# 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 | – | KΩ |

## Environmental indicators:

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

## Mechanical dimensions and installation drawings:
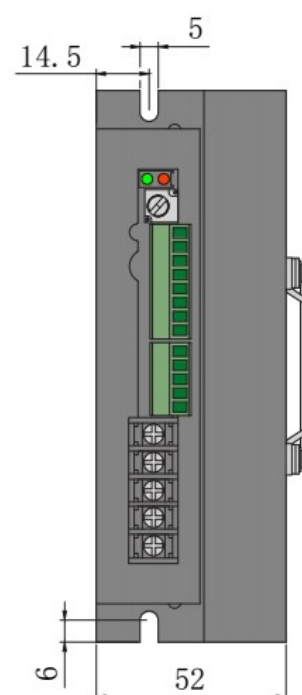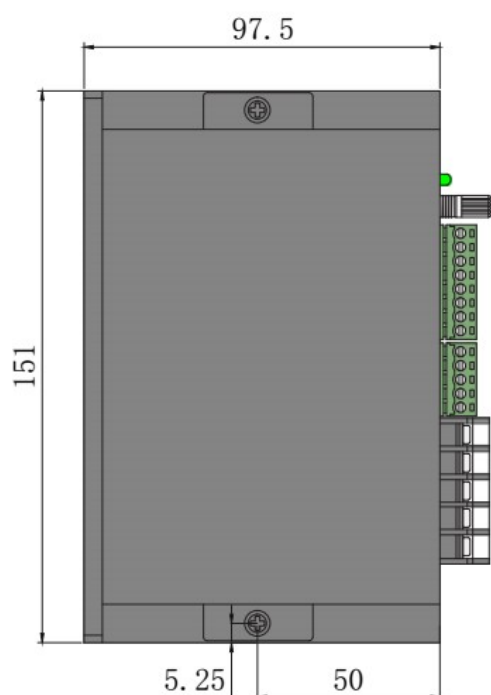
## Driver interface and wiring diagram:
## Driver interface
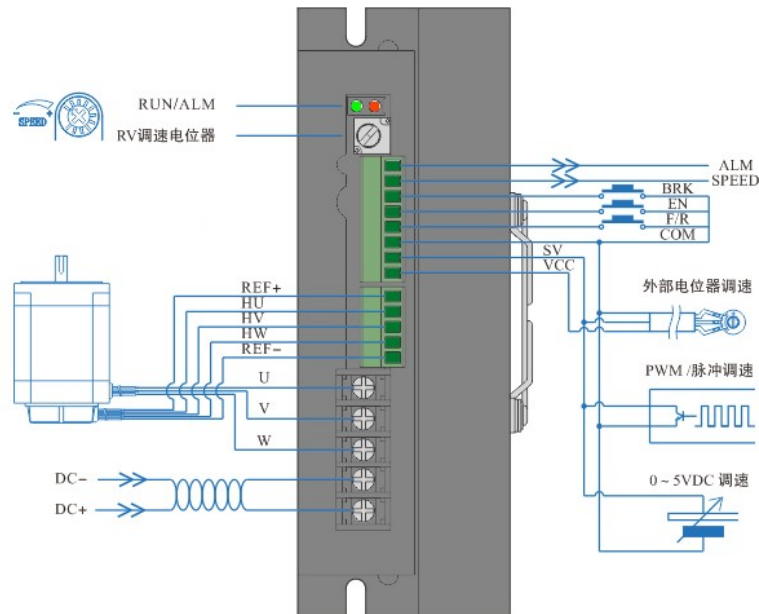


## Input connection

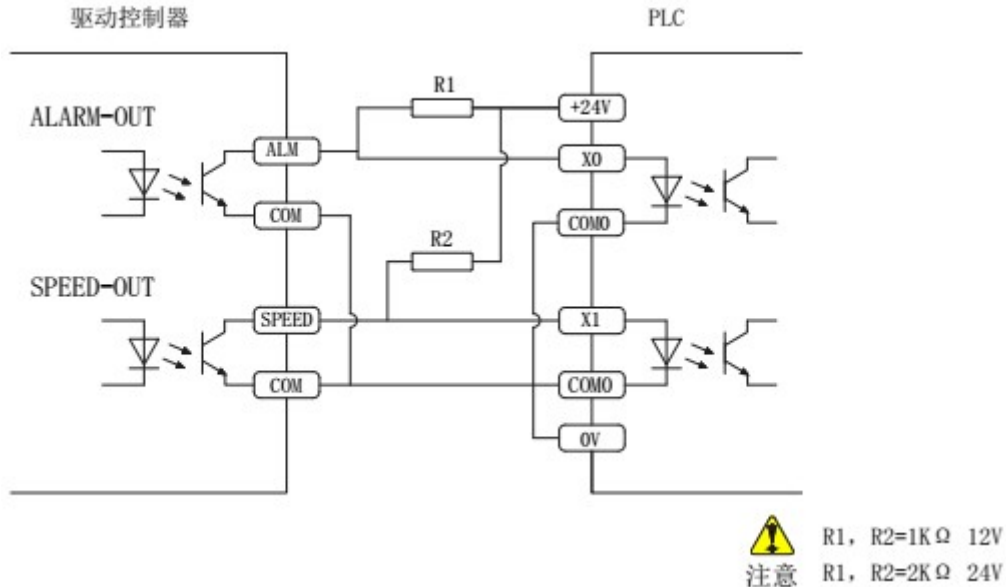| signal | Terminal | SYS-BLD-35225 |
|---|---|---|
| power input | DC+ | DC power input positive (voltage range DC24V-52V) |
| | DC- | DC power input negative |
| Motor connection | W | DC brushless motor W phase |
| | V | DC brushless motor V phase |
| | U | DC brushless motor U phase |
| Hall signal | 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: $$转速（RPM/MIN）= \frac{SPEED-OUT\ 的频率}{6\times POLE\ （磁极对数）} \times 60/3$$ F: output pulse frequency; Hz: P: motor pole pairs: N: motor speed |

Example: Motor 4 pole

2ms

F=1sec/2ms=500Hz

(rpm)=(500/4×60)/3=2500

## Output signal diagram

驱动控制器                                                    PLC

ALARM-OUT

ALM

COM

R1

+24V

X0

COMO

R2

SPEED-OUT

SPEED

COM

X1

COMO

0V

⚠ 注意    R1，R2=1KΩ  12V
         R1，R2=2KΩ  24V

## 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 ±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.
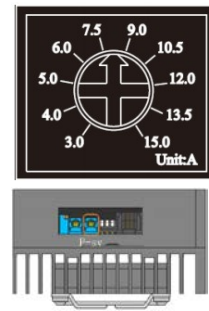
## Stalled output current limit

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.
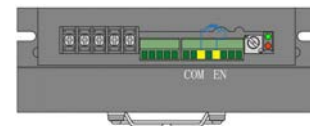
The factory setting of the BRK terminal and the COM terminal is that the BRK terminal and the COM terminal are not connected. When the power is turned on, the drive SYS-BLD-35225 can drive the motor to run by itself.
Connecting or disconnecting the BRK and COM terminals controls the natural operation 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.
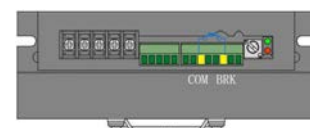
Switching between motor start and fast stop can be achieved by connecting the switch between COM and BRK or by using PLC to control its on/off.

## 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.
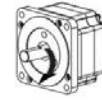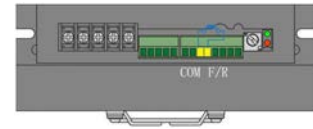
## Selection and setting of speed control scheme:

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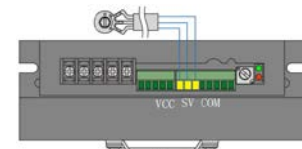
Note: When switching to the external SV input control speed mode, the built-in speed potentiometer RV must be off. The built-in potentiometer RV is rotated counterclockwise to the limit position after the "click".
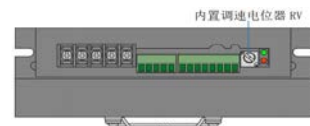
### Use external potentiometer to speed

When using an external potentiometer to adjust the speed, use a potentiometer with a resistance value of 10KΩ. 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".
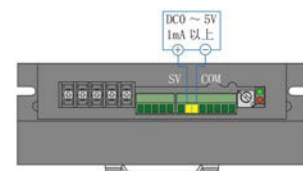
Relationship between analog signal voltage
and motor speed (open loop no load)
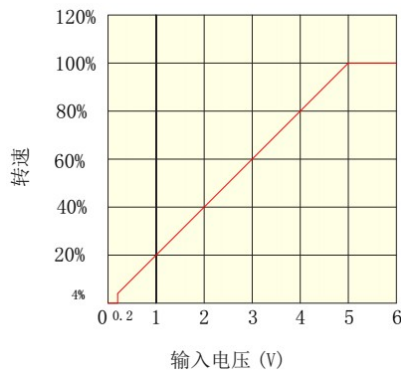


When the input voltage is approximately 0.2V,
the motor speed is 4% of the maximum speed; when
the input voltage is approximately 5V, the
speed of the motor is the maximum. The maximum
speed value depends on the motor
specifications and the supply voltage.

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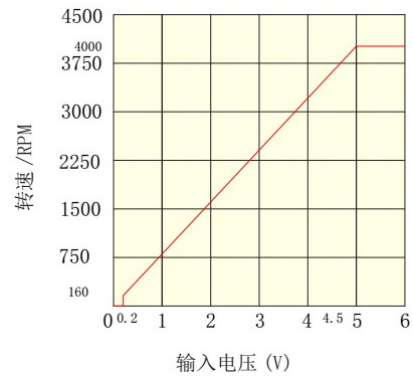


When the input voltage is approximately
0.2V, the motor speed is 160 rpm; when the
input voltage is approximately 5 V, the
motor speed is 4000 rpm.

## 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
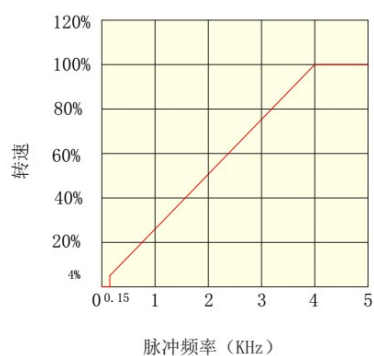extreme position of the "click".
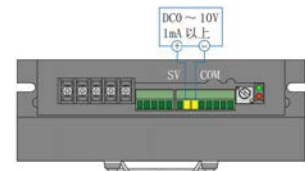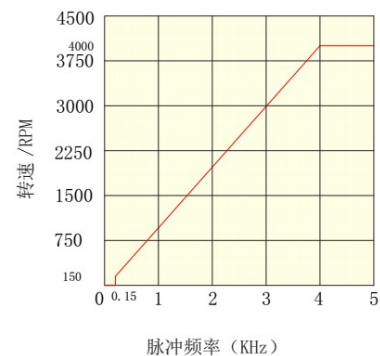


## Using PWM speed

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".
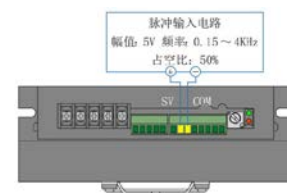


Relationship between duty cycle
and motor speed (open loop no load)



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 | ON 1S  5S  OFF 1S |
| red flash 3 | power tube over current alarm | ON 1S  5S  OFF 1S |
| red flash 4 | over current alarm | ON 1S  5S  OFF 1S |
| red flash 5 | under voltage alarm | ON 1S  5S  OFF 1S |
| red flash 6 | Hall alarm | ON 1S  5S  OFF 1S |
| red flash 7 | stall alarm | ON 1S  5S  OFF 1S |
| red flash 8 | two or more alarm | ON 1S  5S  OFF 1S |

### 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 |