

SYS-BLA32654 Brushless DC Motor Driver

Overview:

SYS-BLA32654 Suitable for high-voltage three-phase brushless DC motors with power up to 350W. This product design adopts

With advanced DSP control technology, features such as high torque, low noise, low vibration, fast start and stop. with With PID current and speed double closed-loop control, over-voltage, under-voltage, over-current, over-temperature and other protection functions. Stop and reversing control, speed signal output, fault alarm output, brake stop function.

Electrical parameters:

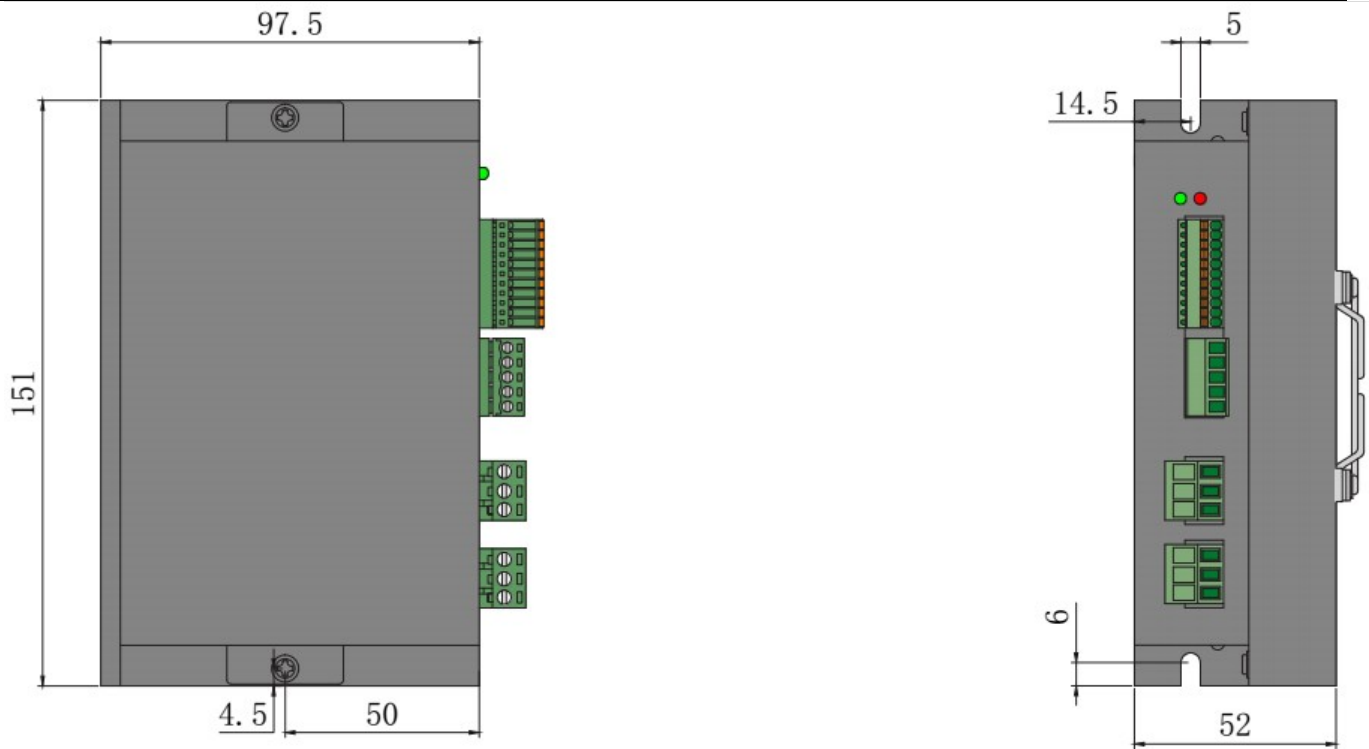
parameter	Min	Typical	Max	Unit
Input voltage	180	220	265	VAC
Output current	-	-	4	A
motor speed	0	-	20000	RPM
Hall signal voltage	-	-	5	V
Hall drive current	12	-	-	mA
External speed potentiometer	-	10	-	KΩ



Environmental indicators:

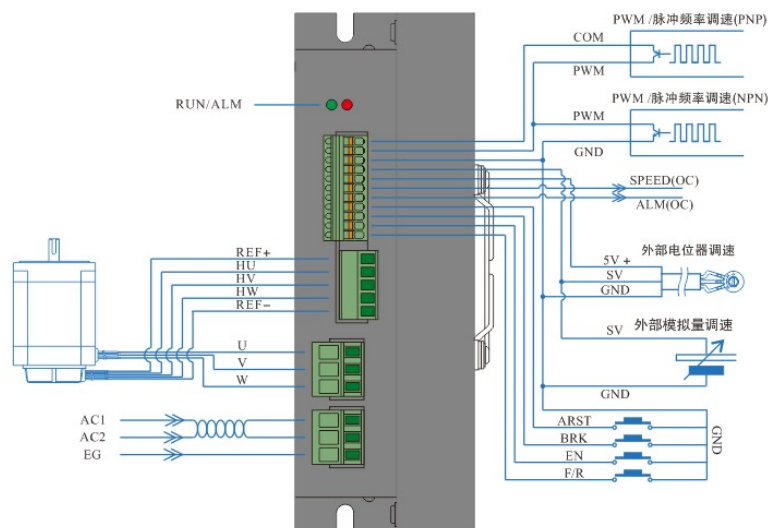
envirnmental factor	Environmental indicators
cooling method	Natural cooling or forced cooling
Use occasion	Avoid dust, oil and corrosive gases
Operating temperature	10℃-+50℃
environment humidity	90%RH(no condensation)
humidity	5.7m/S2max
storage temperature	0℃-+50℃

Mechanical dimensions and installation drawings:



Driver interface and wiring diagram:

Driver interface

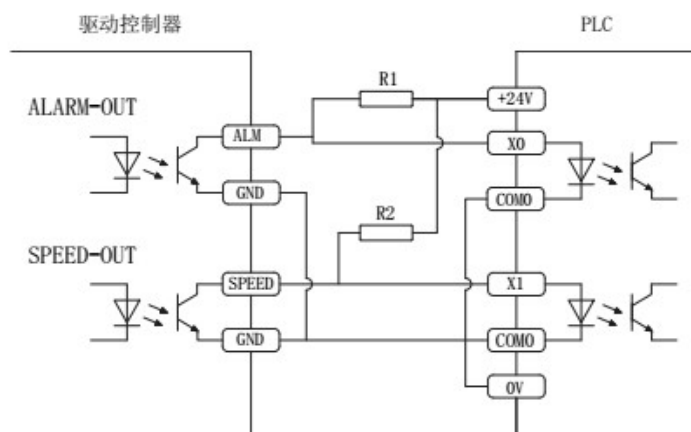


Input connection

signal	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 connection	AC1,AC2	AC power input(voltage arrange AC180-265V)
	EG	Grounding

Output signal diagram



注意 R1, R2=1K Ω 12V
R1, R2=2K Ω 24V

Function selection setting and operation: Acceleration/deceleration time setting

The potentiometer ACC/DEC sets the acceleration and deceleration times of the motor. You can increase or decrease the acceleration/deceleration time by rotating ACC left or right. Setting range: 0.3-15s. Acceleration time is the time required for the motor to reach the rated speed from a standstill. By rotating the DEC left or right, the acceleration/deceleration time can be increased or decreased. Setting range: 0.3-15s. The deceleration time is the time required for the motor to stop from the rated speed until the motor stops.



Speed mode selection



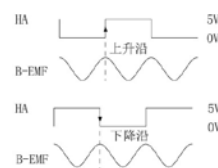
SW1	SW2	Speed mode
OFF	OFF	Built-in potentiometer speed
ON	OFF	External analog voltage / external potentiometer speed
OFF	ON	PWM speed regulation
ON	ON	Pulse frequency regulation

Motor pole number setting

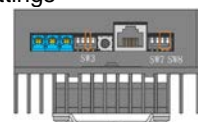
SW5	SW6	pole
ON	OFF	2
OFF	ON	4
ON	ON	5
OFF	OFF	Factory setting is 4 poles, customers can modify via RS-485

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



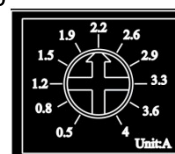
Open/closed loop control settings



Set the open and closed loop settings with SW7 and SW8.

switch	OFF	ON
SW7	Closed-loop control	Open-loop control
SW8	Speed closed loop	Speed current double closed loop

Peak output current setting



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

The P-sV potentiometer is used to set the peak output current. When the load suddenly increases, the output current is limited to the set value, which reduces the motor speed and protects the motor from damage. The setting range is 0.5-4A. Please set the peak current according to the graph scale. The error between setting the 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 increases, the peak current setting time is 3s, more than 3s, if the load is still high, it will alarm. The protection function starts and the drive will stop working.

With RS-485, you can set and read operation commands and various parameters through the host computer. Please select the communication address through ADDR dialing (see communication manual for details)

RS-485 terminal 120Ω resistor

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

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

Start and stop

The factory settings for the EN and GND terminals are to connect the EN terminal to the GND terminal. When the power is turned on, the driver BLDH-350 can drive the motor to run on its own.

Connecting or disconnecting the connecting wires at the EN and GND terminals controls the operation and stopping of the motor. When the connection between EN and GND, the motor runs. Instead, the motor slowly stops.

By switching the switch between GND and EN or using a PLC to control its on/off, the start and stop of the motor can be switched.

The factory settings for the BRK and GND pins are that the BRK and GND pins are not connected. When the power is turned on, the driver BLDH-350 can drive the motor to run on its own.

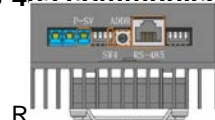
Connecting or disconnecting the connecting wires of the BRK terminal and the GND terminal can control the natural operation and quick stop of the motor.

The motor quickly stops when the connection between BRK and GND is

connected.

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

RS-485 communication



note: The difference between EN and BRK and the use of choice:

- ① Natural stop for EN control; fast stop for BRK control
- ② The EN and BRK controls have the same start state
- ③ When one of EN or BRK is selected to control the start-stop, the other way of wiring should be kept at the factory.

Direction contro

The factory setting of the F/R and GND terminals is that the F/R and GND terminals are not connected.

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

Connecting or disconnecting the connecting wires of the F/R and GND terminals can control the positive and negative rotation of the motor.

When the connection between F/R and GND is disconnected, the motor rotates forward.

When connecting the F/R end to the GND end, the motor reverses.

note: Observed from the direction of the motor shaft, the motor shaft rotates clockwise, and vice versa.

The switch between motor start and quick stop can be achieved by controlling the switch of the GND and BRK to the switch or PLC.



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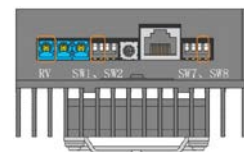
Speed control options and settings

Use internal potentiometer RV speed

Clockwise rotation of built-in speed potentiometer RV, motor speed increases

Counter-clockwise rotation of built-in speed potentiometer RV, motor speed is reduced

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

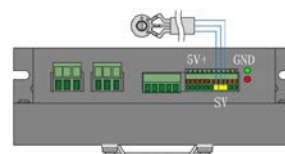


Use external potentiometer to adjust speed

When using an external potentiometer for speed control, use a potentiometer with a resistance of 10KΩ. The middle lead of the potentiometer is connected to the SV terminal, and the leading ends of the potentiometer are connected to 5V+ and GND terminals respectively.

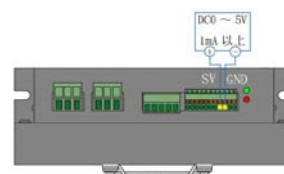
SW1	ON
SW2	OFF
SW7	OFF: closed-loop control ON: open-loop control
SW8	OFF: speed closed loop ON: speed current double closed loop

RV Rotate counterclockwise to the extreme position

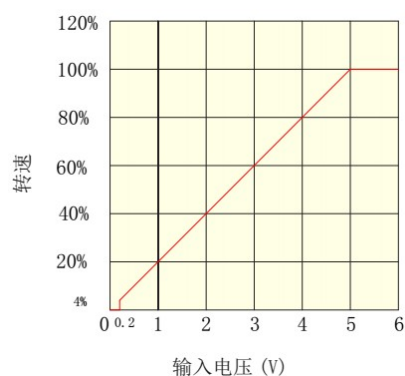


Speed control using external analog signals DC0-5V

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

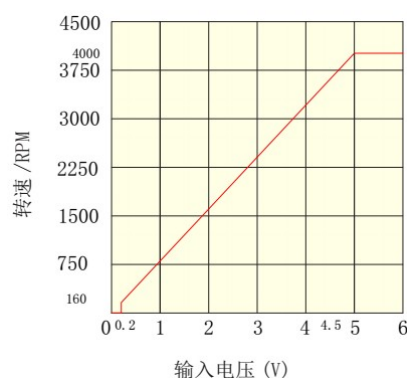


Analog signal voltage and motor speed relationship (open-loop no-load)



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 size and supply voltage.

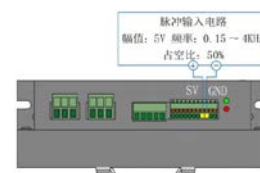
Analog signal voltage and motor speed relationship (closed-loop no-load)



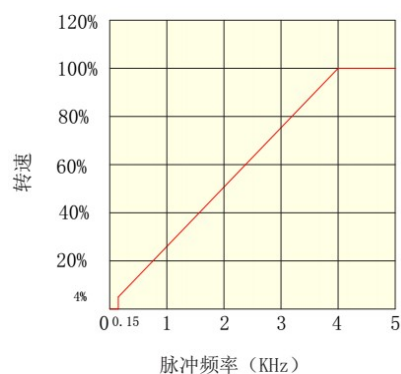
When the input voltage is about 0.2V, the motor speed is 160rpm; when the input voltage is about 5V, the speed of the motor is 4000rpm.

Use pulse frequency speed regulation

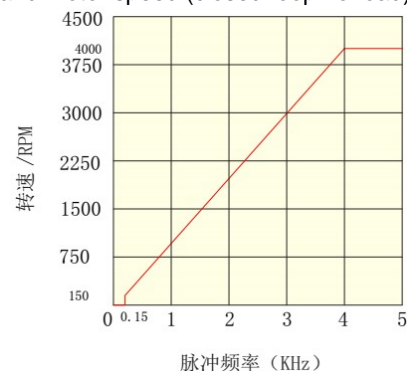
SW1	ON
SW2	OFF
SW7	OFF: closed-loop control ON: open-loop control
SW8	OFF: speed closed loop ON: speed current double closed loop
RV	Rotate counterclockwise to the extreme position



Relationship between pulse frequency and motor speed (open-loop no-load)



Relationship between pulse frequency and motor speed (closed-loop no-load)

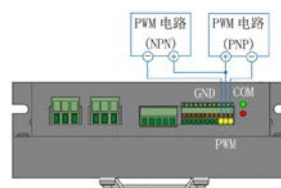


When the pulse frequency is 0.15KHz, the motor speed is 5% of the maximum speed; when the input voltage is about 4KHz, the speed of the motor is the maximum. The maximum speed value depends on the motor size and supply voltage.

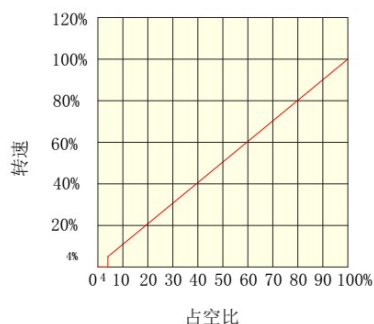
When the pulse frequency is 0.15 KHz, the motor speed is 150 rpm; when the pulse frequency is 4 KHz, the motor speed is 4000 rpm.

Use PWM speed

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
Amplitude: 5V Frequency: 1-3KHz	

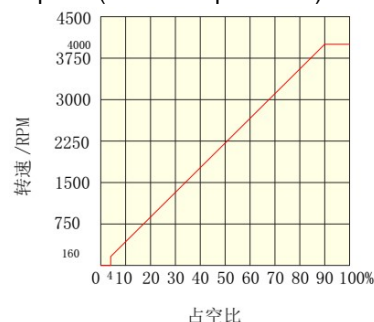


Relationship between duty cycle and motor speed (open-loop no-load)



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

The relationship between 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 speed of the motor is the highest speed, 4000 rpm.

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