

MOT-BL-DRV-750

Brushless dc motor driver



1 Brief introduction

MOT-BL-DRV-750 is for BLDC motors of 48v less 750w. With DSP controlling technology, it has features of high torque, low vibration, low noise, closed loop control and rich speed control modes.

1.1 Features

- Acc/Dec time setting
- Pole-pairs selection
- Open/closed loop control
- Max output current P-sv setting
- Restart
- Motor stall torque hold
- . Alarm indication
- Built-in RV speed setting
- External potentiometer speed setting
- External analog signal speed setting
- . PWM speed setting
- Pulse frequency speed control

2 Electrical properties and environmental indicators

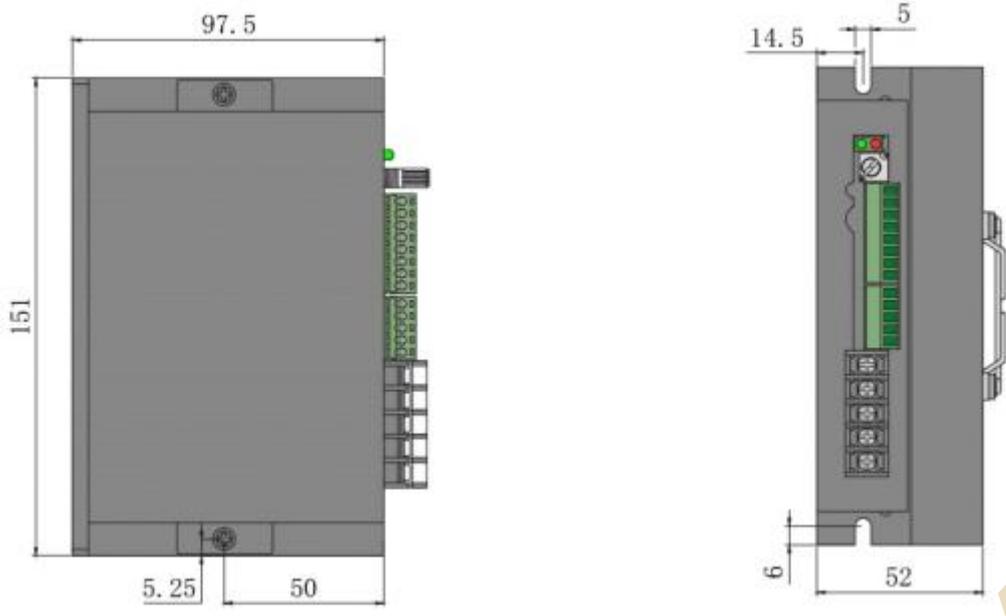
2.1 Electrical properties

Driver parameter	Min Value	Typical Value	Max Value
Voltage input DC (V)	12	48	52
Current output(A)	-	-	25
Motor speed range(rpm)	-	-	20000
Hall signal voltage(V)		-	5
Hall drive current (mA)	、-)/	20	-
External potentiometer(KQ)	-	10	-

2.2 Environmental indicators

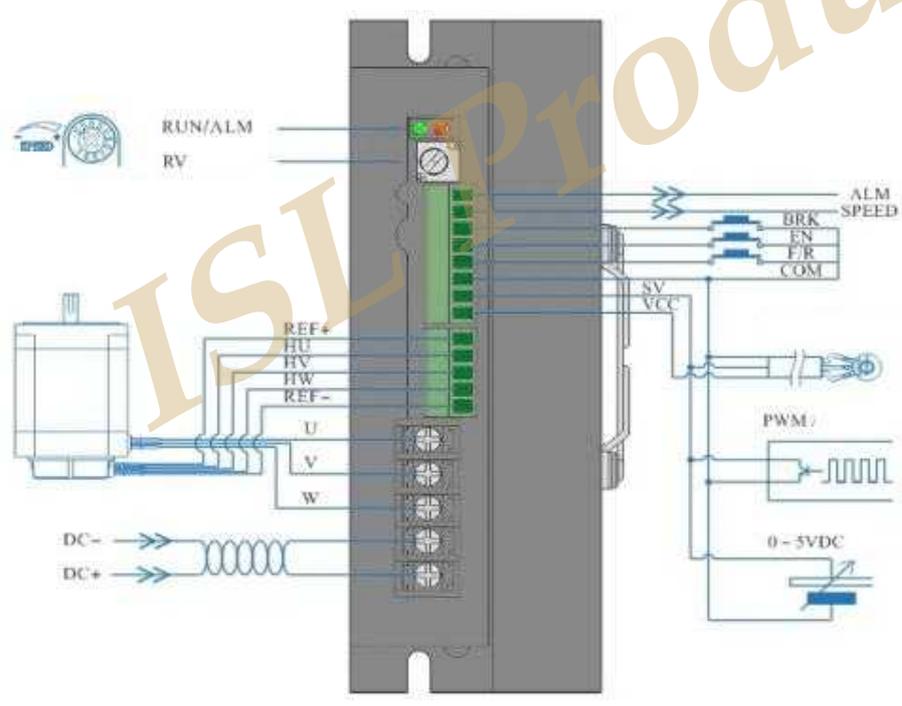
Heat Sinking Method	Natural cooling or fan-forced cooling
Atmosphere	Avoid dust, oily mist and corrosive air
Operating Temperature	0 ~ +50°C
Ambient Humidity	80% or less (non-condensing)
Vibration Resistance	5.7m/s ² maximum
Storage Temperature	0 ~ +60°C

3 Dimension(Unit: mm)

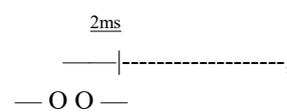


4 Driver interface and wiring diagram

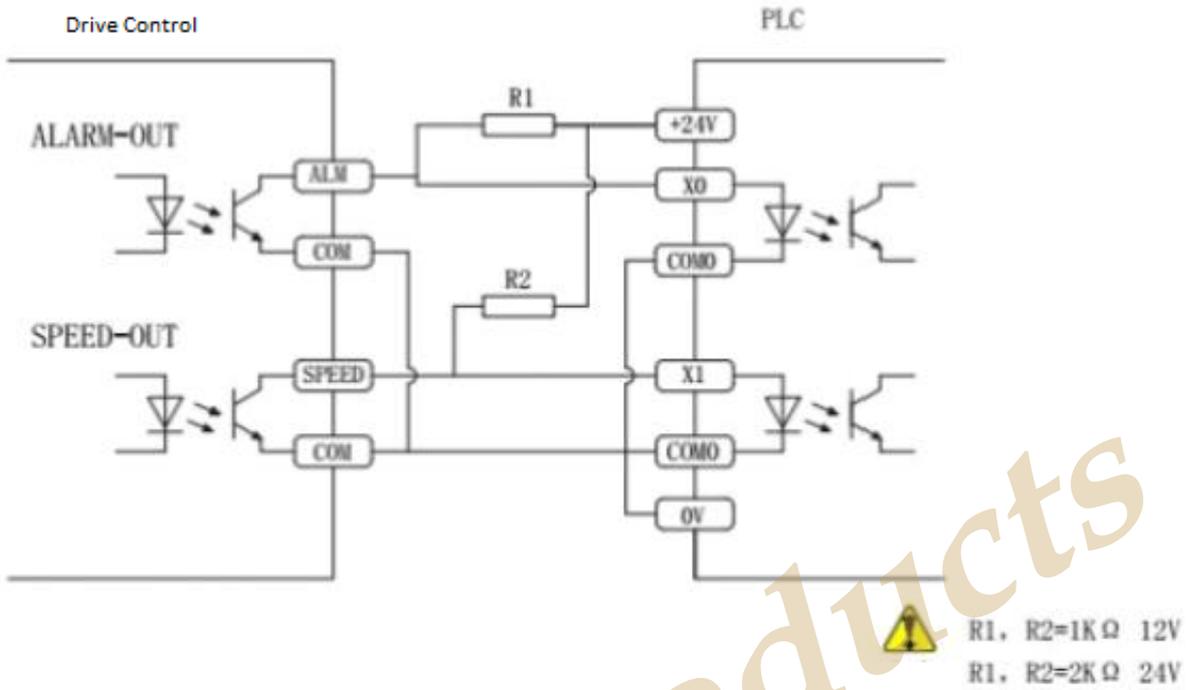
4.1 Driver interface



4.2 Port signal description

Signal category	Terminal	Functional Description
Output signal	ALM	Motor or driver fault signal output. It is 5v in normal situation and 0V when fault occurs.
	SPEED	Output pulse frequency corresponded with running speed. Speed can be figured out according: $N(\text{rpm}) = (F/P) \times 60/3$ F: Output pulse frequency P: Motor pole pairs N: Motor speed For example: Motor has 4 pole pairs, $F = 1 \text{ sec}/2\text{ms} = 500\text{Hz}$ $N(\text{rpm}) = (500/4) \times 60/3 = 2500$ 
Control signal	BRK	Motor brake stop control signal; BRK and COM connect in default, motor brake stops when BRK and COM disconnect.
	EN	Stop signal terminal; EN connects COM, motor runs, otherwise motor stops.
	F/R	Motor direction control terminal; F/R and COM disconnect, motor will rotate clockwise, and otherwise, motor will rotate anticlockwise.
	COM	Common port(0V)
	SV	① External potentiometer speed setting input; ② External analog voltage input terminal ③ PWM speed setting input
	VCC	External power source
Hall signal	REF+	Hall sensor signal power supply+
	HU	Hall sensor signal Hu
	HV	Hall sensor signal Hv
	HW	Hall sensor signal Hw
	REF-	Hall sensor signal-
Motor connection	U	Motor line U phase
	V	Motor line V phase
	W	Motor line W phase
Power connection	DC-	Power supply negative electrode
	DC+	Power supply positive electrode (24-52VDC)

4.3 Output signal connection diagram



5.1 ACC/DEC time setting

Set acceleration time and deceleration time by ACC/ DEC, range is 0.3-15s. Acceleration time is time needed from 0 to rated speed. Deceleration time is time needed from rated speed to 0. Ti



5.2 Open/Closed loop setting

SW1 ON=Closed loop; SW1 OFF=Open loop

When closed-loop mode is selected, poles
Notice pair should be set rightly via SW2.



5.3 Motor poles pair selection

SW2 is for motor poles pair selection to match different BLDC motor.

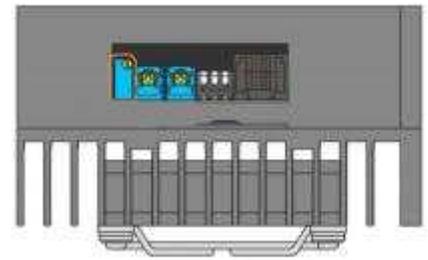
SW2=ON, 2P, SW2=OFF, 4P

When closed-loop control, please set SW2 according to the number of stages corresponding to the motor.

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5.4 Fine tuning potentiometer

1. When analogue voltage (0-10V) is used, Please use the fine adjustment potentiometer to adjust the speed.
2. If the motor doesn't have the same speed with the set value, please reset via fine tuning potentiometer.

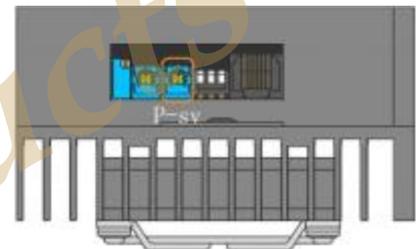
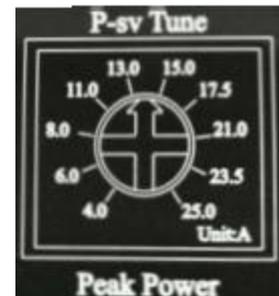


5.5 Peak current setting

Use P-sv to set the output peak current. When load is increased suddenly, the output current will be limited by the set value, which reduces motor speed and protects the motor. Current setting ranges: 4-25A.

As the admissible error of real current and setting value is $\pm 10\%$, to ensure safety, set current accordingly.

The duration of peak current is 3s when load increases suddenly. After 3s, if load is not reduced, driver will stop working. After 5s, it restarts automatically.



5.6 Stalling output current limitation

When motor is stalled, the output current is limited to 3A, which protects driver and motor from damage.

5.7 Stalling torque holding

When motor stalls, torque will be kept in short time.

This feature can't be used for brake stalling.

5.8 Restart function

When stalling occurs, driver stops working, after 5s, it restarts. If fault occurs again, alarm signal will be sent out and driver will stop working.

When the motor is locked, the output current will be limited to 3A to protect the driver and motor from damage.

When the motor is locked, it has a simple torque holding function.

Stall holding torque is a short-term behavior and should not be used for braking stalls.

When the motor is locked, etc., the drive will stop working. After 5 seconds, the drive will start automatically. After restarting, if there is another fault, it will alarm, the protection function will start and stop working.

5.9 Motor start and stop

The default setting of EN and COM is to connect EN to COM. when powered on, the driver can run the motor by itself.

Connect or disconnect the EN and COM terminals to control the running and stopping of the motor.

When the EN and COM terminals are wired together, the motor runs. Conversely, the motor stops slowly

- ◆ Add a switch or PLC between COM and EN you can control the motor start and stop.

BRAKE

The default setting of the BRK terminal and the COM terminal is that the BRK terminal is connected to the COM terminal. when powered on, the driver can run the motor by itself.

Connecting or disconnecting the BRK terminal and the COM terminal can control the natural operation and speed of the motor, slow down speed.

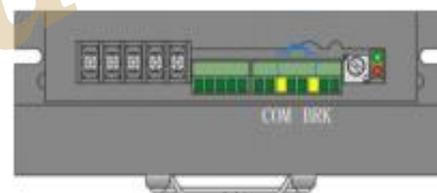
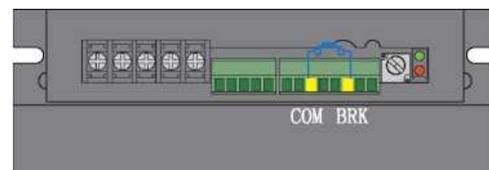
When the connection line between the BRK terminal and the COM terminal is disconnected, the motor stops quickly.

Diflerence between EN and BRK

1. EN is for stop naturally, BRK is for stop suddenly.

Notice % EN and BRK have the same startup state

- 3 .When selecting one of the modes, another mode must be kept as default setting.



- ◆ Add a switch or PLC between COM and BRK can control the motor start and stop.

5.10 Direction control

The default setting of the F/R terminal and the COM terminal is that the F/R terminal and the COM terminal are not connected.

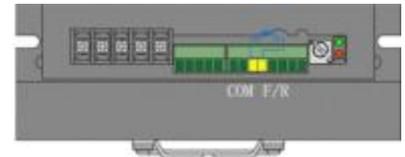
When the power is turned on, the motor rotates forward.

Connecting or disconnecting the F/R terminal and the COM terminal can control the forward and reverse rotation of the motor.

When disconnecting the connection line between F/R terminal and COM terminal, the motor rotates forward.

When connecting the F/R terminal and the COM terminal, the motor reverses. The direction is judged from the quarter view Notice of the axle.

Viewed from the direction of the motor shaft, the motor shaft rotates clockwise in the forward direction, and vice versa.



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6 Speed setting methods and settings

6.1 Speed setting via built-in potentiometer

Motor speed increases when RV knobs is rotated clockwise, when anticlockwise, motor speed decreases.

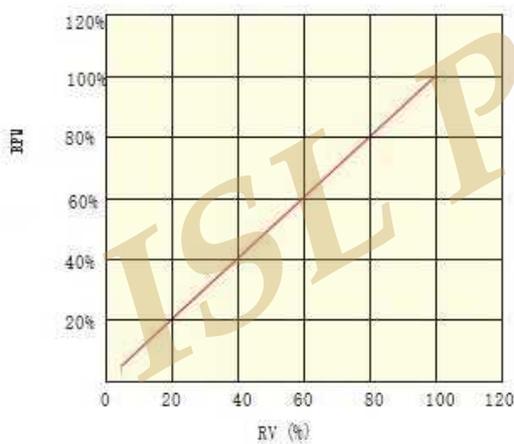
If customers use other speed modes, RV should be rotated counterclockwise to limit position.

Continue to rotate counterclockwise to the limit position after a "click" sound. At this time, the built-in speed control positioner RV has been turned off and the motor has stopped running.

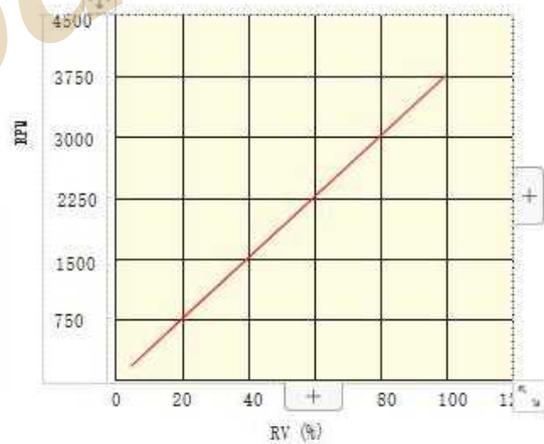
When it is necessary to switch to the external SV input control speed mode, the built-in speed control Bit RV must be off.

To turn on the built-in potentiometer RV rotate counterclockwise, Go to the limit position after a "click".

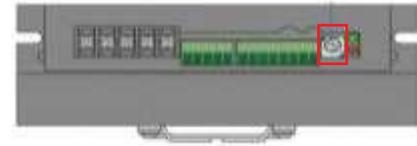
Built-in speed potentiometer and motor speed diagram (open-loop no-load)



Built-in speed potentiometer and motor speed diagram (closed-loop no-load)

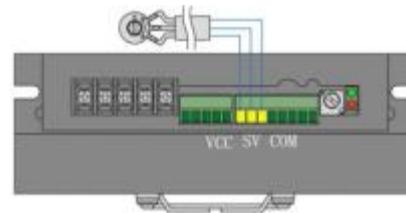


RV Built-in potentiometer



6.2 Speed setting via external potentiometer

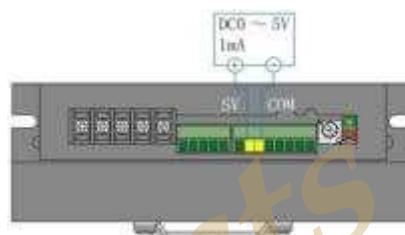
Use a suitable potentiometer with a resistance value of 10KQ; with an external potentiometer, the middle terminal connects to 5V; the other two terminals connect to REF+ and COM.



① At this time, the built-in speed regulating potentiometer RV needs to be rotated counterclockwise to the limit position after a "click" sound.

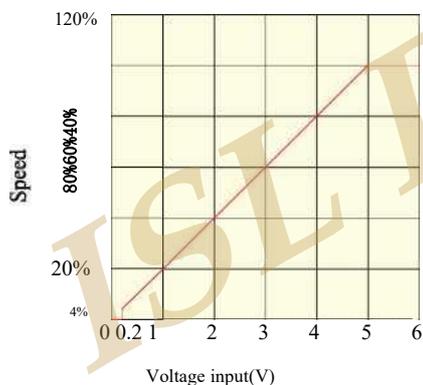
② Be sure to pay attention to the connection order of the potentiometer leads.

6.3 Speed setting via external analog signal 0-5V



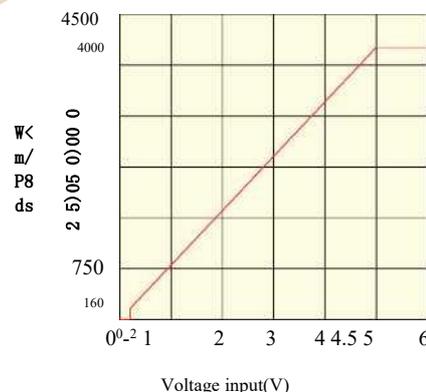
RV should be rotated counterclockwise to limit position.

graph between duty ratio and the motor speed (open loop no load)



When analog voltage is 0.2V motor speed is 4% of max speed, when analog voltage is 5V, motor reaches max speed. The max speed also depends on the motor specification and power voltage.

graph between duty ratio and the motor speed (closed loop no load)



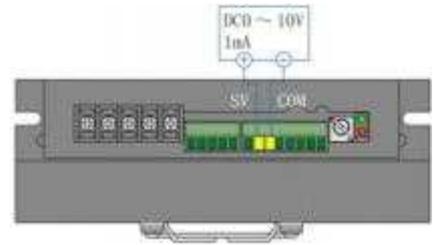
When analog voltage is 0.2V, motor speed is about 160rpm; when analog voltage is 5V, motor reaches max speed 4000rpm.

6.4 Speed setting via external analog signal 0-10V

6.5

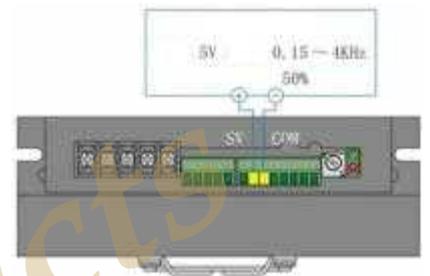
When analog voltage (0-10V) is used, fine turning function is recommended to be used.

RV should be rotated counterclockwise
┌° limit position.

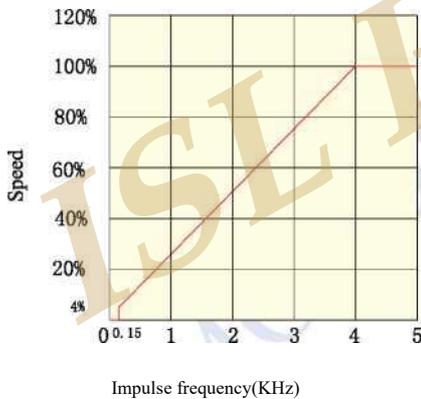


6.6 Speed setting via pulse frequency

When analog voltage (0-10V) is used, fine turning function is recommended to be used.

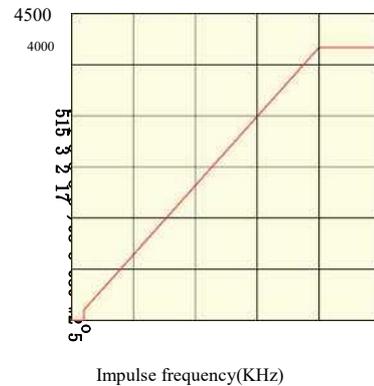


graph between the impulse frequency and motor speed (open-loop no-load)



When the frequency is 0.15KHz, the motor speed reaches 5% of fastest speed; when the impulse frequency is 4KHz, the motor speed reaches maximum value, which depends on the motor specification and power voltage.

graph between the impulse frequency and motor speed (closed-loop no-load)



When the frequency is 0.15KHz, the motor speed would be around 150rpm; when the impulse frequency is 4KHz, the motor speed reaches 4000rp.

*Motor speed would decrease via motor parameter and power supply.

7 Status indicator. Issue handling

When the motor has overcurrent, Hall input error, locked rotor, overtemperature, overvoltage, etc., the driver will send an alarm signal. At this time, the fault alarm output terminal (ALM) and the common terminal (COM) will be turned on, so that the fault alarm output terminal (ALM) becomes a low level, and at the same time, the drive stops working and the alarm light flashes.

7.1 Status indicator

Description	Status	LED
Red light flashes 2 Times	Over Voltage	<p>ON 1S OFF 1S 5S</p>
Red light flashes 3 Times	Input Current Over	<p>ON 1S OFF 1S 5S</p>
Red light flashes 4 Times	Over Current	<p>ON 1S OFF 1S 5S</p>
Red light flashes 5 Times	Under Voltage	<p>ON 1S OFF 1S 5S</p>
Red light flashes 6 Times	Hall Sensor Error	<p>ON 1S OFF 1S 5S</p>
Red light flashes 7 Times	Stall Conditions	<p>ON 1S OFF 1S 5S</p>
Red light flashes 8 Times	Multiple Issues	<p>ON 1S OFF 1S 5S</p>

7.2 Exceptional handling

Led error display	Status statements	Solution
Red Led flashes twice	Over voltage	Check the bus voltage
Red Led flashes three times	Input over current	Ensure model selection is right
Red Led flashes four times	Over current	Check P-sv setting and motor parameter.
Red Led flashes five times	Low voltage	Increase the acceleration time Check power voltage, and ensure power supply is 1.5times of motor power.
Red Led flashes six times	Hall error	Ensure motor connection is well
Red Led flashes seven times	Locked-rotor	Check 迂 motor is overload
Red Led flashes eight times	Over two errors	Hall error or locked-rotor. When speed setting is not available, set P-sv to max value