE OF THE FITTING FOR YOU STEPPER CABLE (THE SIDE THAT EXPOSES THE RELEASE CLIPS FOR THE WIRING)

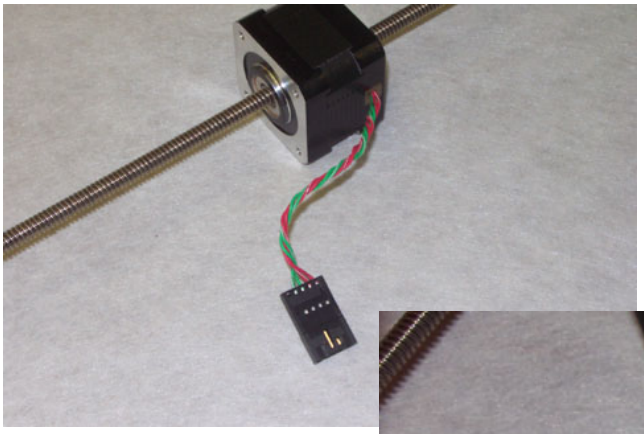
4.TAKE THE OTHER LEAD AND PLACE IT ON ANY OF THE 3 WIRES IN THE FITTING. MOVE FROM WIRE TO WIRE UNTIL YOU RECEIVE A READING OF RESISTANCE ON THE METER. THIS INDICATES THOSE 2 WIRES ARE ON THE SAME COIL.

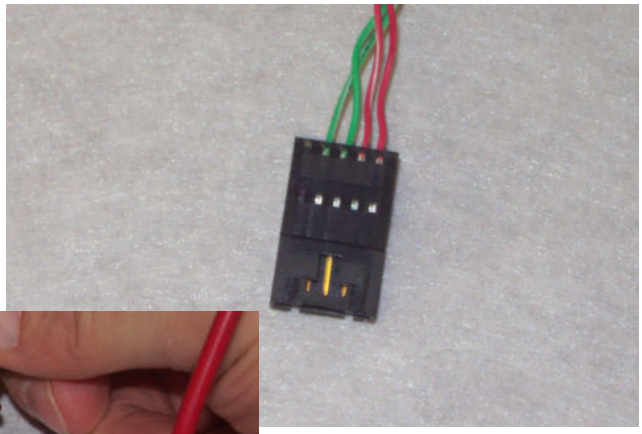
5. ONCE YOU HAVE FOUND ONE PAIR, YOU DON'T HAVE TO CHECK THE OTHER 2 WIRES, BUT I DO SO TO ENSURE EVERYTHING IS CONNECTED WITHIN THE MOTOR (AT LEAST ON A RESISTANCE LEVEL AND WE HAVE CONTINUITY ON OUR COILS FROM ONE END TO THE NEXT).

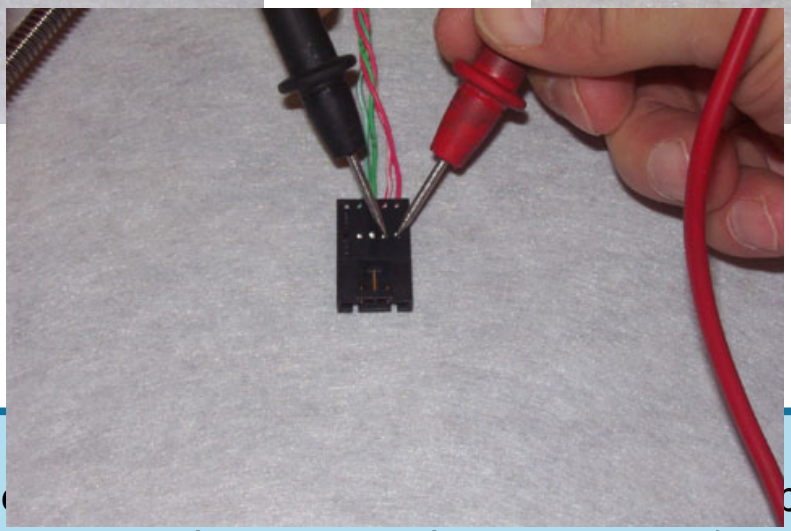
6. *(FOR THOSE THAT WISH TO FOLLOW THROUGH AND CHECK ALL WIRING)* NEXT I REPEAT STEPS 3 & 4

7. WRITE DOWN THE WIRES THAT ARE PAIRED (EX. 1 & 2 / 3 & 4 - FROM LEFT TO RIGHT WHEN LOOKING AT THE BACK OF THE CONNECTOR)

BELOW IS AN ACTUAL VISUAL OF CHECKING THE RESISTANCE OF A MOTOR





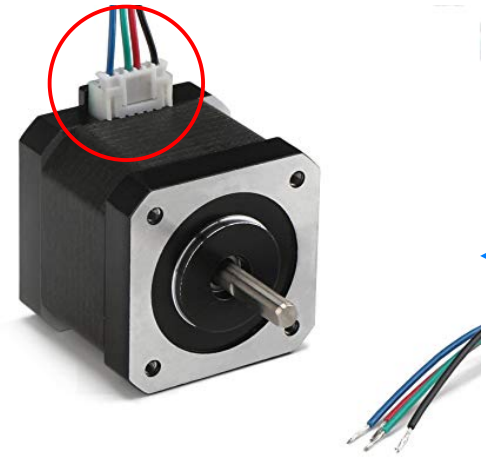


Resistance in th phases. To measure the resistance, disconnect the motor at the connectors (see Figure 1). There are four wires to each motor. Starting from either side, the first two wires are one phase and the remaining two wires are the second phase. At the connector, you can see tabs where the pins are (see Figure 2 and Figure 3). These can be used to measure the resistance. Each motor, regardless of the connector, can be measured this way.

IMPORTANT: Set the multimeter to the ohm scale and zero it out by touching the two leads together and pressing the appropriate button to zero your meter (see your meter instruction manual on how to do this). If you do not know how to zero your meter, take note of the resistance measured when the two leads are touched together and subtract that from the actual measurement. This gives you the true resistance measurement.

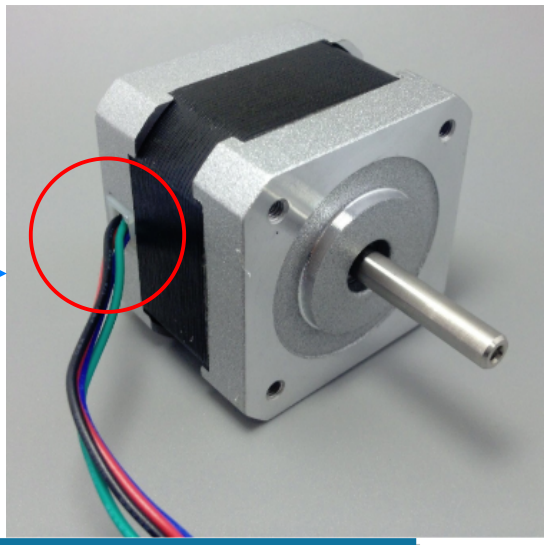
A low measurement indicates the motor has a shorted winding. A high measurement indicates the motor has an open winding. In either case, the motor should be replaced.

NOW TO IDENTIFY THEM ON THE MOTOR SIDE, THIS CAN VARY DEPENDING ON THE MOTOR AND MANUFACTURER. SOME COME WITH A 6-PIN CONNECTOR AND SOME ARE HARDWIRED. WE WILL GO OVER BOTH OF THESE TO DEMONSTRATE BOTH TYPES.

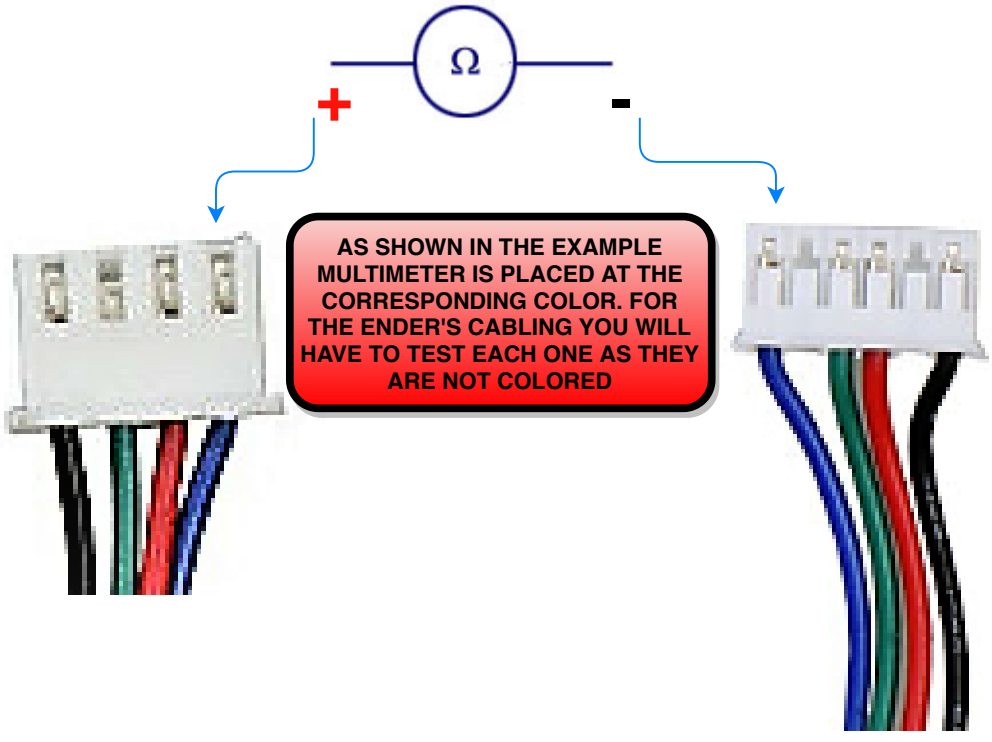


WITH REMOVABLE WIRES

WITH HARDWIRED WIRES



SO THERE IS NOT MUCH TO TEST WITH THE HARD WIRED CONNECTION, AS WE DETERMINED THE CONTINUITY FROM THE CABLE FITTINGS ON THE OTHER END. I FEEL IT IS BEST PRACTICE THOUGH, WITH THE REMOVABLE CONNECTOR TO TEST THE LEADS FROM ONE END TO THE OTHER, OF THE TO ENSURE THEY ARE WIRED IN THE *(FOR NOW WE WILL CALL THIS THE STANDARD)* STANDARD WAY. WHICH CAN BE SEEN ON THE ABOVE LEFT PHOTO.



AS SHOWN IN THE EXAMPLE MULTIMETER IS PLACED AT THE CORRESPONDING COLOR. FOR THE ENDER'S CABLING YOU WILL HAVE TO TEST EACH ONE AS THEY ARE NOT COLORED

AFTER ALL IS CONNECTIONS ARE TESTED AND VERIFIED FOR RESISTANCE AND MATCHED ACCORDINGLY, I JUST CONNECT THE REPLACEMENT MOTOR TO THE CONTROLLER BOARD AND THEN POWER ON THE MACHINE.

THROUGH THE CONTROL PANEL (DISPLAY) MOVE THE INDIVIDUAL AXIS IN ALL DIRECTIONS IT CAN MOVE. I.E. (Z AXIS) UP AND DOWN, (X AXIS) LEFT AND RIGHT, OR (Y AXIS) BACK AND FORTH.

I SUGGEST PLACING IN THE SLOT FOR THE AXIS YOU PLAN ON REPLACING THE MOTOR ON.

1. PLACE A PIECE OF TAPE ON THE MOTORS SHAFT SO THAT IT RESEMBLES A FLAG IN A WAY.

2. THEN OPERATE THE MOTOR VIA CONTROL PANEL, AS PREVIOUSLY STATED. AND WATCH FOR THE SHAFT TO SPIN. IT SHOULD MOVE JUST AS IF IT WAS INSTALLED IN THE PRINTER.

3. IF THERE IS NO OPERATION, OR ITS MOVEMENTS ARE HECTIC, YOU MAY HAVE A BAD MOTOR OR YOU INCORRECTLY WIRED THE MOTOR. IN WHICH CASE PLEASE REFER BACK TO THE BEGINNING OF THIS GUIDE AND DOUBLE CHECK YOUR MOTORS CABLING OR THE CONNECTORS ON THE BOARD SIDE.

AFTER COMPLETING ALL PREVIOUS STEPS AND THE MOTOR WORKS PROPERLY (WIRED CORRECTLY AND MOVING) YOU CAN INSTALL THE MOTOR(S) AT YOUR OWN LEISURE AND THEY ARE NOW READY AND ARE SET UP AS DROP-IN REPLACEMENTS FOR YOUR MACHINE.

LASTLY MAKE SURE TO ADJUST THE VREF FOR YOUR STEPPER DRIVERS, RESPECTIVELY FOR THE MAX AMPS ALLOWED FOR THE MOTOR, ALSO ENSURING YOU DO NOT OVER VOLT THE DRIVERS

MORE INFORMATION REGARDING DIFFERENT MOTORS WITH SPECIFIC MODEL NUMBERS, SOME WITH DATASHEETS SOME WITHOUT. ONCE TESTED THE IN INFORMATION WITH PICTURES WILL BE ADDED. ALSO ONCE THE LIST IS COMPILED IF OTHERS HAVE INFO REGARDING MODELS NOT ON THE LIST PLEASE FEEL FREE TO SEND ME A MESSAGE ON THINGVERSE