

General Description

Driving stepper motor is common necessity in most robotic projects. A stepper motor is a brushless, synchronous electric motor that can drive a full rotation into a large number of steps. Stepper motor is ideally suited for precision control. This motor can operate in forward/reverse with controllable speed from a microcontroller through a driver circuit. There are various kinds of stepper motor. Some example are variable reluctant stepper motor, permanent magnet stepper motor, bipolar/unipolar stepper motor, bifilar stepper motor and hybrid stepper motor.

FIPSD2M step motor driver is a step and direction driver with current adjusting capability. **FIPSD2M** can drive up to 2 ampere per phase with 4 level selected phase currents from 25% to 100% via DIP switch. Full-step, half-step resolution is also switch selectable.

This drive is compatible with any micro-based control system.

Figure 1. FIPSD2M Driver Board

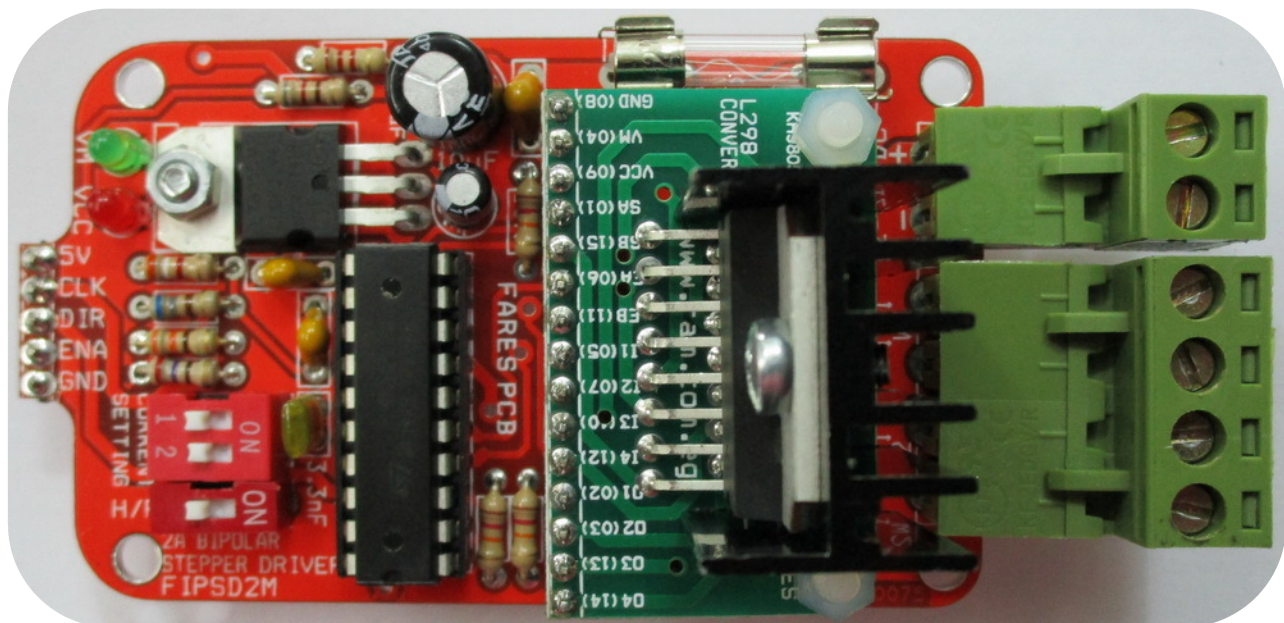
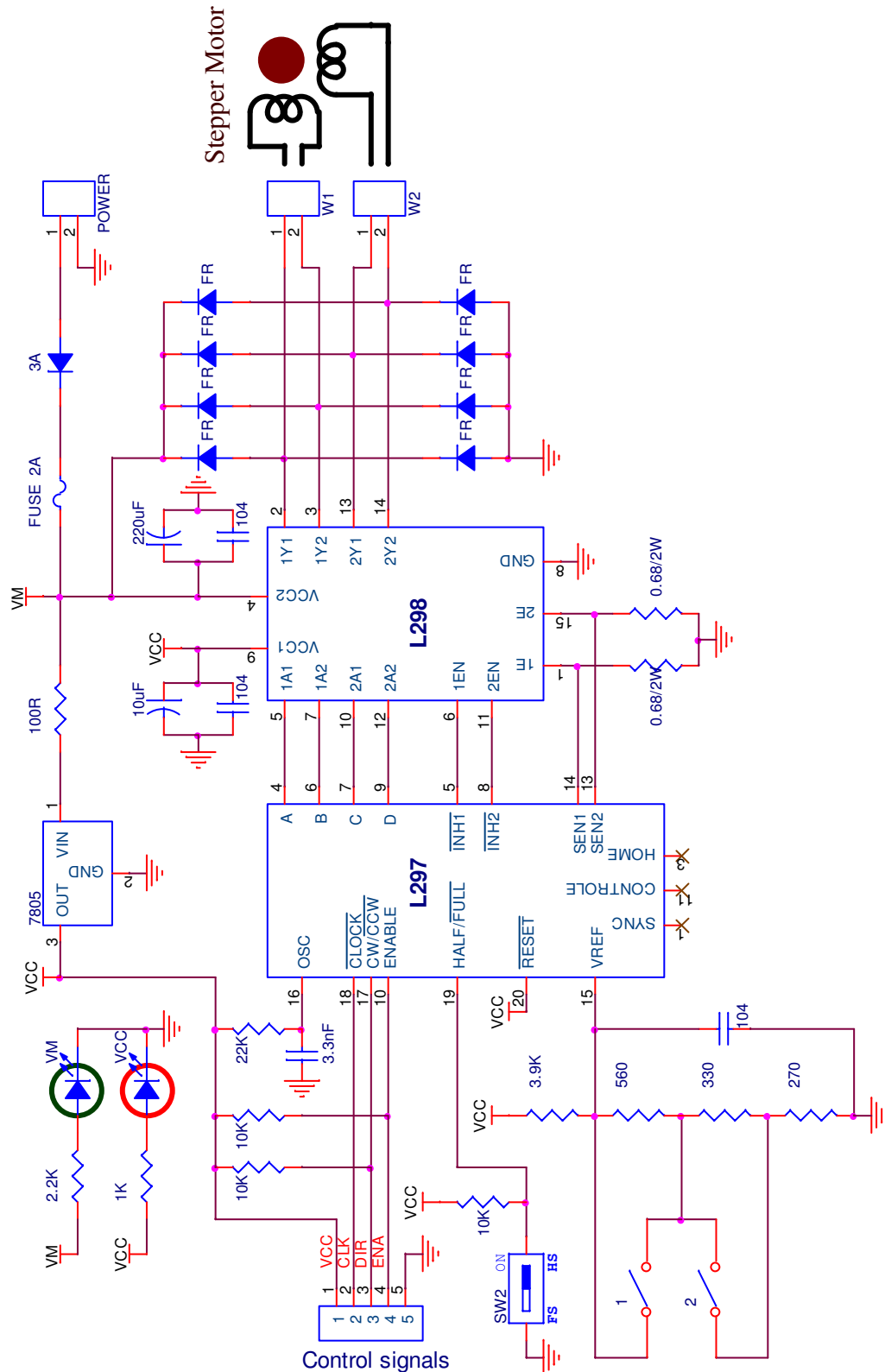


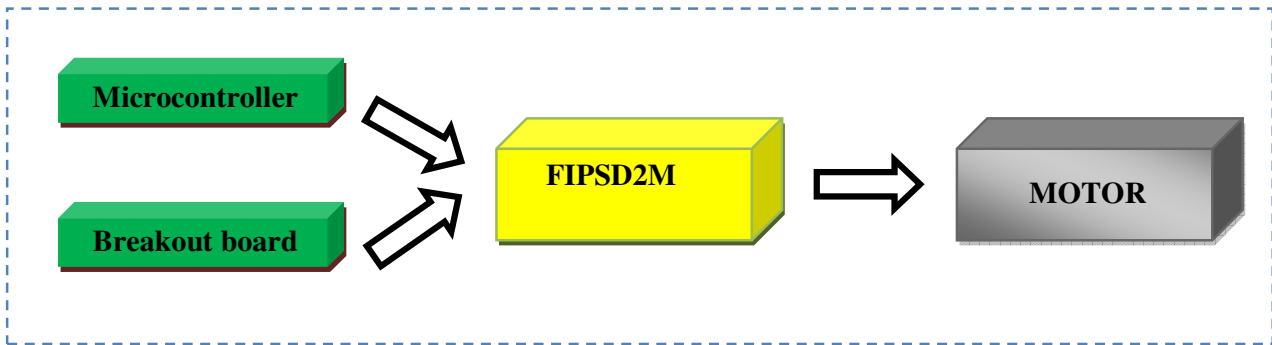
Figure 2. FIPSD2M Schematic diagram



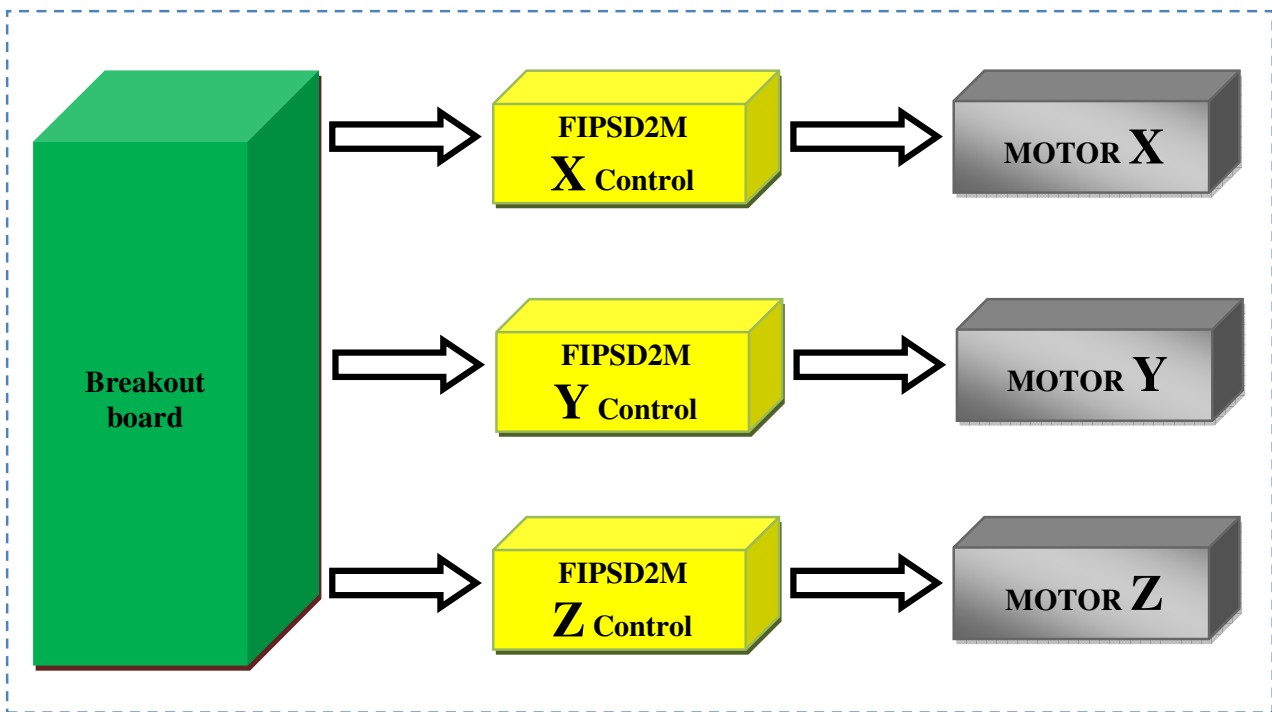
FIPSD2M Features

- DC12-30V single power input.
- Driver card is protected against reversed polarity of power.
- Maximum 2 Amps/phase motor output.
- Step, direction, Enable input TTL compatible control signals.
- Full and half step Resolution.
- 4 adjustable work current levels 25%, 50%, 75%, 100% of the maximum nominal current 2A.
- Inputs are brought out via pin header connector for flexibility.
- LED indicator for input power "Green LED" for motor power and "Red LED" for control.
- 1 u sec minimum width for CLK input pulse (500 KHz max).
- Dimension: 96 x 45 x 38 mm.

Figure 3. System Overview



Single motor control system diagram



Three axes motor control system diagram

Signal Input Pins Function Description

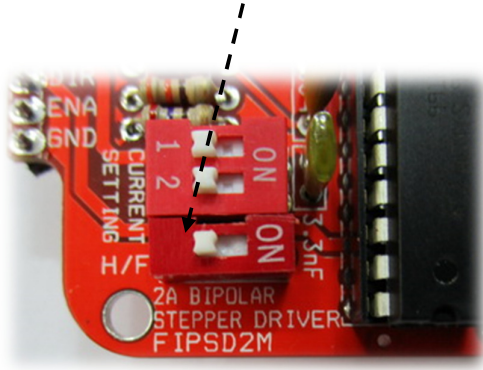
Table1. Connector signal definition

Label	Definition	Function
GND	Ground reference	Connected to external ground reference of control signal such as GND or VSS of microcontroller.
CLK	Stepping input pulse	Input to drive the stepper motor. This pin is TTL/CMOS logic (5V and 0V). Each pulse (logic change from 0 to 1) will drive the stepper motor one step. Minimum Pulse time is 1uSec.
DIR	Stepper driver rotation direction input	Input for stepper motor to rotate CW (clockwise) or CCW (counterclockwise). This pin is TTL/CMOS logic (5V and 0V). The direction is depends on the connection sequence of stepper motor. This input is pulled up internally with 10K resistor.
ENA	Stepper driver enable input	Input pin to enable FIPSD2M. This pin is TTL/CMOS logic (5V and 0V). 5V input will enable the motor driver further hold the shaft of stepper motor while 0V will disable the motor driver and release the shaft of the stepper motor. By default, the driver is enabled. This input is pulled up with 10K resistor.
W1	Motor winding 1	Motor coil 1
W2	Motor winding 2	Motor coil 2
12-30V	Motor supply voltage	External DC power supply from 12V to 30V for both motor power and control circuit biasing.

Resolution Adjustment

Table2. Mode DIP switch setting

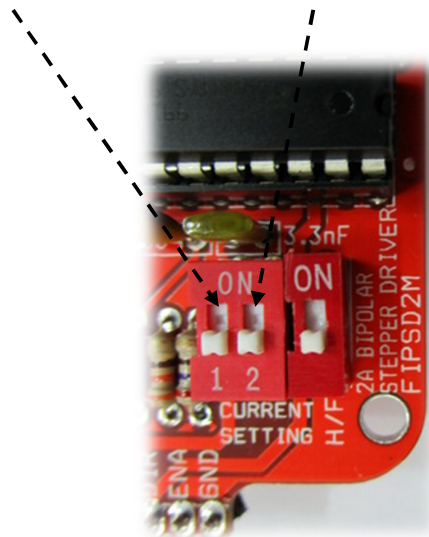
Mode DIP switch H/F	Step	Comment
ON	Full Step	200 Pulse per turn
OFF	Half Step	400 Pulse per turn



Current Setting

Table3. Current DIP switch setting

Current DIP switch		Work Current	
1	2	Percentage	Absolute
OFF	OFF	100%	2 Ampere
OFF	ON	75%	1.5 Ampere
ON	OFF	50%	1 Ampere
ON	ON	25%	0.5 Ampere



Wiring Diagram

FIPSD2M may drive 4, 6 or 8 lead stepper motors. Some motor wiring provides high torque and some other provides high speed. Figures 1-4 shows many motor types and its connections to obtain high torque and speed.

Figure 4. Four leads motor connection

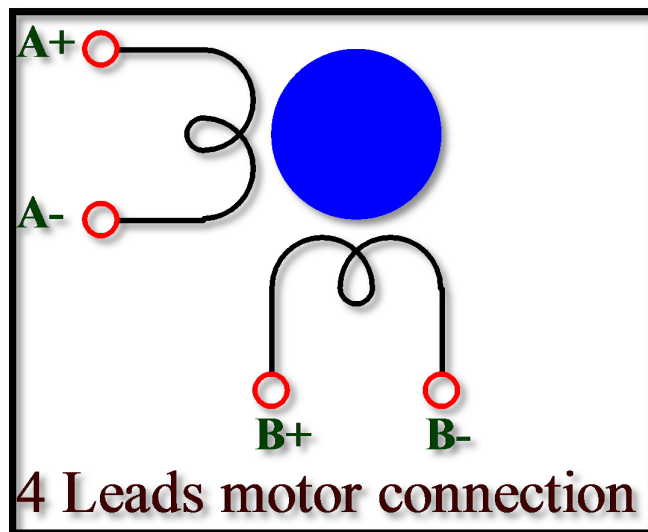


Figure 5. Six leads motor (High torque connection)

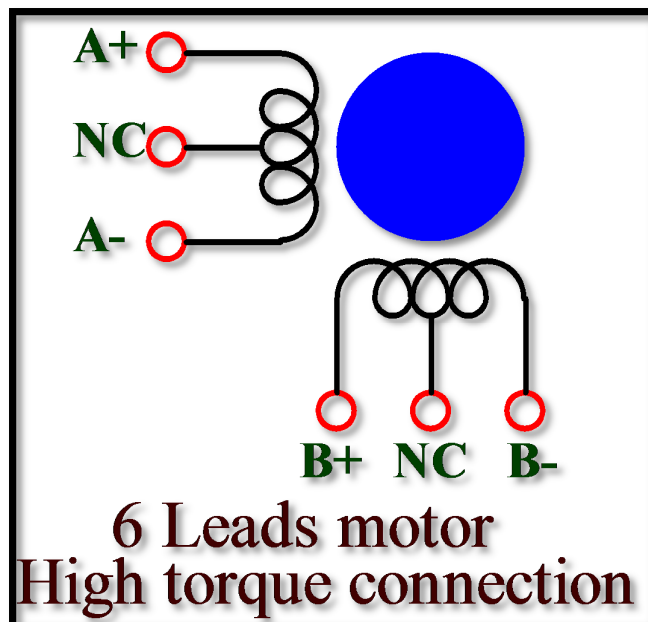


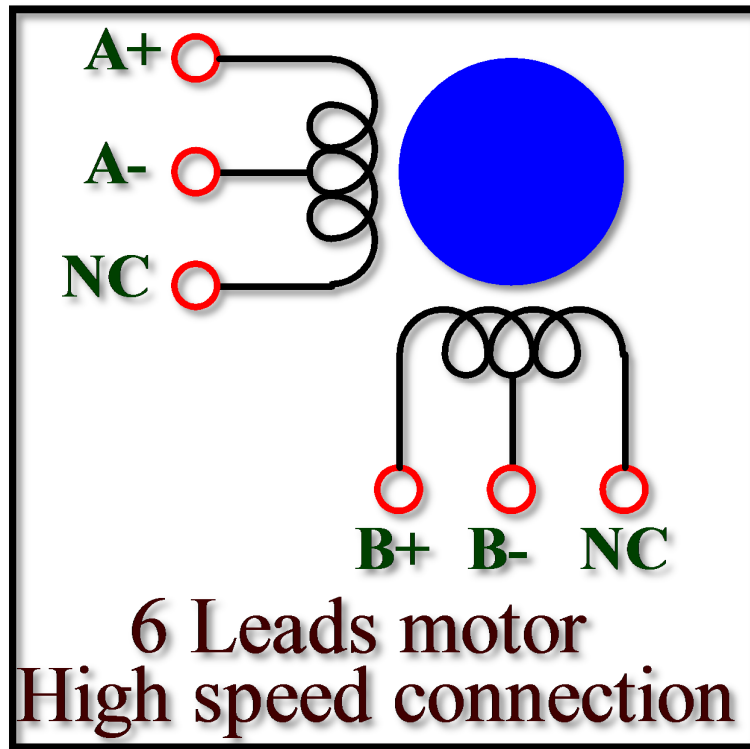
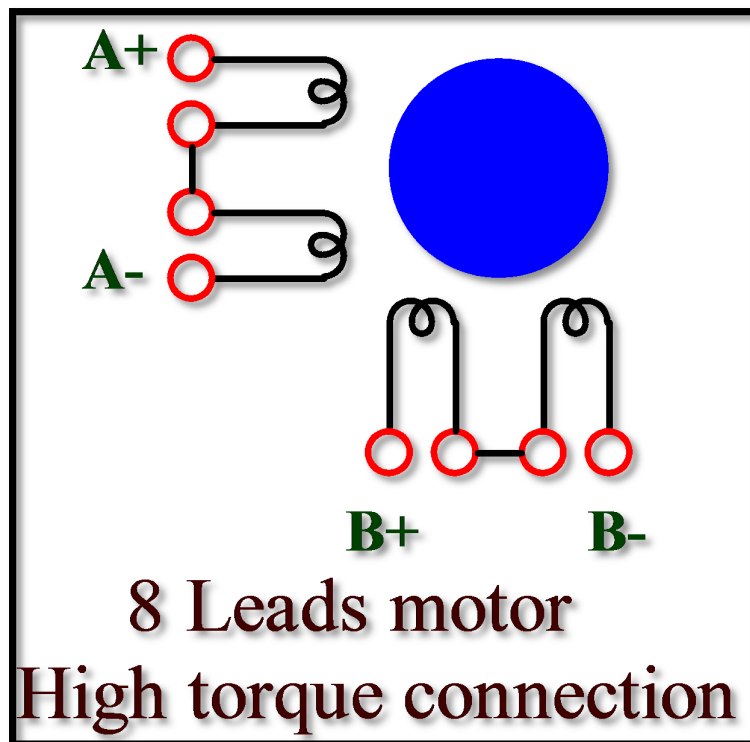
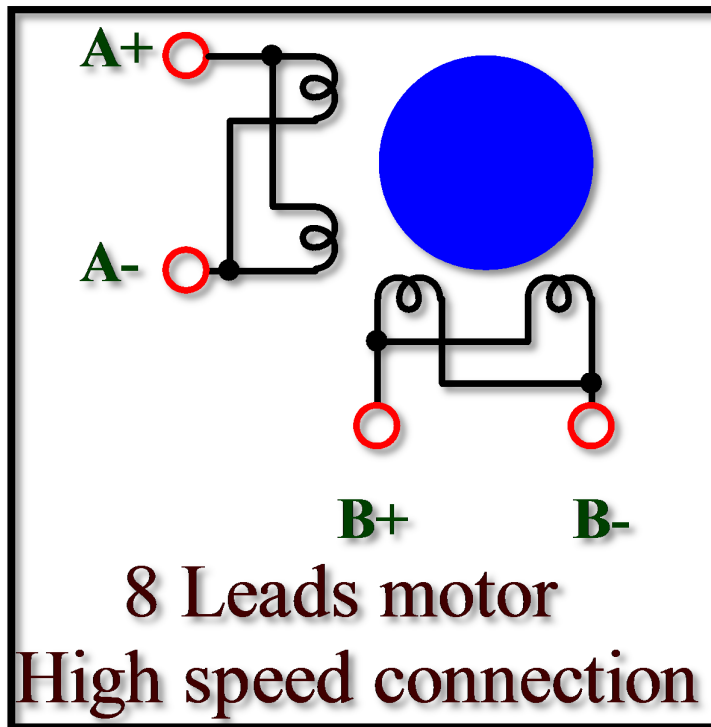
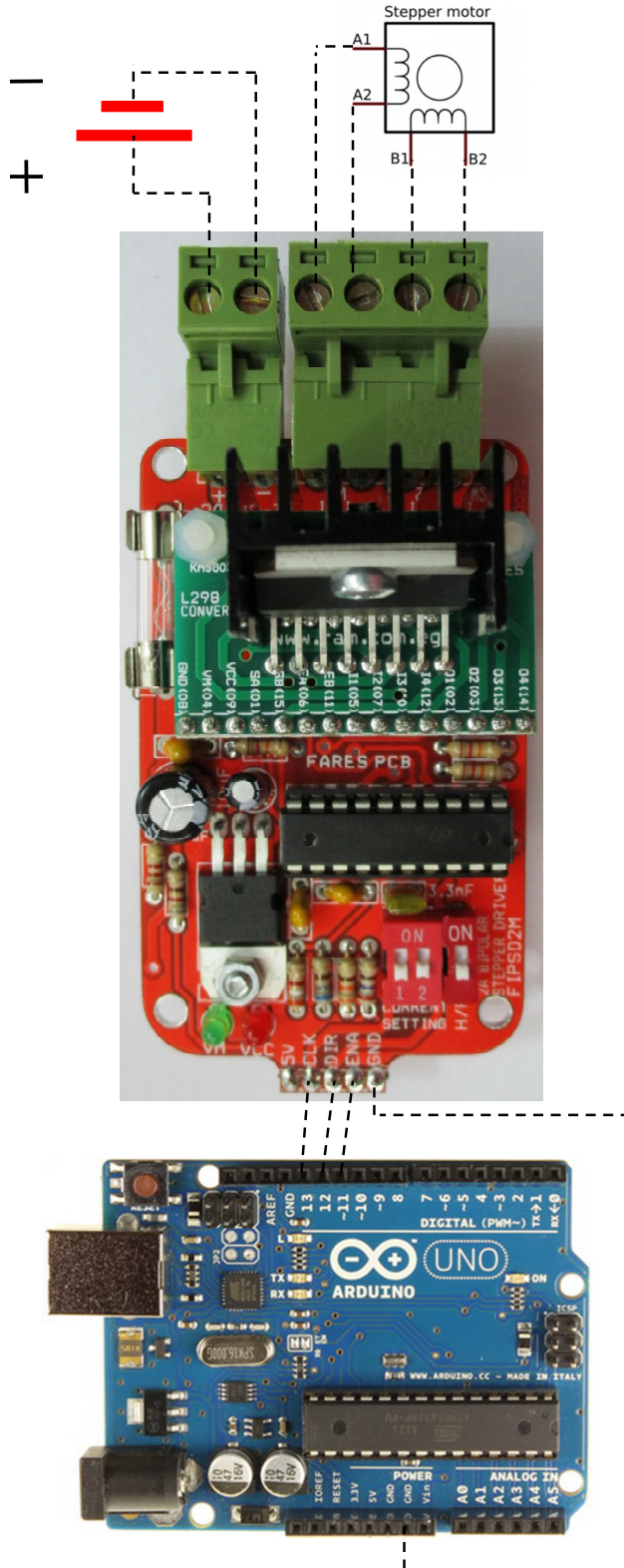
Figure 6. Six leads motor (High speed connection)**Figure 7. Eight leads motor (High torque connection)**

Figure 8. Eight leads motor (High speed connection)

Caution: Don't connect or disconnect the motor while the driver is energized. This may cause permanent damage to the Driver.

Typical application

FIPSD2M Stepper motor Control using (Arduino UNO kit interfacing).
 Sample code is included in user manual CD.
 Figure 9. Arduino UNO kit interfacing



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