

## SYS-BLA32658 Brushless DC Motor Driver

### Overview:

SYS-BLA32658 is suitable for high-voltage three-phase DC brushless motors with a power of 750W or less. This product design With advanced DSP control technology, it has the characteristics of high torque, low noise, low vibration, fast start and stop. With It has PID current and speed double closed loop control, over voltage, under voltage, over current, over temperature and other protection functions. From Stop and commutation control, speed signal output, fault alarm output, brake stop function.



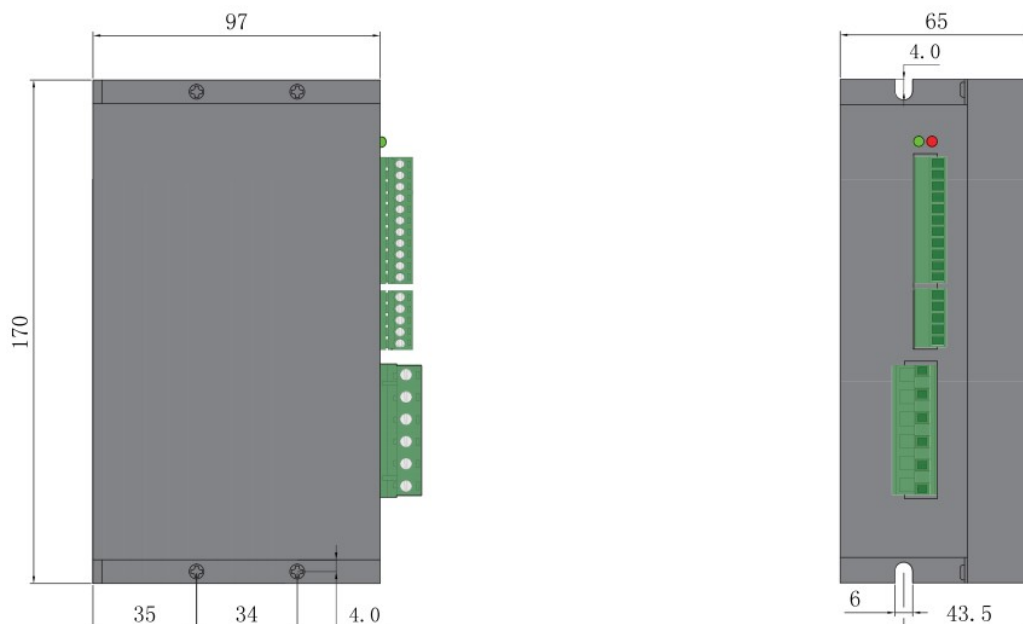
### Electrical parameters

parameter	Min	Typical	Max	Unit
Input voltage	180	220	265	VAC
Output current	–	–	8	A
motor speed	0	–	20000	RPM
Hall signal voltage	–	–	5	V
Hall drive current	12	–	–	mA
External speed potentiometer	–	10	–	K $\Omega$

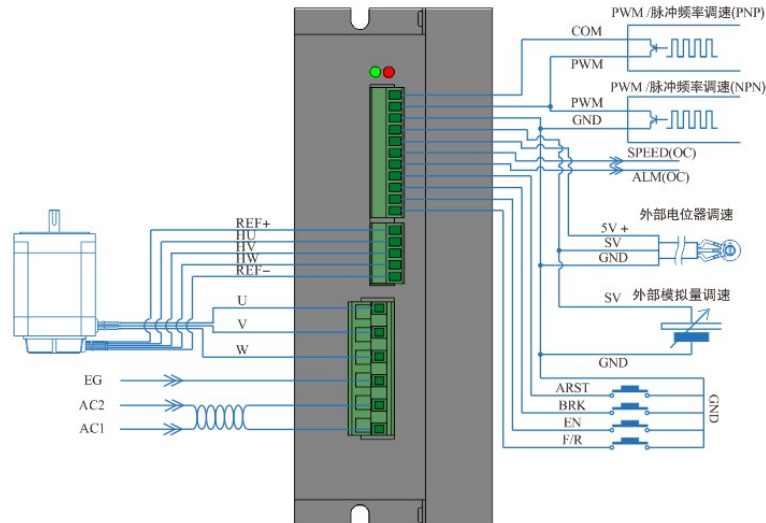
### Environmental indicators:

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:



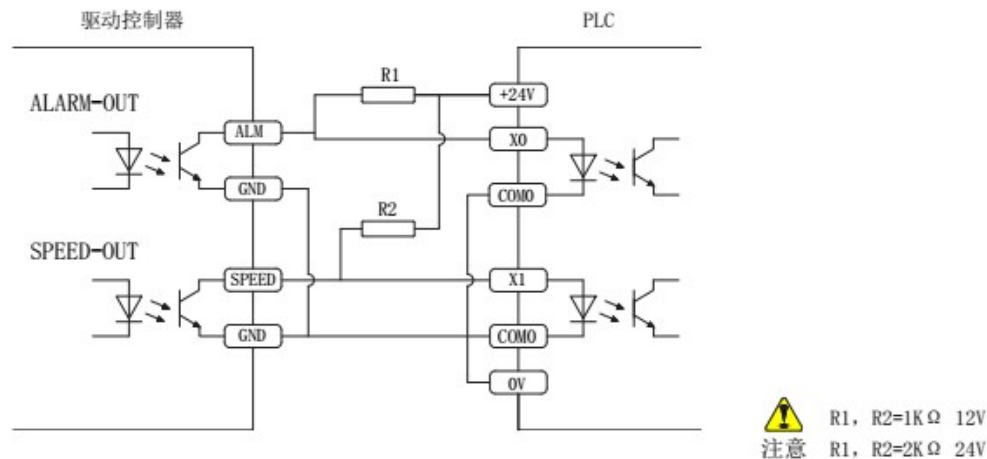
## Driver interface and wiring diagram: Driver interface



## Input connection

signal	Terminals	content
control signal	COM	External power supply common terminal. (Example, PLC24V output port can be connected)
	PWM	Pulse frequency/duty cycle adjustment signal input port, SW1, SW2 dialing to select speed mode
	GND	Control ground port (common)
	SV	External speed input port
	5V+	Built-in 5V voltage port, potentiometer can be used for external speed regulation
output signal	SPED	Corresponds to the operating speed of the motor, Output the corresponding pulse frequency, use SPEED-OUT to calculate the motor speed
	ALM	Motor or drive control fault signal output, normally 5V, 0V at fault level
control signal	ARST	The fault resets the input port. When the driver fails, the connection to the GND terminal clears the fault alarm.
	BRK	The motor brake is stopped when the RK and COM terminals are disconnected or the high level is input, and the motor is operated when the short or low level is input.
	EN	Disconnected or high level at the EN and COM terminals Slowly stop the motor, motor runs at short or low input
	F/R	The F/R and COM terminals are disconnected or the high level is input. The motor rotates forward. When the short or low level input is input, the motor is reversed.
Hall signal	REF+5	DC Brushless Motor Hall Signal Power Line
	HU, HV, HW	DC Brushless Motor Hall Signa
	REF-	Brushless DC Motor Hall Signal Grounding
Motor signal	V, U, W	DC brushless motor V,U,W phase
Power connect ion	AC1,AC2	AC power input(voltage arrange AC180-265V)
	EG	Grounding

## Output signal diagram



## Function selection setting and operation: Acceleration/deceleration time setting

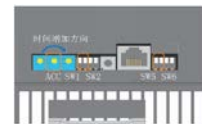
The acceleration time and deceleration time of the motor are set by the potentiometer ACC. The acceleration/deceleration time can be increased or decreased by rotating the ACC left and right. Setting range: 0.3-15s.

The acceleration time is the time for the motor to reach the rated speed from the standstill. By rotating the DEC left and right, the acceleration/deceleration time can be increased or decreased. Setting range: 0.3-15s.

The deceleration time is the time for the motor to travel from the rated speed to the stop of the motor.

## Speed mode selection

SW1	SW2	Speed mode
OFF	OFF	Built-in potentiometer speed control
ON	OFF	External analog voltage / external potentiometer speed
OFF	ON	PWM speed regulation
ON	ON	Pulse frequency speed regulation



## Motor pole count setting

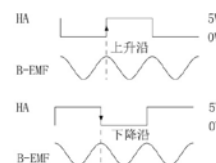
SW5	SW6	Number of pole pairs
ON	OFF	2
OFF	ON	4
ON	ON	5
OFF	OFF	The factory setting is 4 poles, customers can modify it through RS-485

**Note:** For closed-loop control, set SW5 and SW6 according to the number of motor poles.

## Motor matching

The opposite electromotive force is selected by SW3 to correspond to the rising or falling edge of the Hall signal. Please set SW3 according to the motor

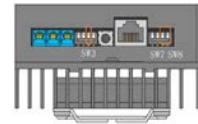
ON	The opposite electromotive force corresponds to the rising edge of the Hall signal
OFF	The opposite electromotive force corresponds to the falling edge of the Hall signal



## Open/closed loop control setting

Open loop closed loop setting is set by SW7 and SW8.

switch	OFF	ON
SW7	closed loop control	open loop control
SW8	Speed closed loop	Speed current double closed loop



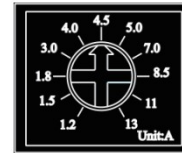
**Note:** For closed-loop control, set SW5 and SW6 according to the number of motor poles.

## 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. The setting range is 1.2-13A. 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.

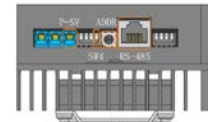
**Note:** When the load suddenly becomes larger, the peak current setting time is 3s, when more than 3s, if the load is still high, it will alarm. The protection function is activated and the drive will stop working.



## RS-485 communication

By setting RS-485, the operation command and various parameters can be set and read by the host computer.

Please select the communication address through ADDR dialing code (see the communication manual for details)



## RS-485 terminal 120Ω resistor

When the 485 bus length is long, in order to reduce the interference of the current signal transmission to the bus, please set SW4 to the ON state to connect the RS-485 terminal 120Ω resistor.

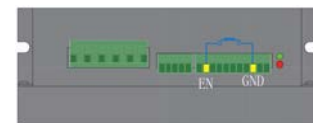
ON	RS-485 terminal 120Ω resistor connection
OFF	RS-485 terminal 120Ω resistor is not connected

## 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 driver SYS-BLDH-750 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.



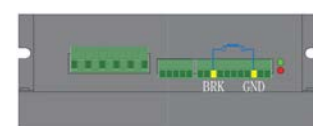
## Quick stop

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 driver SYS-BLDH-750 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.



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.

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

- ① EN controls the natural stop; BRK controls the fast stop
- ② EN and BRK control have the same startup state
- ③ 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.

## Direction control

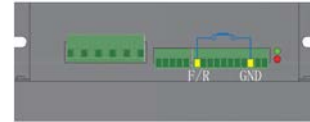
The factory setting of the F/R terminal and the COM terminal is that the F/R terminal and the COM terminal are not connected.

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.

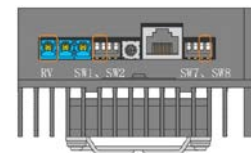


## Selection and setting of speed control scheme:

### Use built-in potentiometer RV speed

Rotate the built-in speed potentiometer RV clockwise to increase the motor speed  
Rotate the built-in speed potentiometer RV clockwise to increase the motor speed

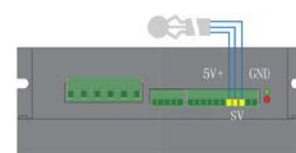
SW1	OFF
SW2	OFF
SW7	OFF: Closed loop control ON: open loop control
SW8	OFF: speed closed loop ON: speed current double closed loop



### Use external potentiometer to speed

When using an external potentiometer to adjust the speed, use a potentiometer with a resistance value of 10KΩ. The middle terminal of the potentiometer is connected to the SV end, and the terminals on both sides are respectively connected to the 5V+ and GND terminals.

SW1	ON
SW2	OFF
SW7	OFF: Closed loop control ON: Open loop control
SW8	OFF: speed closed loop ON: speed current double closed loop
RV	Rotate counterclockwise to the extreme position

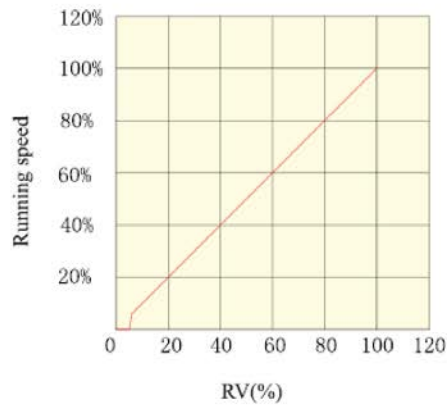


### Use external analog signal to regulate DC0-5V

SW1	ON
SW2	OFF
SW7	OFF: Closed loop control ON: Open loop control
SW8	OFF: speed closed loop ON: speed current double closed loop
RV	Rotate counterclockwise to the extreme position



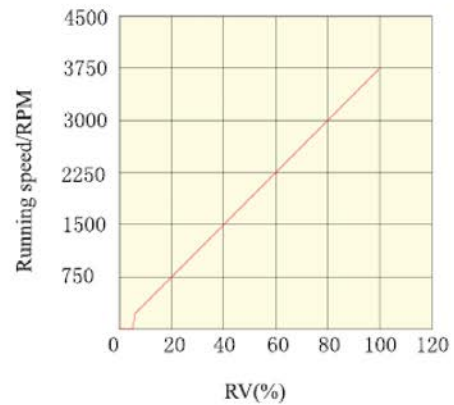
Built-in speed potentiometer and motor speed diagram (open-loop no-load)



When the input voltage is approximately 0.6V, the motor speed is 4% of the maximum speed; when the input voltage is approximately 5V, the motor speed is the maximum.

\*1. The maximum speed depends on the motor specifications and the supply voltage.

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



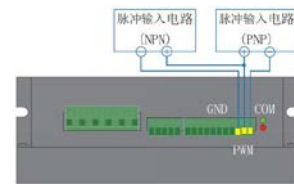
When the input voltage is approximately 0.6V, the motor speed is 160 rpm; when the input voltage is approximately 5V, the motor speed is 4000 rpm.

\*1. Depending on the motor specifications and the supply voltage, the motor speed will drop.

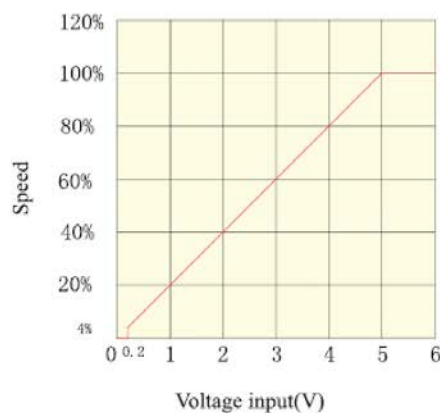
2. Please set the number of pole pairs of the motor through SW5, SW6 or RS-485.

### Using pulse frequency speed regulation

SW1 ON  
 SW2 ON  
 SW7 OFF: Closed loop control ON: Open loop control  
 SW8 OFF: speed closed loop ON: speed current double closed loop  
 RV Rotate counterclockwise to the extreme position  
 Amplitude: 5V Frequency: 0.15-4KHz Duty cycle: 50%

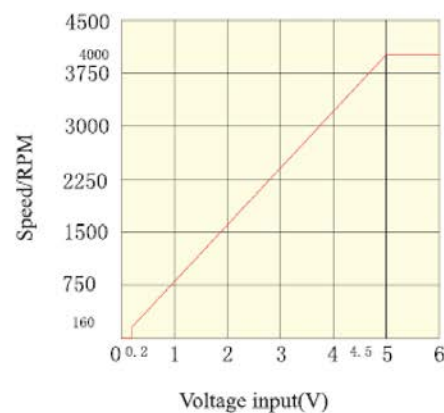


Relational graph between duty ratio and the motor speed (open loop no load)



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.

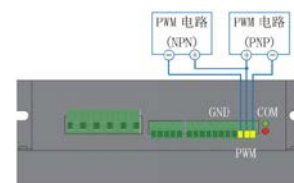
Relational graph between duty ratio and the motor speed (closed loop no load)



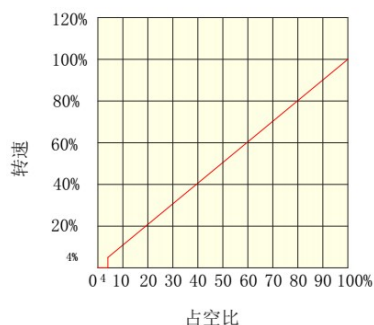
When analog voltage is 0.2V, motor speed is about 160rpm; when analog voltage is 5V, motor reaches max speed 4000rpm.

## Using PWM speed

SW1 OFF  
 SW2 ON  
 SW7 OFF: Closed loop control ON: Open loop control  
 SW8 OFF: speed closed loop ON: speed current double closed loop  
 RV Rotate counterclockwise to the extreme position  
 Amplitude: 5V Frequency: 1-3KHz

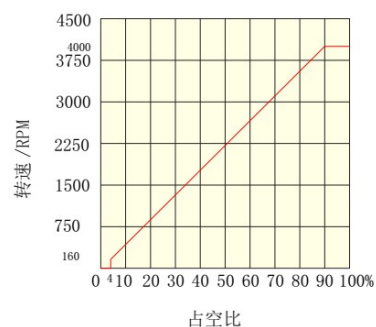


Relationship between duty cycle and motor speed (open loop no load)



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.  
 \*1. The maximum speed value depends on the motor specifications and power supply voltage.

Duty cycle and motor speed (closed loop no load)



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.  
 \*1. Depending on the motor specifications and the power supply voltage, the motor speed may decrease.  
 2. Set the pole count of the motor by SW5, SW6 or RS-485.

## Recommended and adapted motors:

The following DC brushless motors of the company have good compatibility with SYS-BLDH-750 DC brushless drives. With smooth speed, large output torque, quiet, low vibration,

Such excellent features are the best choice for your use.

Model	Output Power (W)	Voltage (VDC)	Rated Speed (RPM)	Rated Torque (NM)	Length (mm)
80BLF-5030HBB	500	310	3000	1.6	145
80BLF-7530HBB	750	310	3000	2.5	150
86BLF-4030HBB	40.	310	3000	1.4	112
86BLF-5030HBB	500	310	3000	1.6	125
110BLF-60200HBB	1250	310	2000	6.0	198

**Status indication. Exception handling:**

## Status indication

When the motor has overcurrent, Hall input error, locked rotor, over temperature, over voltage, etc., 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	State description	
Red flashes 1 times Green flashes 1 times	Overcurrent alarm	Excessive current flows into the controller due to ground short circuit Please check if the wiring between controller and motor is broken
Red flashes 2 times Green flashes 1 times	Over temperature alarm	The internal temperature of the controller exceeds the detection temperature of ALARM
Red flashes 3 times Green flashes 1 times	Overvoltage alarm	The power supply voltage reaches the rated 130%
Red flashes 4 times Green flashes 1 times	Under voltage alarm	The supply voltage is lower than the rated 60%
Red flashes 5 times Green flashes 1 times	Abnormal sensor	The sensor signal line of the motor is disconnected during operation or the connector of the motor signal is disconnected
Red flashes 6 times Green flashes 1 times	Over speed	The output shaft speed of the motor is over 4800r/min
Red flashes 8 times Green flashes 1 times	Stall	When the external load momentarily becomes too large, the motor stops
Red flashes 9 times Green flashes 1 times	system error	Control system circuit failure
Red flashes 10 times Green flashes 1 times	Short circuit protection	Short circuit in motor or cable
Red flashes 11 times Green flashes 2 times	Power tube over-current alarm	Short circuit in motor or connecting wire, or excessive load