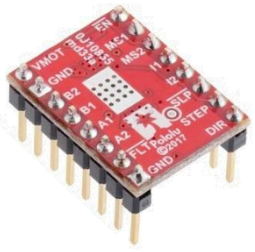
Pololu MP6500 Motor Driver



Specs

Motor Voltage: 7-30V
Logic Voltage: 2.1-6V
Current Limiting: 0-2A (1.5A Continuous, 2A with heatsink)
Micro-stepping: Full – 1/8th step

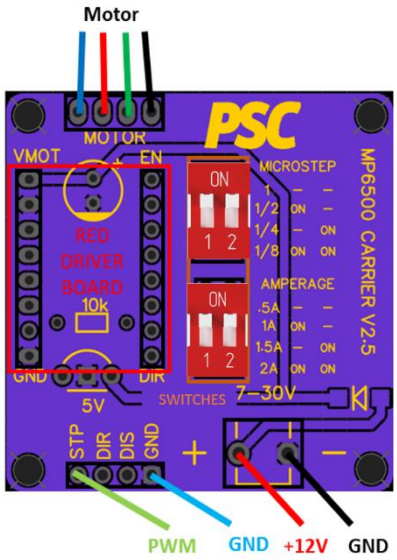
Basic Operation

To use this motor driver, you will need a stepper motor, a DC power supply, and a PWM signal. If you are using a microcontroller (or Arduino), recognize that neither of these can supply enough current to run a stepper motor, and you will need an additional power source.

A stepper motor has a set number of "steps" per full rotation. A common motor has 200 steps per rotation. Therefore, each step is 1/200th of a full rotation. When more precision is needed, micro-stepping can be used, where a stepper motor will move by 1/2th, 1/4th, or 1/8th of a step (1/400th, 1/800th, or 1/1600th of a full rotation) instead of a full step.

The motor speed is proportional to the frequency of the signal on the STEP pin. The motor will make one "step" for every "high" pulse it receives. When using a PWM signal on the STEP pin, set the duty cycle to 50% and vary the frequency of the signal to control the motor speed. For example, if the frequency of the PWM is 200Hz and your motor has 200 steps per rotation, then the motor will move 1 step every 1/200th of a second, or 1 full revolution per second (with micro-stepping, the motor will take 1/2th, 1/4th, or 1/8th of a step as explained above per pulse, and will completely rotate every 2, 4, and 8 seconds respectively).

MP6500 Carrier Board



The PSC also provides carrier boards for the MP6500 stepper motor driver. These carrier boards make it easier to use the motor driver and help protect it.

- To use, insert the red driver board. Make sure that the markings on the driver board pins align with the markings on the carrier board
- Use four switches on the pins in the orange box to control micro-stepping and current regulation, as shown in the tables below.
- Connect motor, power supply, PWM and GND as shown
- A high or low signal to the DIR pin will change motor direction
- A high signal to the DIS pin will disable the motor

Note: The carrier board uses a voltage regulator to step down the applied input voltage to 5V for the SLEEP and other logic control pins. To keep the voltage on these pins between 2.5 and 5V, you must keep the supplied input voltage to the carrier board between 7-30V.

Micro-stepping

To select the step size, flip switches according to the following table.

1	2	Microstep Resolution
-	-	Full Step
ON	-	Half (1/2) Step
-	ON	Quarter (1/4) Step
ON	ON	Eight (1/8) Step

Current Regulation

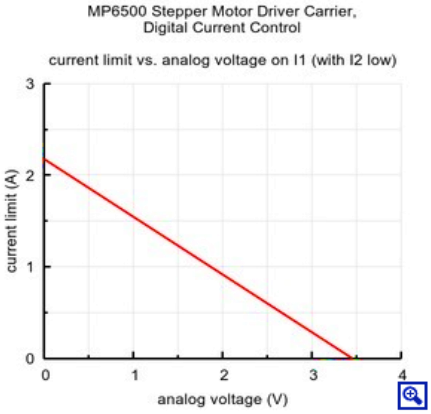
Do not exceed the current limit of your motor. Flip switches according to the following table.

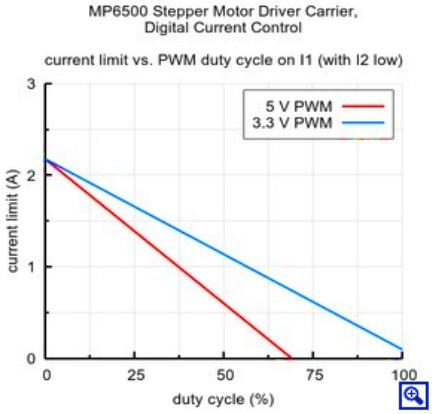
1	2	Amperage
-	-	0.5 A
ON	-	1 A
-	ON	1.5 A
ON	ON	2 A

('-' represents OFF or 0V)

For more precise current control, turn both amperage switches to off and connect I1 to an analog or PWM signal, as indicated below.

$$A_{limit} = 2.2A - 0.63\frac{A}{V} \times (voltage\ on\ 1)$$





Tips and Tricks

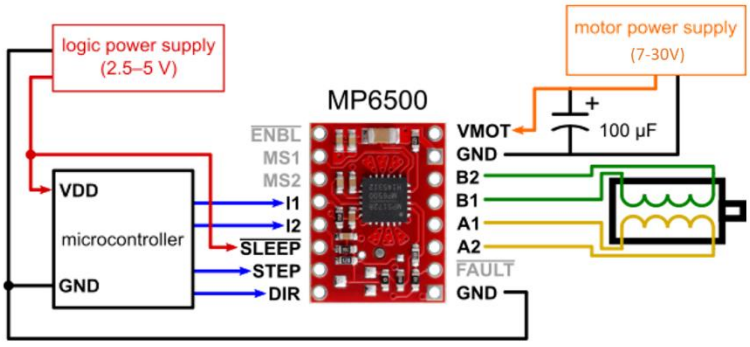
- There are some driving frequencies where these driver/motor combinations experience jitter and the motor will perform erratically. It is usually worse in full/half step than when microstepping. The charts below give approximate values for two different motors (with no load – frequency changes w/ load). If you are getting erratic movement try going slower or faster.

Model Number: SY42STH38	
Current	Jitter Range
1 A	180-220 Hz
1.5 A	120-130, 215-260 Hz
2 A	250-270 Hz

Model Number: 17HS19	
Current	Jitter Range
1 A	none
1.5 A	155-185
2 A	180-220

- Stepper motors can only ramp up so quickly. While the 17HS19 can only reach about 400 rpm from rest, it can reach almost double that speed by ramping up slowly.
- Microstepping (smaller step sizes) can help you reach higher angle resolutions, smoother operation and slightly higher speeds, albeit while sacrificing torque. Current requirements may be as much as double the rated current/phase when doing microstepping as both phases may be on at once.
- Higher input voltages also increase maximum speeds and torques.
- If you do everything according to this guide and the stepper motor will not respond at all, it is likely that your MP6500 motor driver board is fried. Bring to the PSC to test.

Wiring Diagram



For more information, come to the Project Support Center or visit the Pololu webpage.