

2.5 Amp Microstepping Bipolar Stepper Motor Driver ST-1

The ST-1 Bipolar Stepper Motor Driver allows you to drive a bipolar or unipolar stepper motor of up to 2.5 Amps per phase in full, half, quarter or eighth step increments. The opto-isolated STEP and DIRECTION inputs allow simple interfacing to computers and microcontrollers. The motor current is adjustable via the onboard potentiometer to match your motor. Use of PWM provides high torque even at higher step rates.

Absolute Maximum Ratings:

| Parameter | Max | Units |
|---|-----|-------|
| Continuous Output Current Per Motor Phase | 2.5 | A |
| Continuous Input Voltage | 28 | V |

Warning – operating at or above the absolute maximum ratings may damage your controller or your equipment under control.

Operating Parameters:

| Parameter | Min | Typical | Max | Units |
|----------------------------|-----|---------|------|-------|
| Input Voltage | 8 | 24 | 26 | V |
| Continuous Output Current | -- | -- | 2.5 | A |
| STEP, DIR Input Low Level | 0 | 0 | 1.5 | V |
| STEP, DIR Input High Level | 3.5 | 5 | 6 | V |
| STEP, DIR Input Current | 0 | 13* | 18** | mA |
| PWM Frequency | 20 | -- | 40 | kHz |
| Step Frequency | 0 | -- | 200 | kHz |
| Quiescent Current Drain | 6 | 7 | 8 | mA |
| Temperature | -30 | 25 | +55 | °C |

* At 5V logic inputs

** At 6V logic input

Pin-out:

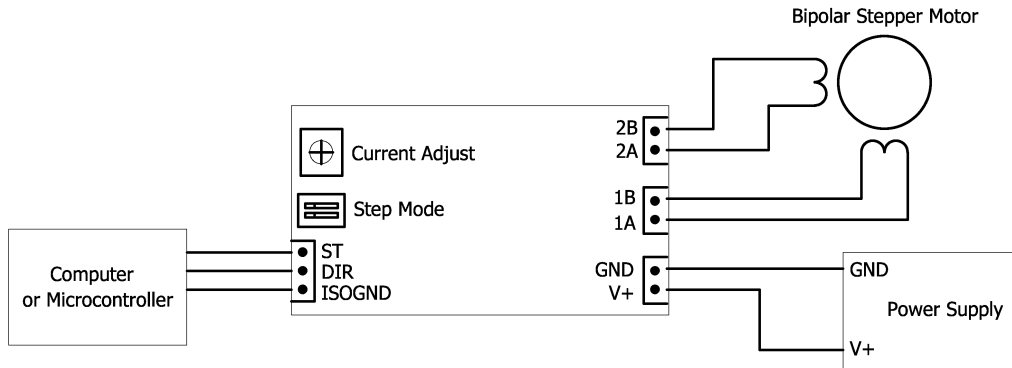
| Pin Label | Function | Active H/L |
|-----------|----------------------------------|-----------------------------|
| V+ | Positive input from power supply | -- |
| GND | Negative input from power supply | -- |
| 1A | Motor Phase 1, Positive | -- |
| 1B | Motor Phase 1, Negative | -- |
| 2A | Motor Phase 2, Positive | -- |
| 2B | Motor Phase 2, Negative | -- |
| ST | Opto-isolated STEP input | Step occurs on falling edge |
| DR | Opto-isolated DIRECTION input | -- |
| ISOGND | Opto-isolated Ground input | -- |

Microstepping Mode Settings:

| Mode | Switch 1 | Switch 2 |
|-----------|----------|----------|
| Full Step | ON | ON |
| 1/2 Step | ON | OFF |
| 1/4 Step | OFF | ON |
| 1/8 Step | OFF | OFF |

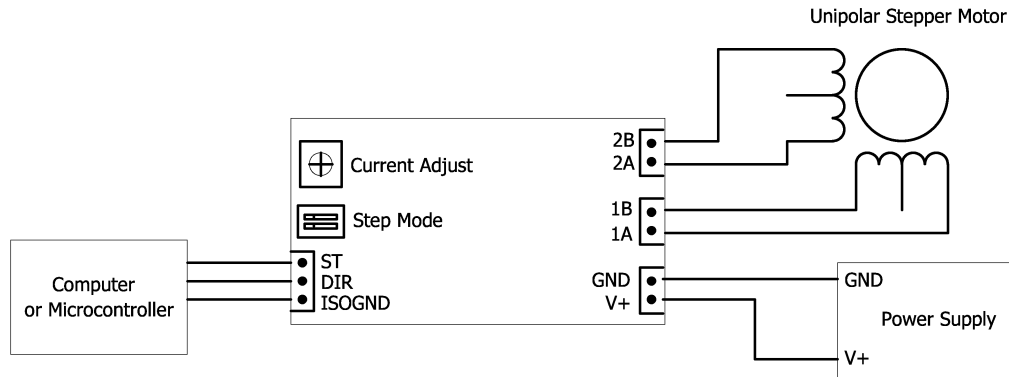
Bipolar Motor Hookup:

Bipolar and unipolar stepper motors can be hooked up to this controller. The bipolar motor will have a total of 4 wires. Connect each phase as shown. If the motor rotates in the opposite direction, simply reverse the 1A and 1B connections.



Unipolar Motor Hookup – 6 wire, full winding:

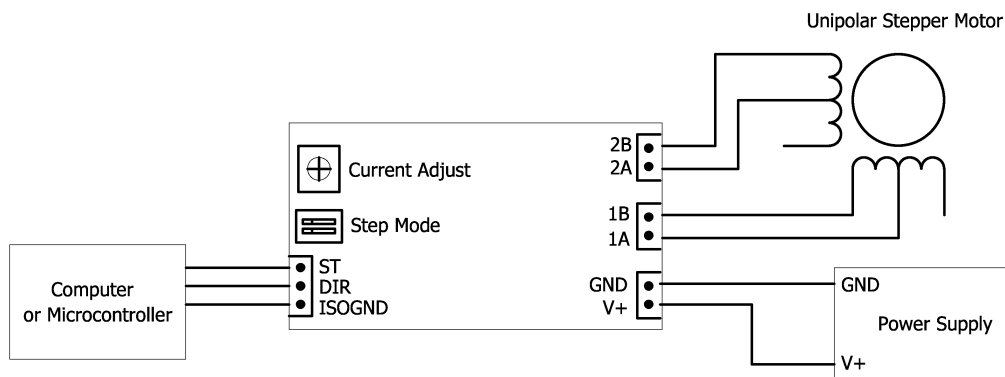
If you have a unipolar motor which has 6 leads, connect each phase as follows:



Note that the center tap of each winding is left disconnected. The current should be adjusted to half that of the motor's rated value to prevent overheating.

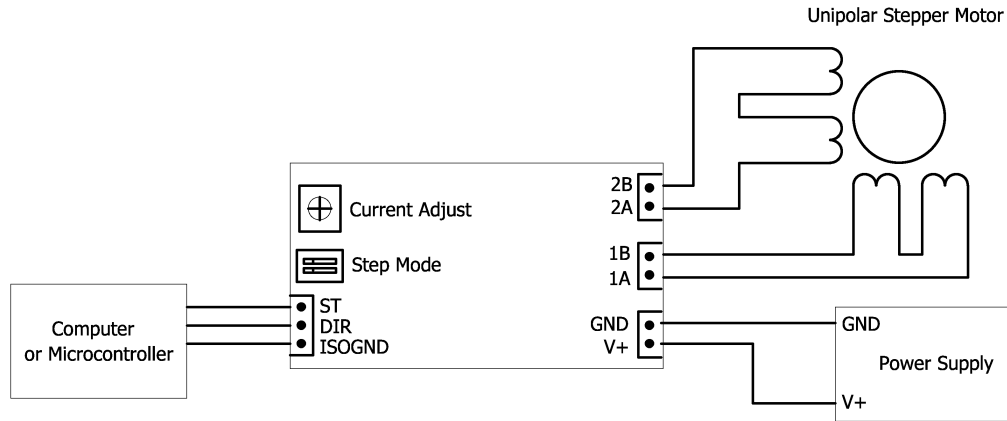
Unipolar Motor Hookup – 6 wire, half winding:

You can also connect only half of each winding instead of the full winding:



Unipolar Motor Hookup – 8 wire, series connection:

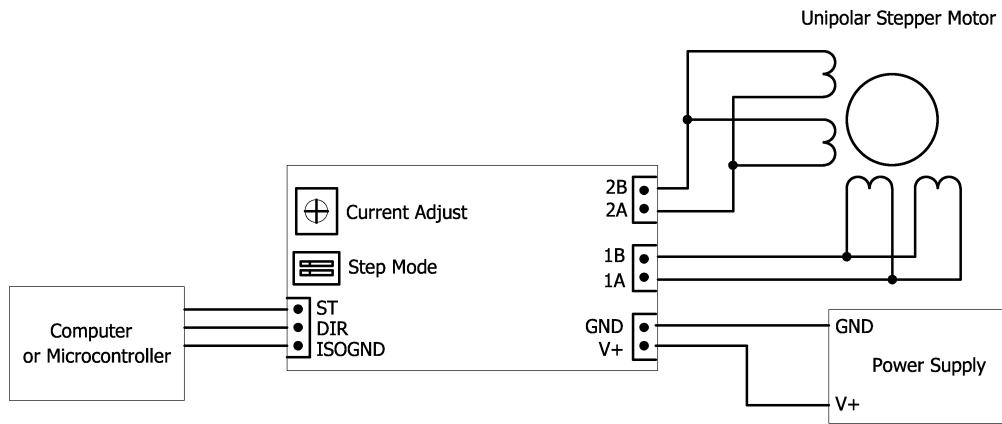
For 8-wire unipolar motors, the windings can be connected in series or in parallel. The series connection is as follows:



Adjust the motor drive current to half of the rated parallel current to prevent overheating in series mode.

Unipolar Motor Hookup – 8 wire, parallel connection:

The parallel connection is as follows:



STEP and DIR Inputs:

The optically isolated STEP and DIR inputs control the stepping and direction of rotation of the stepper motor. Each pulse at the STEP input causes the motor to switch to the next step at the falling edge of the pulse. The DIR input controls the direction of the step sequence.

When connecting the opto-isolated inputs, the ISOGND terminal should not be connected to the GND pin to maintain proper isolation.

Microstepping:

Microstepping allows the motor to move to positions between full steps. This results in smoother operation and a higher step resolution. For example, a 200 full-step motor will require 1600 pulses to rotate one revolution in 1/8th step mode. Use the DIP switch to configure the step mode to the desired setting.

Motor Current Adjustment:

Use the motor current potentiometer to adjust the current level to suit the motor. Do not exceed the motor's current rating to prevent overheating. The full scale of the current adjust potentiometer is from 2.5A down to 0.25A at the rightmost position.

Supply Voltage:

The power supply voltage should be at least a few times higher than the motor's rated voltage in order to take advantage of higher torque at high speeds. The PWM action will ensure the motor does not exceed the set current, while developing more useful torque when compared to direct voltage drives.

If the motor rapidly decelerates with a high inertia load, the excess energy will go back into the power supply, charging up the capacitors and increasing the supply voltage. If this voltage exceeds the maximum rated voltage of the controller, it can become damaged. If rapid deceleration is required, install a voltage clamp such as large zener diode, or a large capacitor to absorb the returned power.

Application Notes:

A fuse appropriately rated for the load device is required to ensure safe operation.

This controller is not reverse-polarity protected. Ensure that it is wired correctly before applying power. Always turn off the power supply before making any changes to the wiring.

PWM controllers switch currents at high frequencies to vary the average power to the load. This switching can cause undesirable RF interference. To minimize such interference, it is recommended to twist the input V+ and Ground wire pair as well as each phase of the motor (1A, 1B and 2A, 2B) together.

Ensure that the controller has adequate air flow for proper cooling. If operating for extended periods of time in high temperature environments, a cooling fan may be necessary.

Use the shortest possible wiring between the load and controller, and between the controller and the power source. Ensure that the cables carrying the load current are adequately sized. Inadequate power supply filtering or other causes leading to a high impedance path to the power supply will result in higher losses in the filter capacitor and wiring, and may damage the load and/or controller.

30-Day Limited Warranty:

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