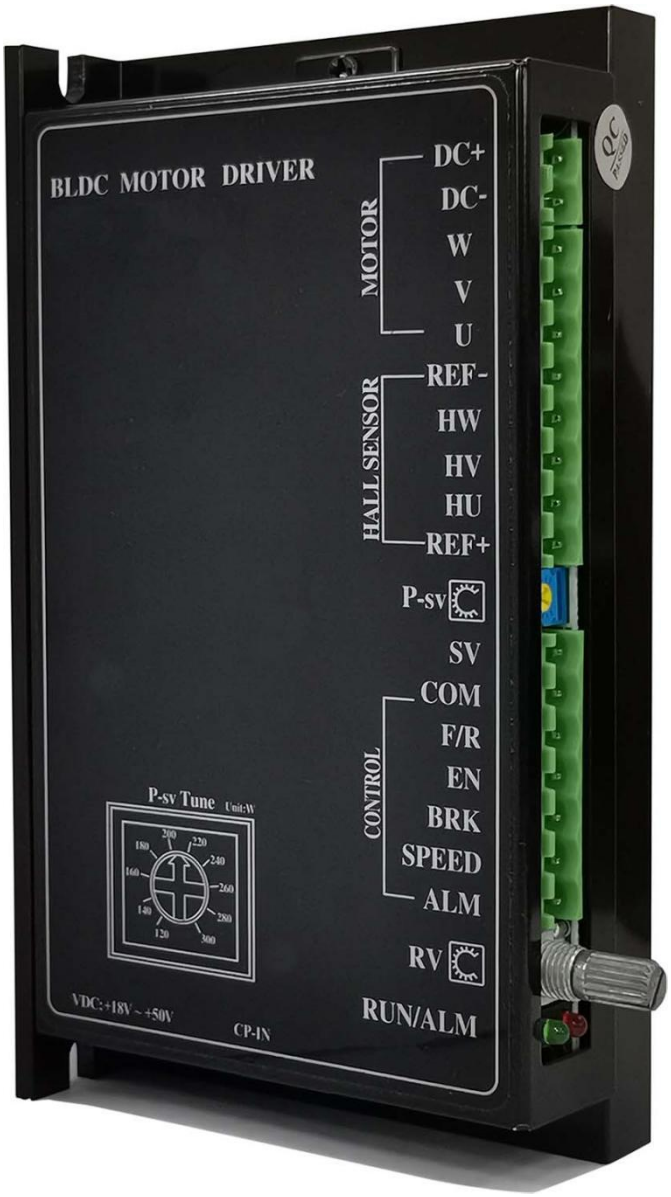
JKBLD300V2

BRUSHLESS DC Driver

User Manual

Version 1.1



1. Product Features

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

2. Electrical properties and environmental indicators

2.1 Electrical properties

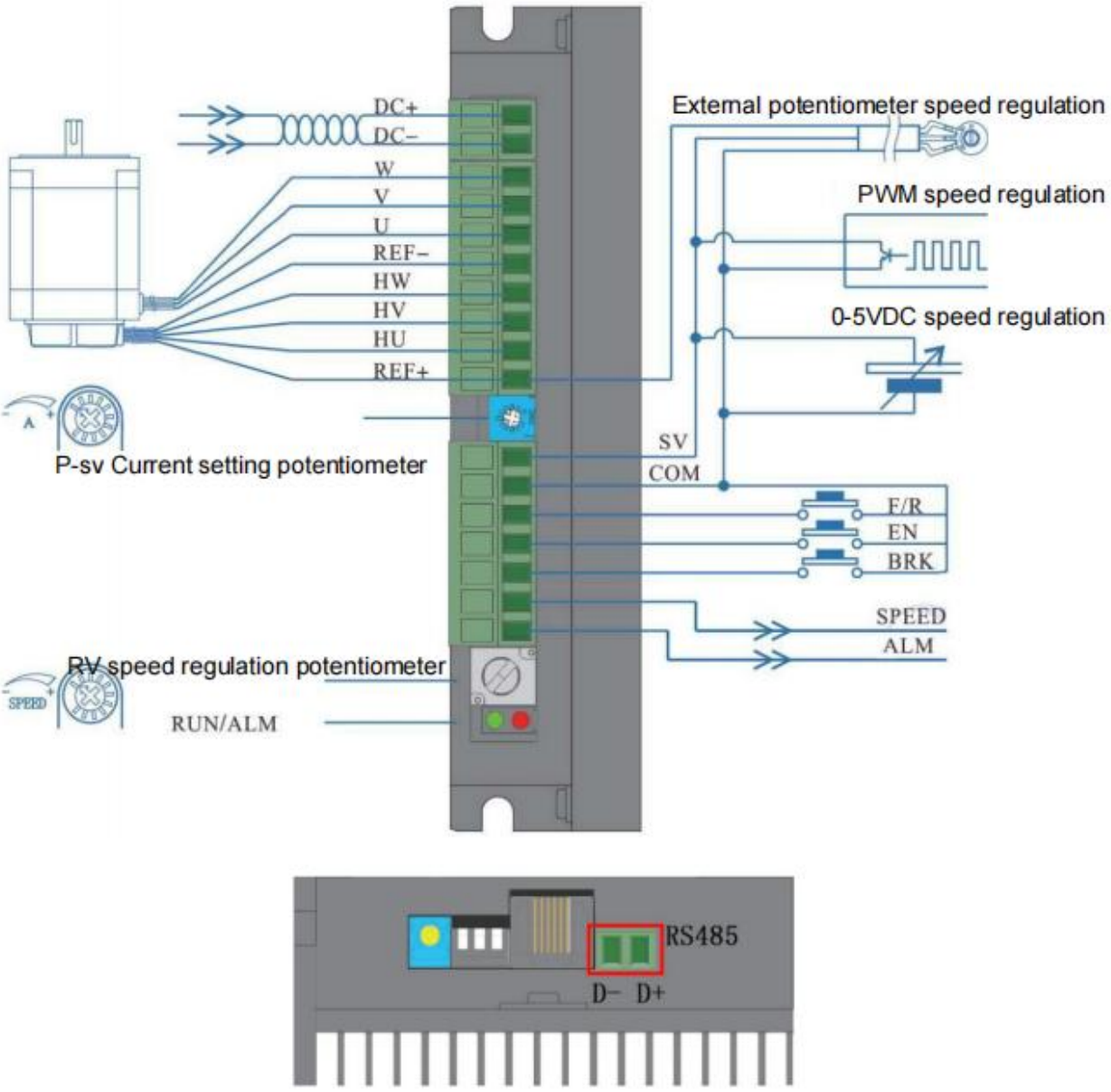
Driver parameter	Min Value	Rated Value	Max Value
Voltage input DC (V)	14	48	56
Current output(A)	-	-	15
Motor speed rang（rpm）	0	-	20000
Hall signal voltag（V）	-	-	5
Hall drive current (mA)	12	-	-
External potentiometer (KΩ)	-	10	-

2.2 Environmental indicators

Environmental factor	Environmental indicators
Cooling method	Natural cooling or forced cooling
Usage occasion	Avoid dust, oil stains, and corrosive gases
Operating temperature	+10℃ ～ +50℃
Environmental humidity	90%RH (non-condensing)
shock	5.9m/s² max
Storage temperature	0℃ ～ +50℃

3. Driver interface and wiring diagram

3.1 Driver interface



3.2 Port signal description

Signal	Terminal	Functional Description
Power connection	DC+	DC power input positive pole. (Voltage range DC24~52V)
	DC-	DC power input negative pole.
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 grounded.
	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 supply.
Control signal	SV	① External potentiometer speed regulation; ② External analog signal input; ③ PWM input
	COM	Common port (OV reference level).
	F/R	When the F/R terminal and COM terminal are disconnected or high-level input, the motor rotates forward, and when short circuited or low-level input, the motor reverses.
	EN	When the EN terminal and COM terminal are disconnected or high-level input, the motor slowly stops, and when short circuited or low-level input, the motor runs.
	BRK	When the BRK terminal and COM terminal are disconnected or high-level input, the motor brake stops, and when short circuited or low-level input, the motor runs.
Output signal	SPEED	Output a pulse frequency that matches the operating speed of the motor. The motor speed can be calculated using SPEED-OUT. The calculation formula is: N (rpm)=(F/P) × 60/3 F: Output pulse frequency (Hz); P: Number of motor poles; N: Motor speed
	ALM	The output signal of the motor or drive control fault signal is normally 5V, and in the event of a fault, it is 0V.
RS485 communication	D+	RS485 communication line D+(A) end.
	D-	RS485 communication line D - (B) end.

4. Function Setting

4.1 Acceleration/deceleration time setting

Set the acceleration and deceleration time of the motor through the side potentiometer ACC/DEC of the driver. Adjusting the potentiometer clockwise can increase the acceleration/deceleration time, while adjusting the potentiometer counterclockwise can reduce the acceleration/deceleration time. Setting range: 0.2-15S.

Note: Acceleration time refers to the time required for the motor to reach the rated speed from a stationary state; The deceleration time refers to the time required for the motor to stop from the rated speed.

4.2 Motor pole number setting

In order to better match DC brushless motors with different pole pairs, the pole pairs of the motor can be set through the driver side dial switch SW1.
ON: 2 pairs of poles;
OFF: 4 pairs of poles.
Attention: When using closed-loop control, please first set SW1 based on the number of motor poles

4.3 Open/Closed Loop Control Settings

Select open loop control or closed loop control through the driver side dial switch SW2.
ON: closed-loop control;
OFF: Open loop control.
Attention: When using closed-loop control, please first set SW1 based on the number of motor poles.

4.4 Peak output current setting

Set the peak output current through the P-sv potentiometer in the middle of the driver interface. When the load suddenly increases, the output current will be limited to the set value, reducing the motor speed and protecting the motor from damage.
Please set the peak output current according to the scale on the driver's label, with a setting range of 3-15A.

Due to the error between the set value and the actual value being approximately ± 10%, to ensure safety, please adjust the peak output current appropriately.

4.5 Locked rotor output current limit

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

4.6 Locked rotor torque maintenance function

When the motor is locked, the driver has a simple torque holding function.
Attention: Locked rotor holding torque is a short-term behavior, please do not use it for braking locked rotor.

4.7 Restart function

When situations such as motor blockage occur, the driver will stop working. After 5 seconds, the drive will automatically start. After restarting, if a malfunction occurs again, the driver will stop working and give an alarm.

4.8 Starting and stopping

① Start and slow stop

The factory setting for EN and COM ends is to connect the EN and COM ends. Connecting or disconnecting the connecting wires between the EN and COM ends can control the operation and stop of the motor.

When the EN end and COM end are connected, the motor runs; When the EN and COM terminals are disconnected, the motor slowly stops.

② Quick stop

The factory setting for the BRK and COM ends is to connect the BRK and COM ends. Connecting or disconnecting the connecting wires between the BRK and COM ends can control the natural operation and quick stop of the motor.

When the BRK end and COM end are connected, the motor operates normally; When the BRK end and COM end are disconnected, the motor quickly stops.

Note: Differences and usage choices between EN and BRK:

·EN control naturally stops, BRK control quickly stops;

·The start status of EN and BRK control is the same;

·When selecting one of the EN or BRK methods to control the start stop, the wiring of the other method should remain in the factory state.

4.9 Direction control

The factory setting for the F/R and COM terminals is that they are not connected. Connecting or disconnecting the connecting wires between the F/R and COM ends can control the forward and reverse rotation of the motor.

When the F/R end and COM end are disconnected, the motor rotates forward; When the F/R end and COM end are connected, the motor reverses.

Attention: Observing from the direction of the motor shaft, clockwise represents forward rotation and counterclockwise represents reverse rotation.

5. Speed setting

5.1 Using the built-in potentiometer RV for speed regulation

Rotate the built-in speed control potentiometer RV clockwise and make a "click" sound before the motor starts running. Continuing to rotate clockwise increases the motor speed. Rotate the potentiometer RV counterclockwise to reduce the motor speed. Continue to rotate counterclockwise until the potentiometer emits a "click" sound, and the built-in speed control potentiometer RV closes, causing the motor to stop running.

Attention: When switching to external SV input to control the speed, the built-in speed control potentiometer RV must be in the closed state, that is, rotating counterclockwise to the limit position after making a "click" sound.

Diagram of the relationship between built-in speed regulating potentiometer and motor speed (open loop no-load)

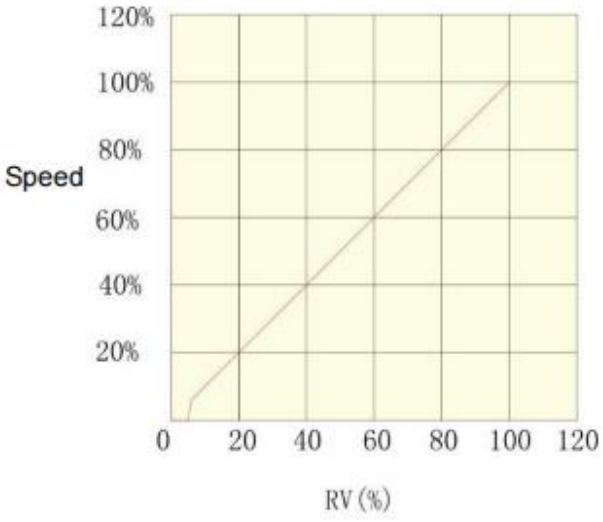
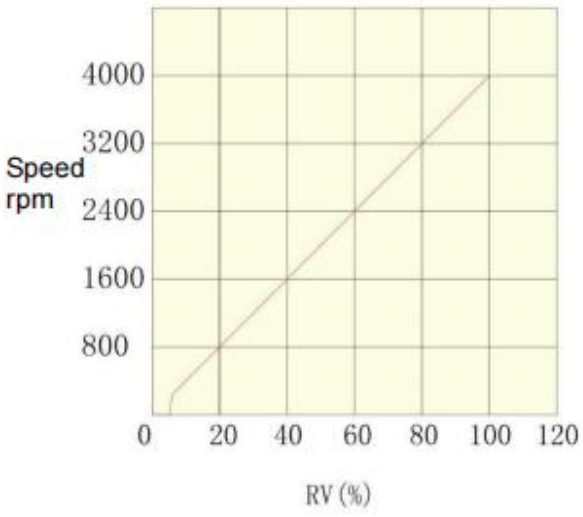


Diagram of the relationship between built-in speed regulating potentiometer and motor speed (closed-loop no-load)

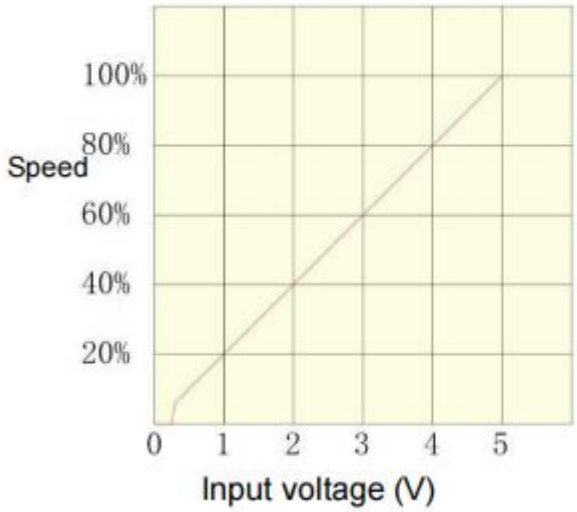


5.2 Using an external potentiometer for speed regulation

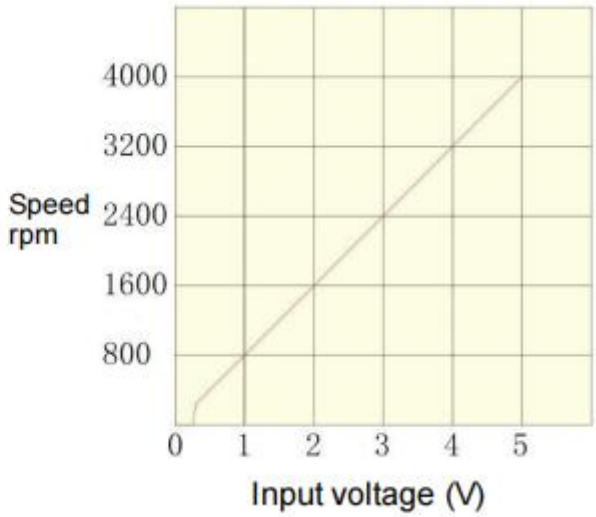
When using an external speed regulating potentiometer for speed regulation, please use a potentiometer with a resistance value of 10K Ω. The middle output end of the potentiometer is connected to the SV end, and the output ends on both sides are connected to the REF+and COM ends respectively.

5.3 Using external analog signals to regulate DC speed

When using an external analog signal for speed regulation, the SV port of the driver is connected to the signal positive pole, and the COM port is connected to the signal negative pole. The external analog signal requires 0-5V and above 1mA.



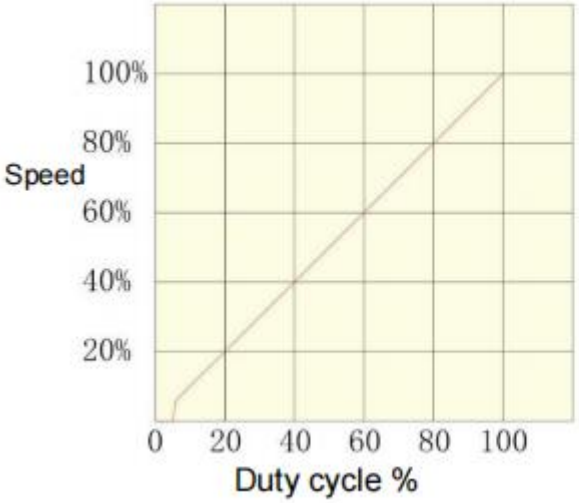
The relationship between analog signal voltage and motor speed (open loop no-load)



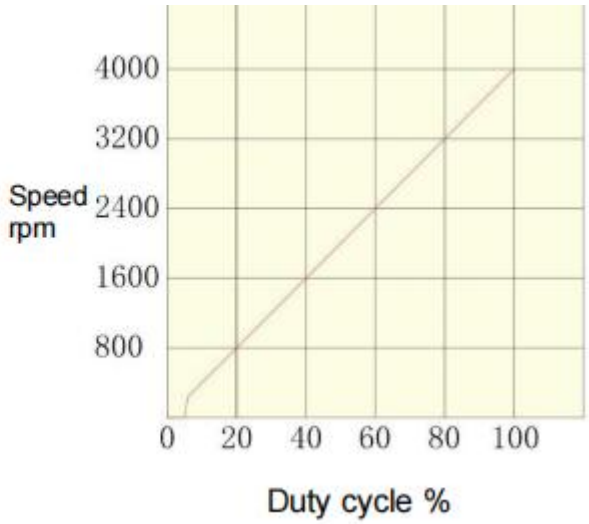
The relationship between analog signal voltage and motor speed (closed-loop no-load)

5.4 Using PWM speed regulation

When using PWM speed regulation, the SV port of the driver is connected to the signal positive pole, and the COM port is connected to the signal negative pole. The PWM signal requires an amplitude of 5V and a frequency of 1-3KHz.



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



The relationship between duty cycle and motor speed (closed-loop no-load)

6. Fault indication and handling methods

When the motor experiences overcurrent, Hall signal input error, locked rotor, over temperature, overvoltage, etc., the driver will issue an alarm signal. When a fault occurs, the driver will stop working, and the fault alarm output terminal (ALM) will output a low level and the alarm light will flash.

Alarm indication	Status Description	Processing method
Red light flashes twice	Overvoltage alarm	Detect bus voltage.
Red light flashing 3 times	Power tube overcurrent alarm	Determine if the selection is correct.
Red light flashing 4 times	Overcurrent alarm	Check P-sv settings and verify motor parameters. Or increase the acceleration time.
Flashing red light 5 times	Under voltage alarm	Check the voltage power supply and also check if the power supply meets the condition of being greater than 1.5 times the motor power.
Red light flashing 6 times	Hall signal loss	Check if the motor wiring is secure.
Red light flashing 7 times	Locked rotor alarm	Check if the motor load is too large.
Red light flashing 8 times	Hall wire sequence error	Check if the motor wiring sequence is correct.
Red light flashing 9 times	Over temperature alarm	Check if the working environment temperature is too high; Check if the radiator fan is working properly.

7. Communication control command

communication mode: Serial asynchronous half-duplex
Communication format: MODBUS RTU
Baud rate: 485 interface defaults to 115200bps; RJ11 interface fixed 9600bps
Data bit: 8 bits
Check digit: none
Start bit: 1 bit
Stop bit: 1 bit
Slave address: default 01

7.1 Data frame format:

Address	Function code	data	CRC check
8bits	8bits	N*8bits	16bits

7.2 Register data definition:

Address	Function code	Content	Size	read-write	Range	Unit	Remark
4000	3/6	address	Word	Read/Write	1-255	---	
4001	3/6	Pair of poles	Word	Read/Write	1-10	---	
4002	3	Overcurrent alarm value	Word	Read only	Hardware setup	A	
4003	3/6	Current limiting value	Word	Read/Write	3-35	A	
4004	3/6	PWM maximum	Word	Read/Write	10-100（10%-100%）		Default is 100
4005	3/6	Control Mode	Word	Read/Write	0：open-loop control 1：closed-loop control		Default is 0
4006	3/6	Closed-loop speed regulation	Word	Read/Write	200-4000	rpm	Control Mode 1
4007	3/6	Open-loop speed regulation	Word	Read/Write	100-1000（10%-100%）		Control Mode 0
4011	3/6	acceleration	Word	Read/Write	300-15000	ms	Acceleration and deceleration time
4034	3/6	Communication start	Word	Read/Write	0 stop 1 start		Default is 0
4035	3/6	change direction	Word	Read/Write	0 CW 1 CCW		Default is 0
4036	3/6	Brake	Word	Read/Write	0 Brake release 1 Brake		Default is 0
4037	3/6	Command source	Word	Read/Write	0 IO 1 communication		Default is 0
4038	3	Voltage	Word	Read only		V	
4039	3	Current	Word	Read only		10mA	
4040	3	Power	Word	Read only		0.1W	
4041	3	Speed	Word	Read only		rpm	
4042	3	Fault code	Word	Read only	Refer to software fault		
4043	6	Fault clearing	Word	Write	1		Write 1 clear
4044	3/6	485 Baud rate modification	Word	Read/Write	0：115200 1：57600 2：38400 3：19200 4：9600		Default is 0 It will take effect after power on again

7.3 Read register format: (Read current speed)

Slave address	Function code	Register address high bit	Register address low bit	Register quantity high bit	Register quantity low bit	CRC high bit	CRC low bit
01	03	40	41	00	01	10	07

7.4 Read register feedback format: (current speed is 1000rpm)

Slave address	Function code	Bytes	4041h high bit	4041h low bit	CRC high bit	CRC low bit
01	03	02	0E	38	B8	4E

7.5 Write register format: (modified to control motor operation with communication instructions)

Slave address	Function code	Register address high bit	Register address low bit	Data high bit	Data low bit	CRC high bit	CRC low bit
01	06	40	37	00	01	EC	04

7.6 Write register feedback format:

Slave address	Function code	Register address high bit	Register address low bit	Data high bit	Data low bit	CRC high bit	CRC low bit
01	06	40	37	00	01	EC	04

7.7 Example of communication control motor operation:

No.	Sending messages	Feedback message	Explain
1	01 06 40 37 00 01 EC 04	01 06 40 37 00 01 EC 04	Set as communication command control
2	01 06 40 07 00 32 AC 1E	01 06 40 07 00 32 AC 1E	Modify the open-loop speed control to 50%
3	01 06 40 34 00 01 1C 04	01 06 40 34 00 01 1C 04	Motor enabled, start running

7.8 Software Fault Code:

Code	Content
2	Software over current
3	Hardware over current
4	Under voltage
5	Over voltage
6	Locked rotor
7	Hall loss
8	Hall wire sequence error
9	Over temperature

8. Version Revision History

Version	Description	Date	Remarks
V1.0	First edition	2022.10.30	
V1.1	Second edition	2023.6.2	Change the minimum acceleration and deceleration time from 1.5s to 0.2s