

Stepper motors trouble ?

1

The Steppers motors use in small CNC

See the QR code video



In summary have 3 kind of steppers motors

- Permanent magnet stepper -----> simple and cheap but not high resolution
- Variable reluctance stepper -----> can turn quickly but can't keep position
- Hybrid synchronous stepper -----> Mix of permanent and reluctance stepper motors
Not expensive, high resolution, good torque and speed

Almost all steppers motors sale and use now are Hybrid steppers motors
The steppers motors use in small CNC, 3D Printers and small robots are Hybrid steppers motors

Hybrid steppers motors



Unipolar

The electronic to control unipolar stepper motor is simple

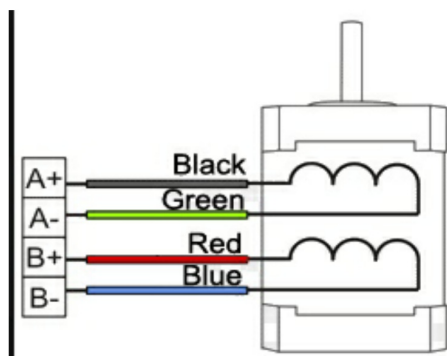
Bipolar

Electronic control need a little more complicate, but for the same weight bipolar have more power

Now with improvement of electronic, specialy microcontroler, drive bipolar hybrid steppers motors is easy

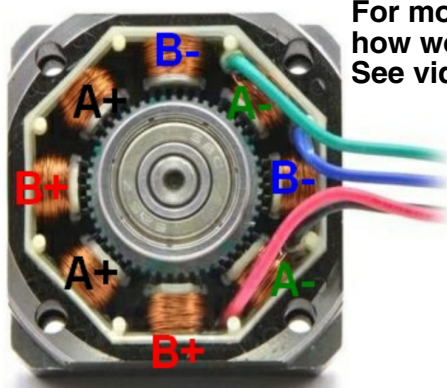
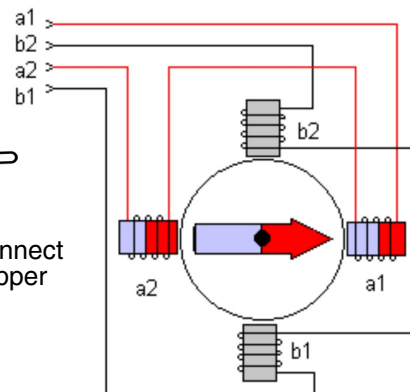
So the steppers motors use actualy for small CNC are Hybrid and Bipolar

Be carefull don't use steppers motors with high inductance, for machine move quickly like CNC need low inductance more information in official wiki of smoothieboard "choosing stepper motors" section
<http://smoothieware.org/stepper-motors>

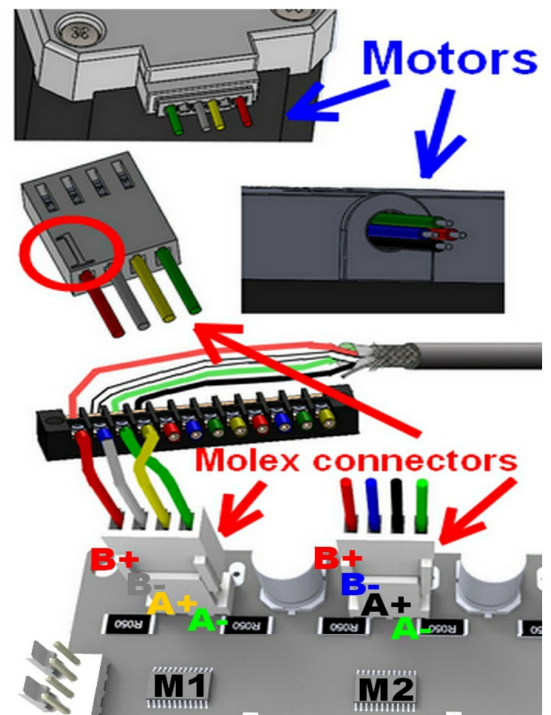


General electric schema of bipolar stepper motor

Color usually used to connect the 4 coils of bipolar stepper motor



For more information about how works bipolar stepper motor
See video behind this QR Code



2

Wires colors of steppers motors

Many, many bipolar steppers motors have for colors
- Red, blue, green, black

But don't have rules sometimes it's (Red, grey, green, yellow)

One rule you can respect :

Put the red wire first and if have "1" write in a connector connect the red wire.

3 When wire of stepper motor is disconnect or invert

When a machining start :

- 1 - The microcontroller read Gcode in Sd-Card
- 2 - The microcontroller create step in 3.3v for the stepper driver of correct motor
- 3 - The stepper driver create step in 24V for the correct coils of motor

This exemple is for small CNC use internal stepper drivers inside smoothieboard.

The limit of current for internal steppers motors of smoothieboard is

- 1.5A without cooling fan
- 2A with cooling fan

People need more power can use external drivers outside smoothieboard

For more information about external stepper driver with smoothieboard see the official wiki of smoothieboard project

<http://smoothieware.org/general-appendixes#external-drivers>

When a wire is disconnect, can be disconnect :

- in the connectors (1)
- in terminal block (2 ; 4 ; 5)



Be carefull !!

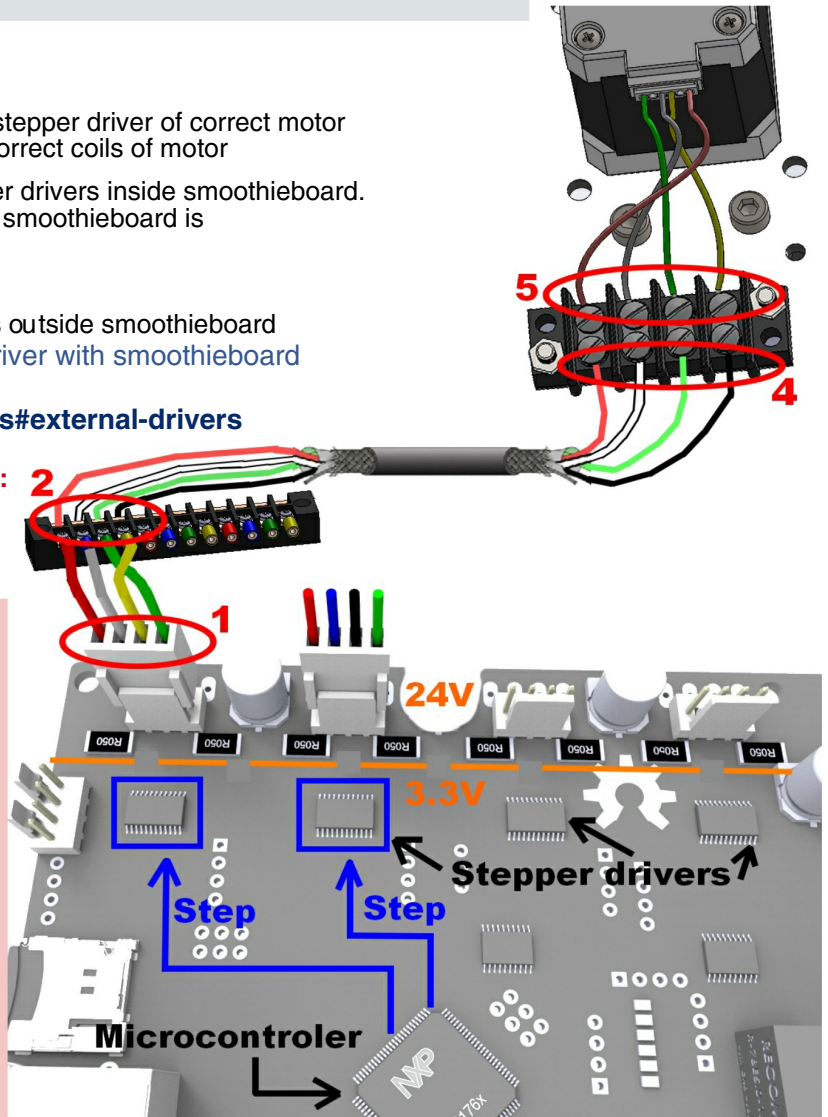
Before connect or disconnect wire for steppers motors, cut the 24V power
If you don't do this, have risk of damage smoothieboard

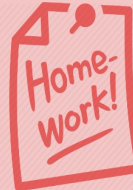
1) Disconnect, one wire of X axis stepper motor, where you want have 5 possibilities

Try to move the X axis whis pronterface and create a short movie of what happend with your phone.

Send your short movie by e-mail to makerslide-machines@gmail.com.

Turn off 24V power and connect the wire to overcome the problem





2) Now invert some wire for X axis

- The red with the bluewhat happen ?
- The black with the greenwhat happen ?
- The red with the black what happen ?

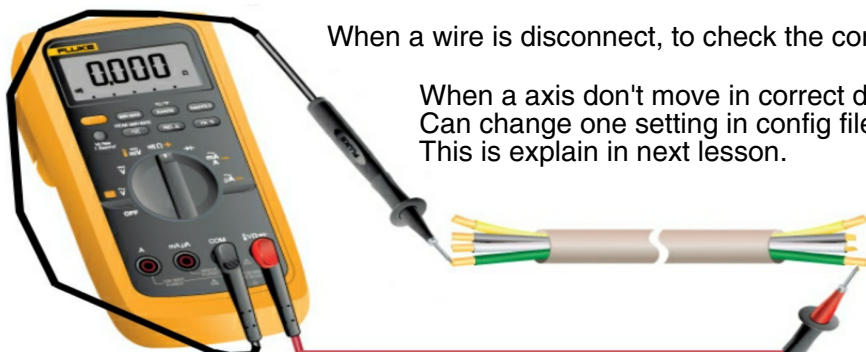
Send the result of your experiences by e-mail to makerslide-machines@gmail.com.

3) See the wires of the two Y axis motor

You can see for one motor the 2 last wire are invert, it's not same between the two motor.

Try to gest why ? if you don't gest do experience with their wire of two Y motors

Send your explain by e-mail to makerslide-machines@gmail.com.



When a wire is disconnect, to check the continuity can use mutimeter

When a axis don't move in correct direction, no need to invert some wire
Can change one setting in config file of SD card.
This is explain in next lesson.