

## SYS-BLD-35225 Brushless DC Motor Driver

### Overview:

**SYS-BLD-35225** is suitable for high-voltage three-phase DC brushless motors with a power of 750W or less. This product is designed with advanced DSP controlSystem technology, with high torque, low noise, low vibration, fast start and stop characteristics. Also has PID power Flow and speed closed-loop control, overvoltage, undervoltage, overcurrent, overtemperature and other protection functions. Manual speed Adjusting and adjusting the analog voltage speed of the upper computer, the perfect adjustment of the pulse frequency speed adjustment of the upper computer.



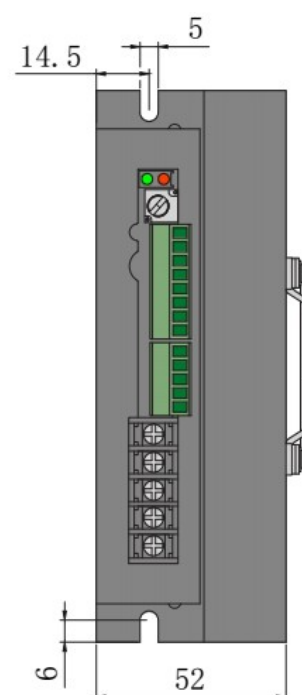
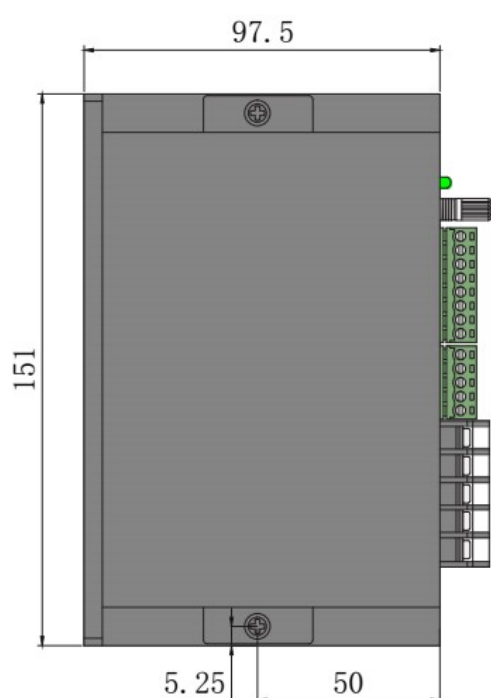
### Electrical parameters

parameter	Min	Typical	Max	Unit
Input voltage	18	48	52	VDC
Output current	–	–	25	A
motor speed	0	–	20000	RPM
Hall signal voltage	–	–	5	V
Hall drive current	–	20	–	mA
External speed potentiometer	–	10	–	K $\Omega$

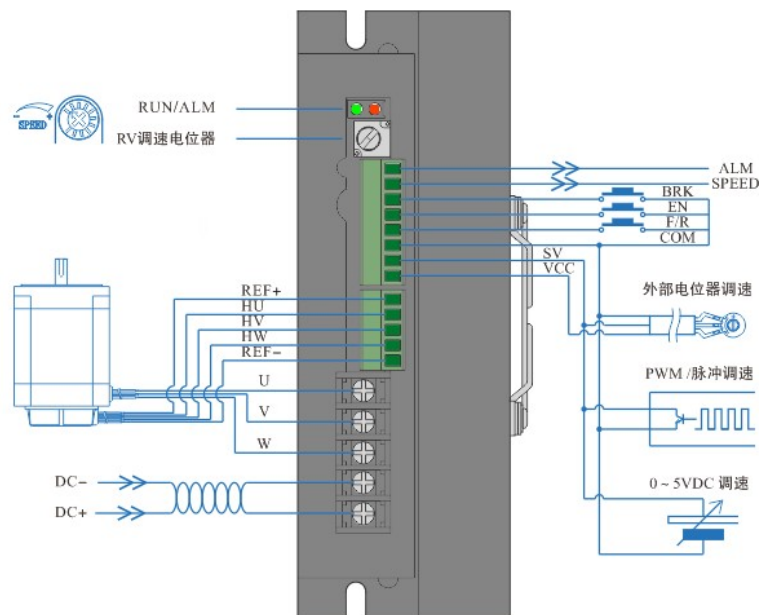
### Environmental indicators:

envirnmental factor	Environmental indicators
cooling method	Natural cooling or forced cooling
Use occasion	Avoid dust, oil and corrosive gases
Operating temperature	10°C-+50°C
environment humidity	90%RH(no condensation)
humidity	5.7m/S2max
storage temperature	0°C-+50°C

### Mechanical dimensions and installation drawings:



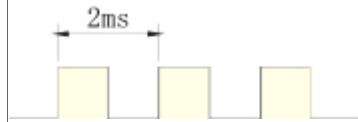
## Driver interface and wiring diagram: Driver interface



### Input connection

signal	Terminal	SYS-BLD-35225
power input	DC+	DC power input positive (voltage range DC24V-52V)
	DC-	DC power input negative
Motor connection	W	DC brushless motor W phase
	V	DC brushless motor V phase
	U	DC brushless motor U phase
Hall signal	REF-	DC brushless motor Hall signal grounding wire
	HW	DC brushless motor Hall signal HW
	HV	DC brushless motor Hall signal HV
	HU	DC brushless motor Hall signal HU
	REF+	DC brushless motor Hall signal power cord
control signal	SV	1 external input speed potentiometer; 2 analog signal input; 3 pulse frequency input
	VCC	External potentiometer interface
	COM	Common port (0V reference level)
	F/R	The motor rotates forward when the F/R terminal and COM terminal are disconnected or the high level input, and the motor reverses when the short or low level input
	EN	The motor stops slowly when the EN and COM terminals are disconnected or the high level is input, and the motor is running when the short or low level is input.
	BRK	The motor brake stops when the BRK and COM terminals are disconnected or the high level is input, and the motor is running when the short or low level is input.
output signal	ALM	The motor or drive control fault signal output signal is normally 5V, and the level is 0V when the fault occurs.
	SPEED	Corresponding to the operating speed of the motor, the corresponding pulse frequency is output. The motor speed can be calculated using SPEED-OUT. The calculation formula is: $\text{转速 (RPM/MIN)} = \frac{\text{SPEED-OUT 的频率}}{6 \times \text{POLE (磁极对数)}} \times 60/3$ F: output pulse frequency; Hz: P: motor pole pairs; N: motor speed

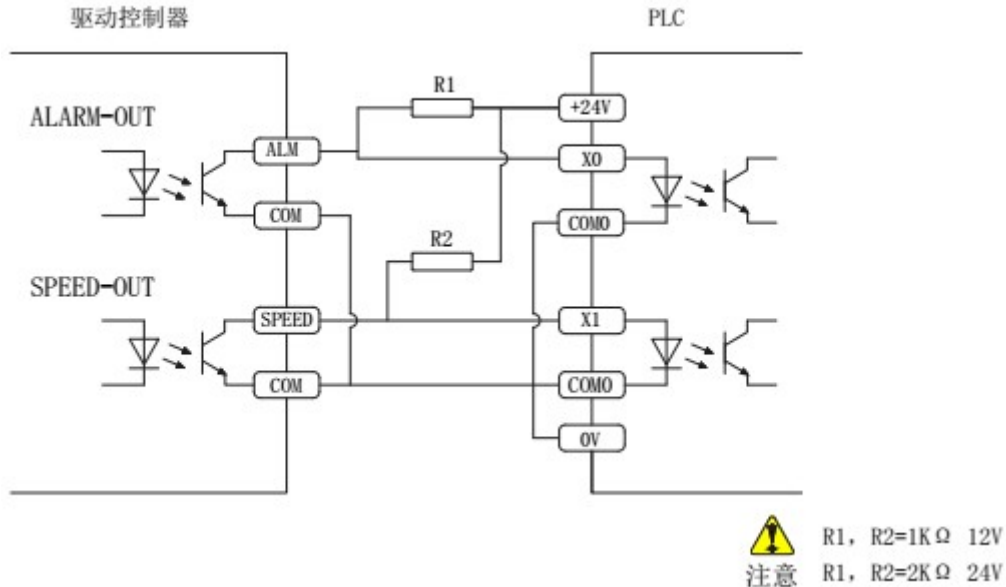
Example: Motor 4 pole



$$F = 1\text{sec} / 2\text{ms} = 500\text{Hz}$$

$$(\text{rpm}) = (500 / 4 \times 60) / 3 = 2500$$

## Output signal diagram



## Function selection settings and operation:

### Acceleration/deceleration time setting

The acceleration time and deceleration time of the motor are set by the potentiometer ACC/DEC. The acceleration/deceleration time can be increased or decreased by rotating ACC/DEC left and right. Setting range: 0.3-15s. The acceleration time is the time required for the motor to reach the rated speed from standstill. The deceleration time is the time required for the motor to run from the rated speed to the stop of the motor.



### Motor pole count setting

In order to better match DC brushless motors with different pole pairs, the pole pairs of the motor can be set by SW2.

ON=2P; OFF=4P

Note: When closing the control, please set SW2 according to the corresponding motor pole pairs.



### Open/closed loop control setting

The open/closed loop control is selected by SW2.

ON = closed loop control; OFF = open loop control.

Note: When closing the control, please set SW2 according to the corresponding motor pole pairs.

### Micro adjustment function

When the external analog voltage is 0-10V, adjust the speed with the micro-adjustable potentiometer.

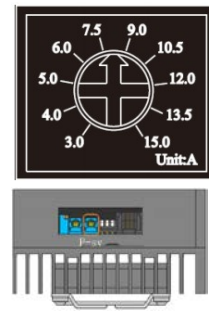
When the motor's running speed does not match the set speed, adjust the speed by slightly adjusting the potentiometer.



## Peak output current setting

The peak output current is set by the P-sV potentiometer. When the load suddenly becomes large, the output current will be limited to the set value, reducing the motor speed and protecting the motor from damage. Please set the peak current according to the scale of the graph. The error between the set peak output current and the actual output current is about  $\pm 10\%$ . For safety reasons, please adjust the peak output current appropriately.

**Note:** When the load suddenly becomes larger, the peak current setting time is 3s, more than 3s. If the load is still high, the drive will stop working. After 5s, the restart function will start.



## Stalled output current limit

When the motor is blocked, the output current will be limited to the set maximum output current value, protecting the drive and motor from damage.

## Stalling torque retention function

It has a simple torque retention function when the motor is blocked.

**Note:** The stalling holding torque is a short-time behavior. Do not use it for braking.

## Restart function

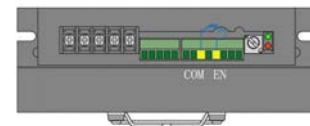
When the motor is blocked or the like, the drive will stop working. After 5s, the drive will start automatically. After restarting, if a fault occurs again, an alarm will be given. The protection function starts and stops working.

## Start and stop

The factory setting of the EN terminal and the COM terminal is to connect the EN terminal to the COM terminal. When the power is turned on, the drive SYS-BLD-35225 can drive the motor to run by itself.

Connect or disconnect the cable between the EN terminal and the COM terminal to control the operation and stop of the motor. When the connection between the EN terminal and the COM terminal, the motor operates. Conversely, the motor stops slowly.

Switching between start and stop of the motor can be achieved by connecting a switch between COM and EN or by using a PLC or the like to control its switching.



The factory setting of the BRK terminal and the COM terminal is that the BRK terminal and the COM terminal are not connected. When the power is turned on, the drive SYS-BLD-35225 can drive the motor to run by itself.

Connecting or disconnecting the BRK and COM terminals controls the natural operation and quick stop of the motor.

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

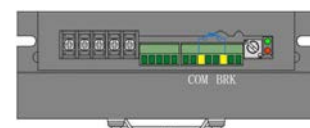
When the connection between the BRK terminal and the COM terminal is disconnected, the motor operates normally.

**Note:** The difference between EN and BRK and the choice of use:

EN controls the natural stop; BRK controls the fast stop

EN and BRK control have the same startup state

When one of EN or BRK is selected to control the start and stop, the other way of wiring should be kept from the factory state.



Switching between motor start and fast stop can be achieved by connecting the switch between COM and BRK or by using PLC to control its on/off.

## Direction control

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

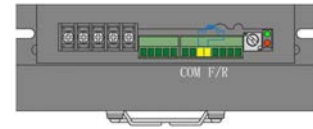
When the power is turned on, the motor rotates forward.

Connect or disconnect the F/R and COM terminals to control the forward and reverse rotation of the motor.

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

When the connection line between the F/R terminal and the COM terminal is connected, the motor is reversed.

Note: When viewed from the direction of the motor shaft, the motor shaft is clockwise for forward rotation and vice versa.



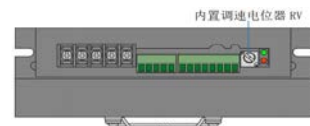
## Selection and setting of speed control scheme:

### Use built-in potentiometer RV speed

Rotate the built-in speed-adjusting potentiometer RV clockwise. After the “click”, the motor starts running. Continue clockwise rotation and the motor speed increases.

Rotate the built-in speed-adjusting potentiometer RV counterclockwise to reduce the motor speed; continue to rotate counterclockwise to the limit position after the “click”. At this time, the built-in speed potentiometer is turned off and the motor stops running.

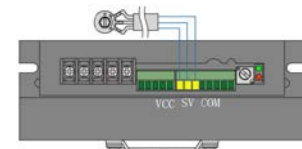
Note: When switching to the external SV input control speed mode, the built-in speed potentiometer RV must be off. The built-in potentiometer RV is rotated counterclockwise to the limit position after the “click”.



### Use external potentiometer to speed

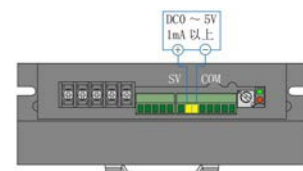
When using an external potentiometer to adjust the speed, use a potentiometer with a resistance value of 10K $\Omega$ . The intermediate terminal of the potentiometer is connected to the SV end, and the terminals on both sides are connected to the VCC and COM terminals respectively.

Note: At this time, the built-in speed potentiometer RV needs to be rotated counterclockwise to the limit position after the “click”. Be sure to pay attention to the order in which the potentiometer leads are connected.

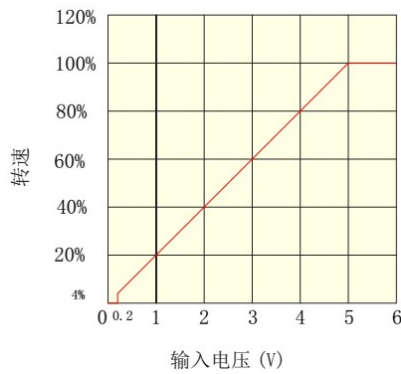


### Use external analog signal speed control DC0-5V

Note: When switching to the external SV input control speed mode, the built-in speed potentiometer RV must be off. The built-in positioner RV is rotated counterclockwise to the extreme position of the “click”.

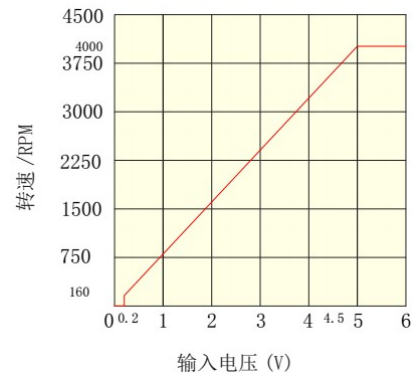


Relationship between analog signal voltage and motor speed (open loop no load)



When the input voltage is approximately 0.2V, the motor speed is 4% of the maximum speed; when the input voltage is approximately 5V, the speed of the motor is the maximum. The maximum speed value depends on the motor specifications and the supply voltage.

Relationship between analog signal voltage and motor speed (closed loop no load)

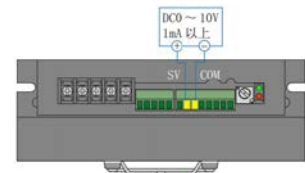


When the input voltage is approximately 0.2V, the motor speed is 160 rpm; when the input voltage is approximately 5 V, the motor speed is 4000 rpm.

### Use external potentiometer to speed

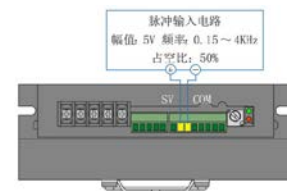
When using the external analog signal DC0~10V speed regulation, please adjust the micro adjustment potentiometer and then adjust the speed control.

Note: When switching to the external SV input control speed mode, the built-in speed potentiometer RV must be off. The built-in positioner RV is rotated counterclockwise to the extreme position of the "click".

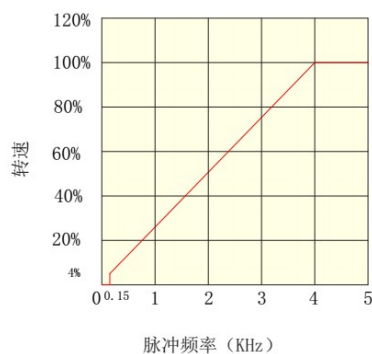


### Using PWM speed

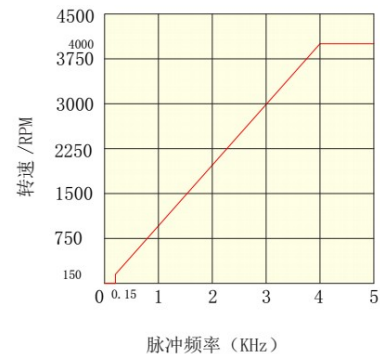
Note: When switching to the external SV input control speed mode, the built-in speed potentiometer RV must be off. The built-in positioner RV is rotated counterclockwise to the extreme position of the "click".



Relationship between duty cycle and motor speed (open loop no load)



Duty cycle and motor speed (closed loop no load)



When the duty cycle is 4%, the motor speed is 4% of the maximum speed; when the duty cycle is 100%, the speed of the motor is the maximum. The maximum speed value depends on the motor specifications and the supply voltage.

When the duty ratio is 4%, the motor speed is 160 rpm; when the duty ratio is 100%, the motor speed is the highest speed, 4000 rpm.

## Status indication. Exception handling:

### Status indication

When the motor has overcurrent, Hall input error, stall, over temperature, over voltage and other conditions, the driver will send an alarm signal. At this time, the fault alarm output (ALM) and the common (COM) will be turned on, so that the fault alarm output (ALM) will be at a low level. At the same time, the driver will stop working and the alarm light will flash.

red indicator	description	
red flash 2	over voltage alarm	
red flash 3	power tube over current alarm	
red flash 4	over current alarm	
red flash 5	under voltage alarm	
red flash 6	Hall alarm	
red flash 7	stall alarm	
red flash 8	two or more alarm	

### Exception handling:

Red indicator	State description	
Red flashes 2 times	Overvoltage alarm	Please check the bus voltage
Red flashes 3 times	Power tube over-current alarm	Determine if the model is correct
Red flashes 4 times	Overcurrent alarm	Check the P-sv settings and check the motor parameters. Or increase the acceleration time
Red flashes 5 times	Undervoltage alarm	Check the power supply voltage and check if the power supply meets a condition that is greater than 1.5 times the motor power.
Red flashes	Hall Alarm	Please check if the motor wiring is firm

6 times		
Red flashes 7 times	Locked alarm	Please determine if the motor is overloaded
Red flashes 8 times	Two or more alarms	Common conditions are Hall and locked-rotor alarms. When the motor cannot adjust the speed, please adjust P-sv to the maximum value