

# SH-CL86BH

Close loop stepper motor for nema34



## I.Product introduction

### 1.Overview:

SH - CL86BH is my company based on years of experience in research and development of low pressure servo system, a new type of low-voltage hybrid servo products, this product USES the latest DSP digital processing chip and advanced technology, current and frequency conversion control algorithm for device manufacturers provide a cost-effective hybrid servo drive solutions.Sh-CL86BH is compact in structure, compact in volume, space-saving, and reduces electromagnetic interference between lines.Better vibration technology and low heat technology are adopted to effectively solve the problems of heat, vibration and noise of motor and driver, and low heat, green and environmental protection.

## 2.Introduction of technical parameters:

- Working voltage: ac, dc universal, ac input voltage 24~80VAC, recommended working voltage 60VAC
- Continuous output current maximum 8.0a (advanced stepping servo overload capacity)
- Differential and single-terminal pulse/direction commands are acceptable, with three control modes of position/speed/torque
- FOC magnetic field positioning control technology and space vector pulse width modulation (SVPMM) closed loop control technology were adopted
- Advanced variable current technology and variable frequency technology are adopted to reduce the heating of motor and driver effectively
- Pulse number per cycle can be set by debugging software or code extraction (subdivision)
- With overvoltage, undervoltage, over - current and over - differential protection functions
- Single/double pulse mode, pulse effective edge optional 500KHz(200KHz by default)
- The input interface level of pulse, direction and enable signals is 4.5-28v compatible
- With serial port RS232 debugging function, but need to use the company's special serial port debugging cable
- Performance: stable speed, small overshoot, small tracking error, low heating of motor and driver

Static current can be set with SW1 dial code switch to set current gain, SW2 dial code switch to set position gain, SW3 rated current to set OFF= 5.0a, ON= 6.5a, SW4 dial code switch to set motor starting direction to set OFF= clockwise rotation, ON= counterclockwise rotation. Internal 2PLS jumper can be set as single and double pulse control. The factory default is pulse + direction control, and the short connection is double pulse control.

## II.Electrical, mechanical and environmental indicators

### 1.Electrical indicators

Parameters	SH-CL86BH			
	Minimum value	Classic value	Max Value	Unit
Continuous output current	0.5		13	A
Power supply voltage (ac/dc)	24	60	80	VAC
logic input current	6	10	16	mA
logic input Voltage	4.5	5	28	VDC
Pulse frequency	0	200	500	KHZ
Pulse high level width	1.5			uS
Position error control accuracy		$\pm 1$		Pulse
Speed control accuracy		$\pm 2$		rpm
Maximum acceleration(no load)		100		Rpm/ms
Overvoltage protection voltage color	90			VAC
Insulation resistance	100			M $\Omega$

**Note: if the power input is dc, the input range is 24-110vdc!!!!**

### 2.Use environment and parameters

Cooling way	Natural cooling or forced air cooling
environment situation	Do not put it beside other heating equipment. Avoid dust, oil mist and corrosive gas.If the humidity is too high and the vibration is too strong, combustible gas and conductive dust are prohibited.
Temperature	-5 $^{\circ}$ C - +45 $^{\circ}$ C
Humidity	40-90%RH
Vibration	10-55Hz/0.15mm
Keep the temperature	-20 $^{\circ}$ C - +65 $^{\circ}$ C
Using an altitude	$\leq 1000$ m
Weight	0.6kg

### 3.Structural dimension drawing

SH - CL86BH drives can match any type of structure, stand 60 and 86 two-phase hybrid motor frame, the department is mainly recommended 3.0 NM and 4.5 NM and 8.5 NM and the mixture of 12 NM servo motor, also can match the other vendors a mixture of servo motor, encoder line number 250-5000 line, but need to contact with our company, provide the motor parameters, according to different motor matching related procedures.If the customer has higher requirements for low-speed vibration or high-speed performance, please contact our company. Our company will write the algorithm matching the motor according to the motor parameters, and the motor will show perfect performance

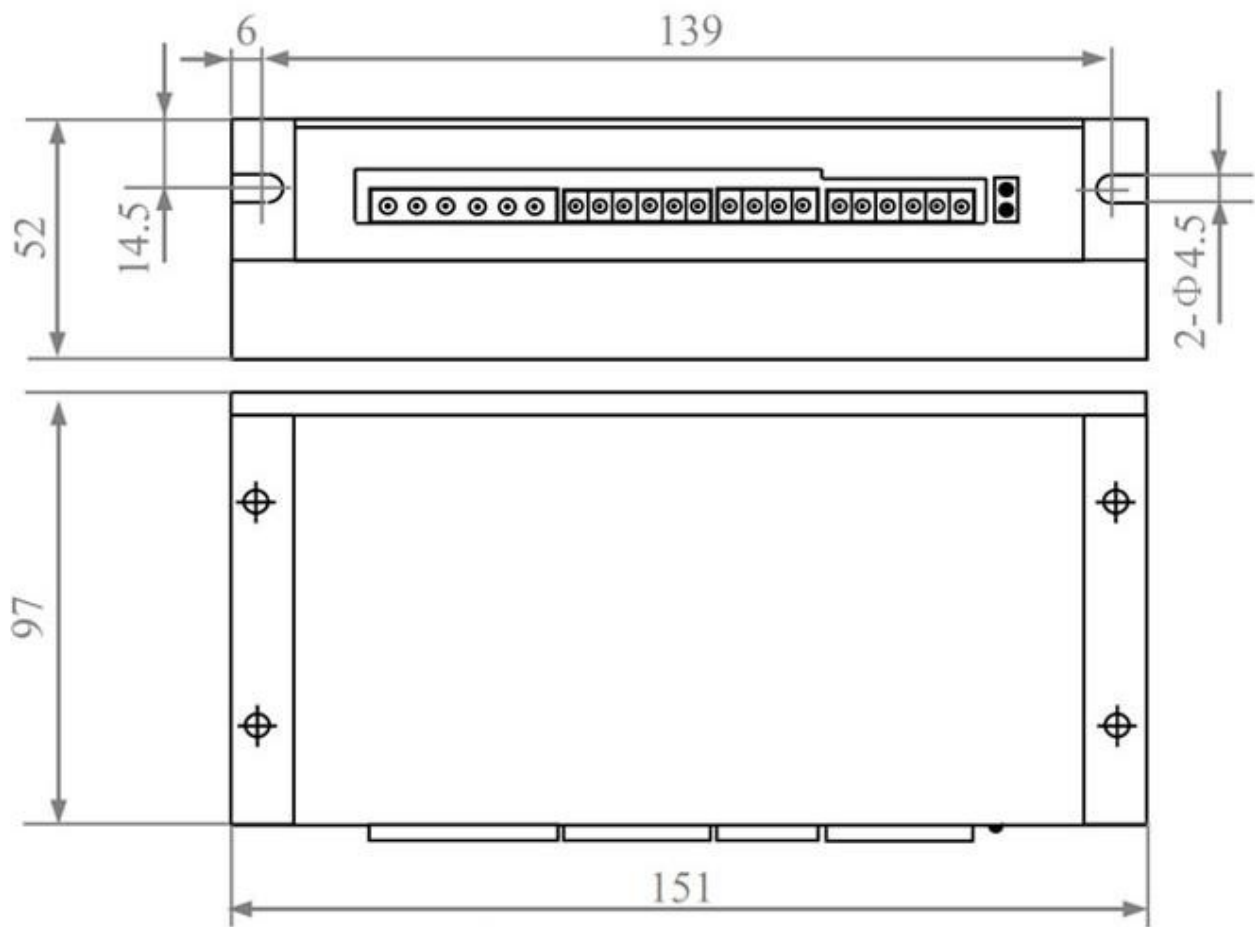


图 1 机械安装尺寸图(单位:mm)

### 4.Heat dissipation considerations

The reliable operating environment temperature of the driver is usually within  $-5^{\circ}\text{C}$  ~  $45^{\circ}\text{C}$ , the temperature of the driver is within  $65^{\circ}\text{C}$  when the driver is working, and the temperature of the motor is within  $70^{\circ}\text{C}$  when the driver is working. When necessary, a fan is installed near the driver to force heat dissipation, so as to ensure that the driver works within the reliable operating temperature range.

### III.Introduction to driver interface and wiring

#### 1. Interface definition

##### 1.1. Control port

Green 6+4Pin 3.81mm spacing terminal

Pins No	interface	Description	Remark
1	PUL+	Pulse positive input	Compatible with 4.5v-28v level signals
2	PUL-	Pulse negative input	
3	DIR+	Direction positive input	
4	DIR-	Direction negative input	
5	ENA+	Enable Positive input	
6	ENA-	Enable negative input	
7	PEND+	PEND+	Open collector OC output, maximum upper level 24V, maximum output current 100MA
8	PEND-	PEND-	
9	ALARM+	ALARM+	Open collector OC output, maximum upper level 24V, maximum output current 100mA
10	ALARM-	ALARM-	

##### 1.2Motor and power input port

5.0mm spacer with green 6Pin with screw terminal

Pins No	interface	Description	Remark
1	A+	Positive drive output of motor winding A	
2	A-	Negative drive output of motor winding A	
3	B+	Positive drive output of motor winding B	
4	B-	Negative drive output of motor winding B	
5	AC	AC input	20-80VAC
6	AC		

### 1.3.Encoder input port

Pins No	interface	Description	Remark
1	EA+	Motor Encoder A+ input	
2	EA-	Motor Encoder A- input	
3	EB+	Motor Encoder B+ input	
4	EB-	Motor Encoder B- input	
5	VCC	Encoder power	Drive +5V output, to power the encoder
6	EGND	Encoder power ground	Drive GND output to encoder

Use the green 6Pin 3.81mm spacer with screw terminal (pay attention to the positive and negative poles of the power supply, do not connect the negative and positive poles backwards!!!

### 1.4.LED light status indicator

The green LED is the power indicator. When the drive is powered on, the LED is always on. When the driver cuts off the power, the LED goes out. Red LED is the fault indicator light, when the fault occurs, the indicator light will flicker for 5 seconds. When the fault is cleared by the user, the red LED always goes out. The flashing frequency of red LED is 2Hz, in which the LED is on for 200ms and off for 300ms. The number of flashes of red leds within 5 seconds represents different failure information.

When the drive fails, the drive will stop and prompt the appropriate fault code. The fault can be cleared only when the user needs to cut off the power and put it back on. When the drive fails, the drive will keep the latest failure in the EEPROM of the drive in the form of queue, and the drive will keep up to 10 latest historical failures. The user can read the corresponding fault code through PC and text display.

Error list

Red LED flash 1time, overcurrent;

Red LED flash 2times, over voltage;

Red LED flash 5times, Tracking error out of tolerance

## 2. Control signal interface circuit

SH-CL86BH driver signal input interface can be differential signal input, single-end input of common anode signal and single-end input of common cathode signal, built-in high-speed photoelectric isolation coupler; The output is OC output with open collector of triode, and the interface is as follows:

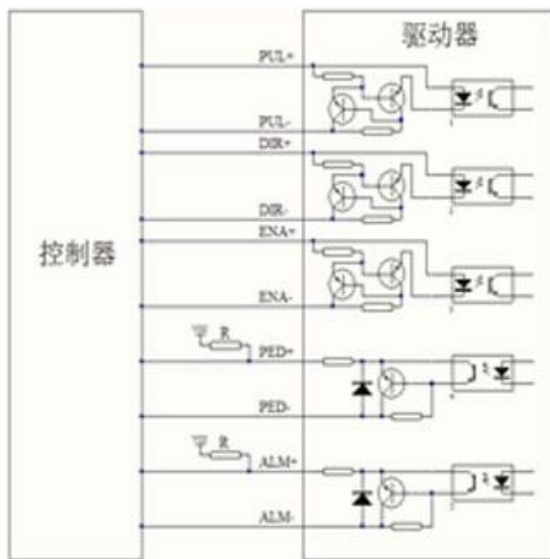


图2 输入信号差分接法

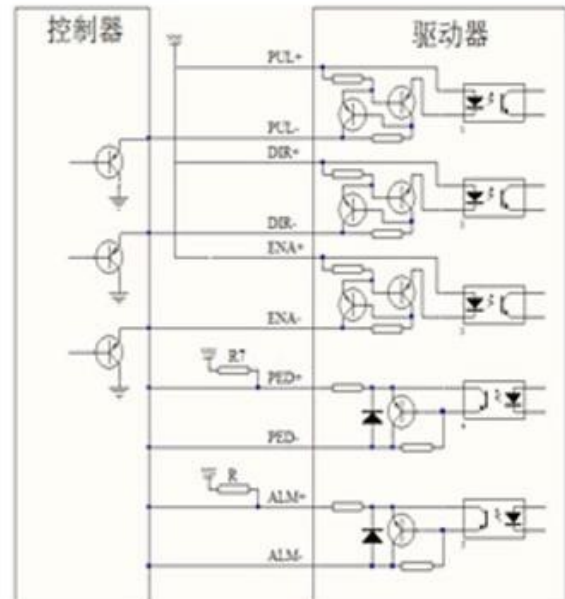
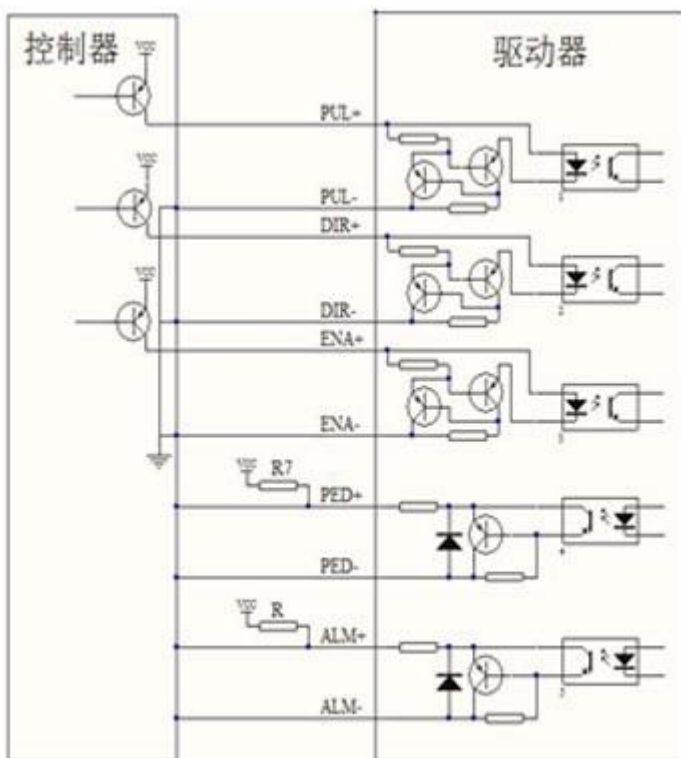


图3 输入信号单端共阳极接法

Input signal differential connection

Input signal single - end common anode connection



Input signal single - end common - cathode connection

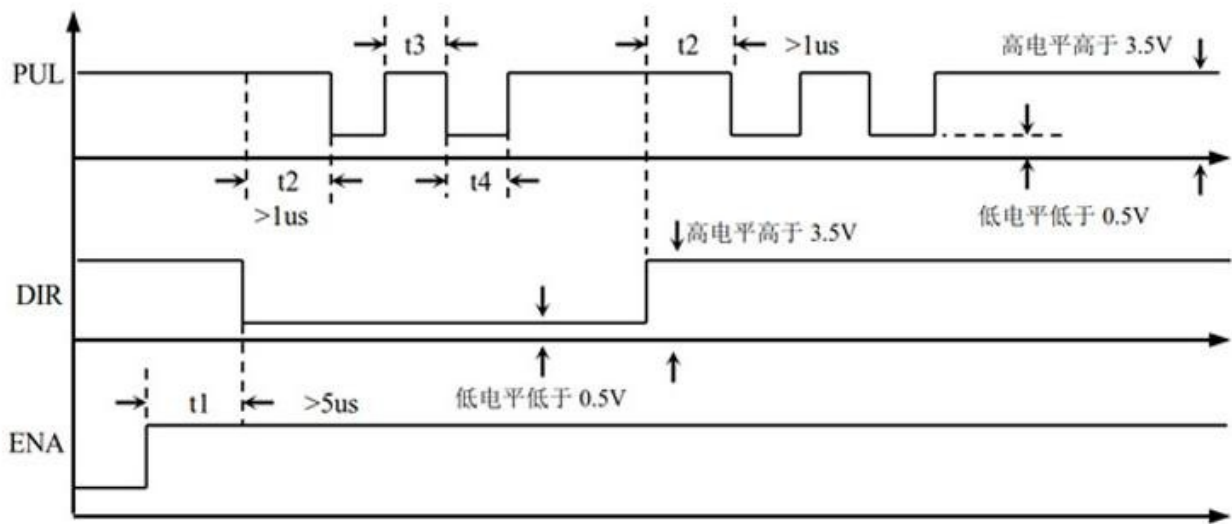
Note: the voltage range of the signal input interface in the figure is 4.5-28 VDC. No series current-limiting resistor is required for either single-terminal connection or differential connection. For output interface of the external voltage maximum 28 VDC,. The maximum output current is 100 ma, choose suitable according to pull up the voltage of an external pull-up resistors, basic parameter values, if an external voltage is 24 VDC, pull-up resistors selection of 2 k, if an



external voltage to 12 VDC, pull-up resistors selection 1 k, if they are driving relay or motor brake coil, please consult our related application engineer.

### 3. Control signal timing diagram

To avoid some missteps and deviations, PUL-, DIR- and ENA- should meet certain requirements, as shown below:



Remark:

- 1)  $t_1$ : ENA (enable signal) should be DIR at least  $5\mu s$  in advance, determined as high. In general, it is recommended to be suspended;
- 2)  $t_2$ : DIR at least in advance PUL descent edge  $1\mu s$  to determine its status high or low;
- 3)  $t_3$ : pulse width not less than  $1.5\mu s$ ;
- 4)  $t_4$ : the width of the low level shall not be less than  $1.5\mu s$ .

### 4. Control signal mode setting

- ▮ Pulse trigger edge selection: set the pulse rising edge or falling edge to trigger effectively through PC software.
- ▮ Single and double pulse selection: set single or double pulse effective through PC software.
- ▮ Direction selection: set the initial running direction of the motor through PC software.

### 5. Wiring Request

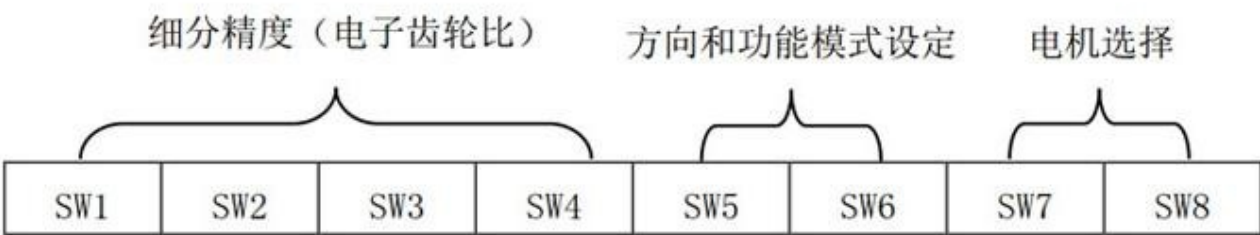
- 1) in order to prevent the driver from interference, it is recommended that the control signal should use a shielded cable, and the shielding layer should be connected to the ground. Except for special requirements, the shielding cable of the control signal cable should be grounded at one end: the upper computer of the shielding cable should be grounded at one end, and the driver of



- the shielding cable should be suspended for a short time. Grounding is only allowed at the same point in the same machine. If it is not the real grounding wire, the interference may be serious. At this time, the shielding layer is not connected.
- 2) the pulse and direction signal line and the motor line are not allowed to be wound together side by side. It is better to separate them for at least 10cm, otherwise motor noise may easily interfere with the pulse direction signal and cause motor positioning errors, system instability and other faults.
- 3) if a power supply is provided for multiple drivers, parallel connection shall be taken at the power supply, and it is not allowed to connect to one and then to another in a chain form
- 4) it is strictly forbidden to unplug the driver terminal with electricity. When the electric motor stops, there will still be a large current flowing through the coil. The unplug terminal will cause a huge instantaneous induced electromotive force to burn out the driver.
- 5) it is strictly forbidden to plug the wire head into the terminal, otherwise it may overheat and damage the terminal due to the increased contact resistance.
- 6) the wiring head shall not be exposed outside the terminal to prevent accidental short circuit and damage the driver.

### III.Dial code switch setting

SH-CL86BH digital integrated low-voltage servo driver adopts 8-bit dial-code switch to set subdivision accuracy (electronic gear ratio), initial direction of motor rotation, self-test and function mode selection. Detailed description is as follows:



**SW1-SW4: Subdivision accuracy (electronic gear ratio)**

**SW5-SW6: Direction and function mode set**

**SW7-SW8: motor choose**

<b>Pulse/rev</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>S4</b>
Default	On	On	On	On
800	Off	On	On	On
1600	On	Off	On	On
3200	Off	Off	On	On
6400	On	On	Off	On
12800	Off	On	Off	On
25600	On	Off	Off	On
51200	Off	Off	Off	On
1000	On	On	On	Off
2000	Off	On	On	Off
4000	On	Off	On	Off
5000	Off	Off	On	Off
8000	On	On	Off	Off
10000	Off	On	Off	Off
20000	On	Off	Off	Off
40000	Off	Off	Off	Off

Subdivision accuracy (electronic gear ratio): when S1, S2, s3 and S4 are all on, the driver microstep subdivision adopts the internal default microstep fraction of the driver, and the internal default microstep fraction initial value of the driver is 400Pulse/rev. The electronic gear ratio can also be set through debugging software. Sw5 sets the motor direction. When ON, the motor turns clockwise (CW); when OFF, the motor turns counterclockwise (CCW): Sw6 function mode is selected; when OFF, the driver is space vector control mode (FOC); when ON, the driver point motion mode (PM), which has a better start-stop effect.

<b>Motor</b>	<b>SW7</b>	<b>SW8</b>
TC60-30	ON	ON
TC86-45	OFF	ON
TC86-85	ON	OFF
TC86-120	OFF	OFF

## **SIX. Protect function**

### **1. Overload protection**

Sh-cl86bh the drive will stop when the input voltage is higher than 90VAC. At this time, the fault must be discharged and reset

## **2. Under voltage protection**

Sh-cl86bh the drive will stop when the input voltage is lower than 15VAC. At this time, the fault must be discharged and reset

## **3. Over current protection**

Sh-cl86bh the drive will stop when overcurrent occurs. At this time, the fault must be discharged and reset.

## **4. Trace error overshoot**

Sh-cl86bh the drive stops when a tracking error overshoot occurs. At this time, the fault must be discharged and reset.

Note: since the driver does not have the protection function of power positive and negative polarity reverse connection, please make sure the power positive and negative polarity connection is correct again before power on. A negative connection will cause the fuse in the drive to burn out!