

User's Manual

2L415B

High Performance-Cost ratio 2-phase Microstepping Driver

VER 2.0

Appreciate your selection of MotionKing™ driver. To make full use of its versatile performance, please read this manual carefully before using the driver!



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2L415B Microstepping Resolution Driver

1. General Introduction

2L415B is a high performance microstepping resolution driver that incorporates the most advanced technology in the world. It is suitable for driving any 2-phase and 4-phase hybrid step motors under 1.5A current. By using advanced bipolar constant-current chopping technique, it can output higher speed and more power than other drivers from the same motor. Its resolution function makes the motors run at high accuracy, less vibration and lower noise.

2. Specifications & Features

- High performance, low price
- Supply voltage +40VDC
- 20khz chopping frequency
- Compatible of TTL input telegraph signal
- Current automatic half reduction statically
- Driving current 1.5A/phase
- Highest reaction frequency 100 KHz
- Extremely Small 86*55*20mm (3.386*2.165*0.787Inch)
- Bipolar constant-current chopping
- Opto-Isolated Inputs
- Selectable Resolution of 1, 2, 4, 8, 16, 32 & 64
- Portable size suitable for set-up
- Microstep Resolution can be changed on-the-fly
- Driving any 2 phase stepping motor with 4, 6, 8 winding under 1.5A current
- Current reverse connection protection

3. Application Field

Suitable for a wide range of automatically equipment and facility, for instance air bonding, labeling machines, cutting machine, laser labeling, graph plotter, engraving machines, CNC and pick-place instrument etc. The function is perfect particularly in the devices expected with low noise, less vibration, high speed and more precision.

4. Definition of Pin Signal

Connector P1 Configurations

Pin Function	Details
PUL	<u>Pulse signal</u> : This input represents pulse signal, effective for each rising edge; 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 1.5ms. Series connect resistors for current-limiting when +12V or +24V used.
DIR	<u>Direction signal</u> : HIGH/LOW level signal, correlative to motor rotation direction. For reliable response, DIR must be ahead of PUL by 5ms at least. 4-5V when DIR- HIGH, 0-0.5V when DIR-LOW. Motor rotation direction also depends upon the connection of the motor windings, exchange any motor phase can reverse motor rotation direction.
OPTO	Opto-coupler power supply, and the typical voltage is +5V.
ENA	<u>Enable signal</u> : This signal is used for enabling/disabling drive. High level for enabling drive and low level for disabling drive. Usually left unconnected (enabled).

Connector P2 Configurations

Pin Function	Details
Gnd	DC power ground
+V	DC power supply, 15~40VDC, Including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+, B-	Motor Phase B

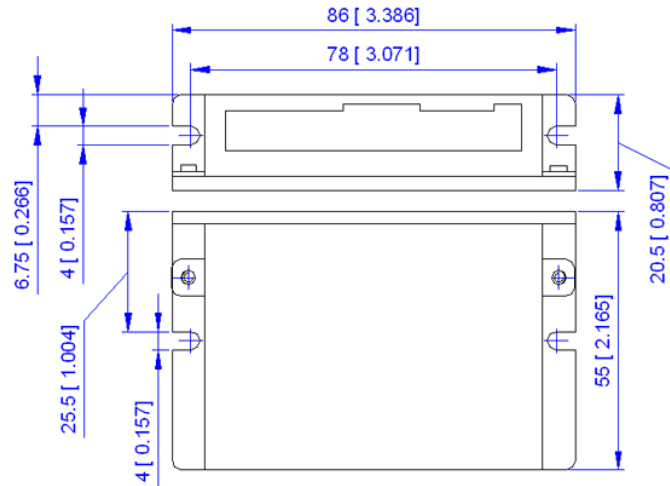
5. Specification of Electric ($T_j=25^\circ\text{C}$)

	2L415B
Supply voltage	+12 to 40 VDC
Rate Supply voltage	+24VDC
Output current peak value	0.1 to 1.5 A (adjustable)
Resolution precision	2 resolution (400 step/rev), 8 resolution (1600 step/rev), 16 resolution (3200 step/rev), 32 resolution (6400 step/rev), 64 resolution (12800 step/rev).

6. Operating Environment and Parameters

Cooling		Natural cooling or forced convection
Environment	Place	Avoid dust, oil frost and corrosive gas
	Temperature	0° — +50°C
	Humidity	40 — 90%RH
	Vibration	5.9m/s ² Max
Storage Temp.		-20°C — +65°C
Net Weight		150 g approx.

7. Mechanical Dimensions



8. Power Supply

The driver can work normally with power supply range between DC12V to DV40V, it is better to use unregulated DC power supply, or it is workable to use transformer + bridge + filter capacitance, the capacitance can be 1100 uF or so. Be reminded that the voltage peak value not exceed 40V after adjusting current, otherwise the driver will be damaged. It is recommended to use 24-36V DC power supply, it can avoid the voltage fluctuation exceed the rate voltage range. MotionKing can supply the suitable DC power supply.

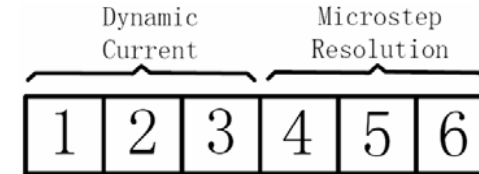
Using regulated switch power supply, please set the output current range to be the maximum.

Attention:

1. Not to reverse the power positive and negative when connecting;
2. It is recommended to use non-stable power
3. The voltage not to exceed the max. when the electric net power supply is fluctuant.
4. When using unregulated supply, the current output rating must more than the driver setting current by 60%. Using regulated power supply, must more than the driver's setting current.
5. In order to lower the cost, two or three drivers can share the same power supply.

9. Selection Microstep resolution and driver current

This driver uses a 6-bit DIP switch to set microstep resolution, dynamic current and standstill current, details as below:



Microstep Resolution Selection

Microstep resolution is set by SW4, SW 5, SW 6 of the DIP switch as shown in the following table:

Microstep	Steps/rev.(for1.8o motor)	SW4	SW5	SW6
1	200	ON	ON	ON
2	400	OFF	ON	ON
4	800	ON	OFF	ON
8	1600	OFF	OFF	ON
16	3200	ON	ON	OFF
32	6400	OFF	ON	OFF
64	12800	ON	OFF	OFF

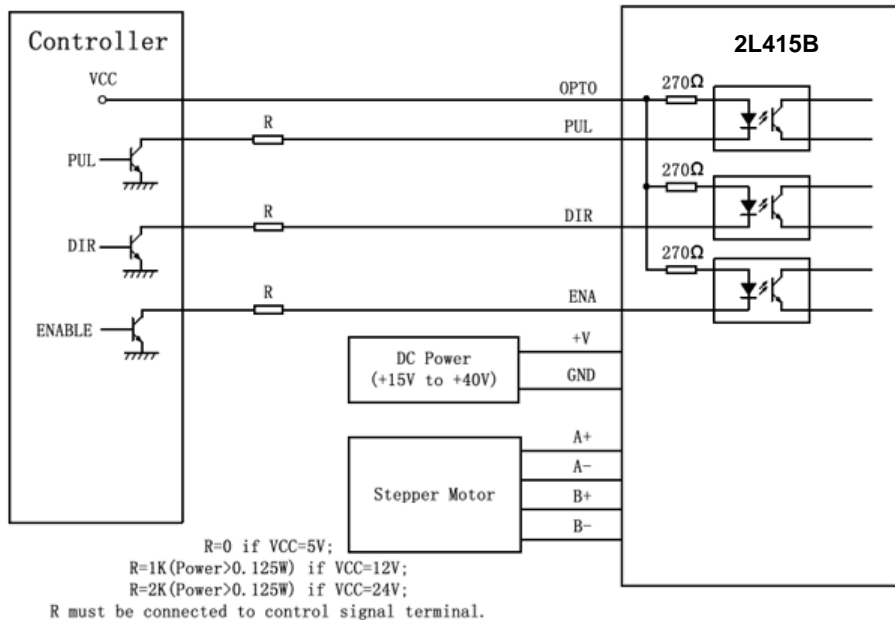
Current Settings

Peak current (A)	SW1	SW2	SW3
0.21A	OFF	ON	ON
0.42A	ON	OFF	ON
0.63A	OFF	OFF	ON
0.84A	ON	ON	OFF
1.05A	OFF	ON	OFF
1.26A	ON	OFF	OFF
1.50A	OFF	OFF	OFF

Note: Due to motor inductance, the actual current in the coil may be smaller than the dynamic current settings, particularly under high speed condition.

10. Connection of Motor

2L415B driver can drive any 2 phase / 4 phase motor with 4, 6 or 8 lines under 1.5A current. Phase A of the stepping motor connected between 3 and 4 pins of P2, phase B connected between 5 and 6 pins of P2. The detailed connection of 4, 6, 8 lines stepping motor is listed as below:



11. Matching between driver and motor

This driver can drive any 2 phase and 4 phase motor under 1.5A current, in order to get the most perfect effect, must set the proper supply voltage and current. The supply voltage determines the speed of the motor, and the current determines the output torque of the motor.

1. Supply voltage setup:

Generally speaking, when the motor runs at high speed, higher voltage makes higher torque so avoid step-lost. But in the other way, high voltage can lead over-voltage protect or, the driver will be damaged, furthermore, operate under high voltage, the low speed vibration is very large, so usually set the voltage to be DC24-36V.

2. Output current setup:

For the same motor, higher current means higher torque, but both the motor and driver's radiation are seriously. So the current usually set to be the value of tepid but not heat which occur in motor's continuous working status.

- (1). 4 and 6 lines motor high speed mode: output current set to be the same, or a little bit less than the motor's rate current;
- (2). 6 phase motor high torque mode: output current set to be 70% of the motor's rate current;
- (3). 8 lines motor in series connection: output current set to be 70% of the motor's rate current;
- (4). 8 lines motor parallel connection: output current set to be 140% of the motor's rate current.

Note: Run the motor for 15-30 minutes after setting the current, if the motor's temperature rise too high, lower the setting current. If the output torque is inadequate after lower the current, improve the radiation condition to ensure that the motor and driver not burn hand. It's better to let the driver work in breezy environment or fix it in metal board to improve the radiation.