

CL86H V3.0

Digital closed loop stepper dr
user's manual

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[Please read this manual carefully before use to avoid damaging the drive]

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Shenzhen Leisai Intelligent Control Co

CL86H Digital Closed Loop Stepper Driver User's Manual

contents

1. Product introduction.....2

1 Overview.....2

2. Technical Features.....2

3. Application areas.....3

2. Electrical, mechanical and environmental indicators.....3

1. Electrical indicators.....3

2. Operating environment and parameters.....3

3. Mechanical installation drawing.....4

4. Strengthen the heat dissipation method.....4

CL86H Digital Closed Loop Stepper Driver User's Manual

CL86H

Digital closed loop stepper driver

1. Product introduction

1 Overview

CL86H is a new type successfully developed by Leisai company based on mo
The closed-loop stepper driver adopts the latest dedicated motor control DSP chip a
Overcome the problem of lost steps of the open-loop stepper motor, and at the same
The degree of heat generation and reduce the vibration of the motor, thereby improv
Energy consumption. In addition, when the motor is continuously overloaded, the d

Three, driver interface and wiring introduction.....5

1. Interface definition.....5

2. Control signal interface circuit.....7

3. Control signal timing diagram.....8

4. Control signal mode and subdivision setting.....9

5. Encoder wiring.....9

6. Serial port connection.....10

4. DIP switch setting.....10

V. Driver parameter setting.....11

Six, typical application wiring.....12

1. Encoder lead definition of closed-loop stepper motor... 13

2. Line definition of closed-loop stepper motor... 13

Leisai product warranty terms.....14

The same reliability of the system. Of course, the installation dimensions of the motor are the same as the previous model. The integrated stepping drive scheme is extremely easy to upgrade, and the cost is c

2. Technical characteristics

- ◆ Adopt a new 32-bit motor control dedicated DSP chip;
- ◆ With trapezoidal wave test function;
- ◆ The current can be set arbitrarily (within the range of 0---8A);
- ◆ Can drive 86 series closed-loop stepper motors;
- ◆ Optocoupler isolation differential signal input;
- ◆ Impulse response frequency is up to 200KHZ;
- ◆ Subdivision setting (within 200~51200);
- ◆ With protections such as overcurrent, overvoltage and tracking error out-of-toler

3. Application areas

Suitable for all kinds of small and medium-sized automation equipment and in
Cutting machine, laser phototypesetting, plotter, CNC machine tool, automatic asse

CL86H Digital Closed Loop Stepper Driver User's Manual

The application effect is particularly good in high-speed equipment.

2. Electrical, mechanical and environmental indicators

1. Electrical indicators

Participate number	CL86H			unit
	Minimum	Typical value	Max	
Continuous output current	4	-	8	A
Input power supply voltage	+18	-	+80	VAC
Logic input current	7	10	20	mA
Pulse frequency	0	-	200	kHz
Insulation resistance	500			MΩ
Digital output port logic current			100	mA
Digital output port withstand voltage			twenty four	V

2. Use environment and parameters

cooling method	Natural cooling or additional radiator	
	Use occasion	Try to avoid dust, oil mist and corrosive gas
Use environment	temperature	0°C - 50°C
	humidity	40-90%RH
	shock	10~55Hz/0.15mm
Storage temperature	-20°C - 65°C	
Heavy quantity	Approximately 600 grams	

3. Mechanical installation dimension drawing (CL86H)

Figure 1 Mechanical installation dimensions (unit: mm)

4. Strengthen the heat dissipation method

- (1) The reliable working temperature of the drive is usually within 60°C, and the wo
- (2) When installing the driver, please install it upright and sideways, so that strong i
- If necessary, install a fan close to the drive to force heat to ensure that the c
- Work within the scope.

At this time, the drive does not r

When it is enabled, the enable si

7	Pend+(BRK+) The positive output of the in-position signal can be configured	
8	Pend - (BRK-) In-position signal negative output	set up
9	ALM +	Alarm signal is output
10	ALM-	Alarm signal negative output

The pin arrangement definition of RS232 interface is shown in Figure 2 below:

Serial number	symbol	name	ill
---------------	--------	------	-----

Serial number	symbol	name	illt
1	NC		
2	+5V	Power positive terminal	Only fo
3	TxD	RS232 sender	
4	GND	Power ground	
5	RxD	RS232 receiver	
6	NC		

Figure 2 Definition of RS232 interface pin arrange

Note: The cable connecting CL86H with PC, text display or STU servo debugg

Please confirm the special cable (supplied according to the user's situation) before u

The green LED is the power indicator. When the drive is powered on, the LEI

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Restart the drive;

Red LED flashes 3 times	Op amp error
f. Red LED	The alarm of restarting the drive still exist

Red LED flashes 4 times	Lock shaft error	Check whether the motor power line is broken
-------------------------	------------------	--

Use the RS232 debug port to connect to the

Red LED flashes 5 times	Storage error	<p>set up;</p> <p>The factory reset alarm still exists, and the</p>
Red LED flashes 6 times	Motor parameter self-tuning mistake	<p>Restart the drive;</p> <p>The alarm still exists after restarting the drive.</p>
Red LED blinks 7 times	Tracking error out of tolerance	<p>Check whether the "motor resolution" in the</p> <p>Check the wiring between the motor and the</p> <p>B+/-B- must correspond strictly to the drive</p> <p>Check whether the encoder wire is disconnected</p> <p>Increase the acceleration time appropriate</p> <p>Check whether the motor is blocked.</p>

Motor direction setting is wrong

Motor rotation direction is wrong of a queue,	error	DIP SW 5 status setting error
--	-------	-------------------------------

The motor does not rotate	No pulse signal	Check whether the pulse signal wiring cor
---------------------------	-----------------	---

Wrong selection of pulse mode

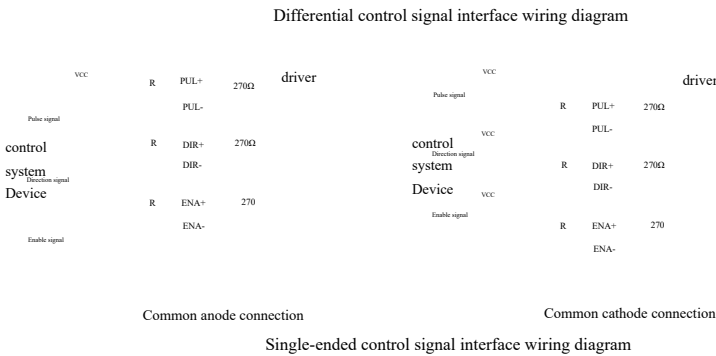
Wrong selection of pulse mode

only rotates in one direction	The drive defaults to pulse + direction.
change	
No direction signal	Check whether the direction signal cable i

Red LED flashes 1 time	Overcurrent	If there is no alarm, please check whether the motor and the motor power line are abnormal; Disconnect the motor winding wire from the drive, restart the drive, such as If the drive still alarms, the drive is damaged; Restart the drive;			
Red LED flashes 2 times	Overpressure	Restart the drive alarm still exists, check whether the power supply voltage is too high.			
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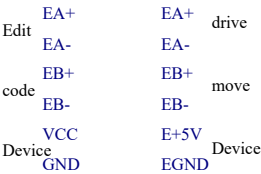
2. Control signal interface circuit diagram

CL86H control signal input and output interface circuit diagram, as shown in the figure.

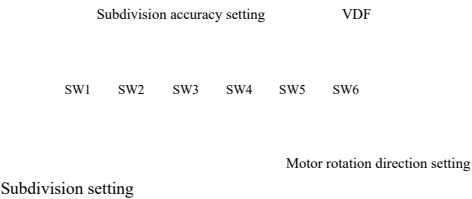


Note: When the VCC value is 5V , there is no need to connect a resistor in series;
When VCC value is 12V , R is 1K , which is greater than or equal to 1/4W resistance ;
When VCC value is 24V , R is 2K , which is greater than or equal to 1/4W resistance ;

Actuators EA+, EA-, EB+, EB- ports. When the current Icc required by the encoder is >50mA, an additional 5V power supply, the specific wiring method is shown in the figure below. It is necessary to ensure that the encoder and CL86 share the same ground.



4. DIP switch setting
The CL86H driver adopts a six-position DIP switch to set the subdivision accuracy. The direction of rotation setting is described in detail as follows:



5V GND 5V DC power supply		Steps/lap	SW1	SW2	SW3	SW4
Icc>50mA		Default	on	on	on	on
Wiring diagram when the encoder is powered by an external power supply		800	off	on	on	on
		1600	on	off	on	on
6. Serial connection	PC or other debugger	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
driver	Serial port	1000	on	on	on	off
		2000	off	on	on	off
RS232 interface	Dedicated cable	4000	on	off	on	off
		5000	off	off	on	off
Figure 6 Schematic diagram of parameter debugging wiring		8000	on	on	off	off
		10000	off	on	off	off
Notice:		20000	on	off	off	off
		40000	off	off	off	off
1. The cable connecting CL86H and PC, text display or STU servo debugger must be a special		8000	on	on	off	off
Use the cable (supplied according to the user's situation) please confirm before use to avoid damage.		10000	off	on	off	off
2. Crimping line of RJ11-6P6C crystal head at both ends of the cable connecting CL86H and STU servo debugger		20000	on	off	off	off
The order is reversed, do not mix with other cables to avoid damage.		40000	off	off	off	off
3. When connecting the CL86H to the PC, it must be ensured that the power supplied is an isolated power source. If you are not sure,		40000	off	off	off	off
Please isolate the PC with an isolation transformer to avoid damage to the PC.						
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Note: The default segment (Default) is subdivided into 1600, and the number of subdivisions can be set through the debugging software in this gear.						Note: The default segment (Default) is subdivided into 1600, and the number of subdivisions can be set through the debugging software in this gear.					
SW5: Motor rotation direction setting. When SW5=off, the motor rotates counterclockwise (CCW); when SW5=on, it is clockwise (CW).						SW5: Motor rotation direction setting. When SW5=off, the motor rotates counterclockwise (CCW); when SW5=on, it is clockwise (CW).					
SW6: Current loop self-tuning. When SW6=off, auto-tuning is on. When SW6=on, auto tuning is off.						SW6: Current loop self-tuning. When SW6=off, auto-tuning is on. When SW6=on, auto tuning is off.					
Five , drive parameter setting						Five , drive parameter setting					
The parameter setting of the CL86H driver must be through the RS232 serial communication port of the PC, and the dedicated debugging software completes the parameter setting, and there is a set of default factory configuration parameters corresponding to the best motor in the drive.						The parameter setting of the CL86H driver must be through the RS232 serial communication port of the PC, and the dedicated debugging software completes the parameter setting, and there is a set of default factory configuration parameters corresponding to the best motor in the drive.					
The user only needs to adjust the internal subdivision number of the drive according to the specific usage. Specific adjustable parameters						The user only needs to adjust the internal subdivision number of the drive according to the specific usage. Specific adjustable parameters					
And functions are shown in the table below:						And functions are shown in the table below:					
Parameter number	parameter name	Parameter range	Defaults	unit	Remark	Parameter number	parameter name	Parameter range	Defaults	unit	Remark
0	Current loop proportional gain P	0~3000	1200	-	Can read and write, can save	25	Closed loop cut to open loop speed threshold	0~3000	12	0.1r/s	-
1	Current loop integral gain I	0~1000	200	-	Can read and write, can save	26	Open loop cut to closed loop delay	0~32767	5	ms	-
2	Command pulse number/revolution	200~51200	1600	P/R	-	27	Closed loop cut to open loop delay	0~32767	250	ms	-
3	Maximum tracking error	0~5999	4000	-	Encoder pulse number	28	Closed loop cut to open loop feedback speed threshold	0~80	50	0.1r/s	-
4	Position loop Kp	0~100	45	-	-	29	Fault output function selection	1~1	1	-	-
5	Speed loop KI	0~100	0	-	-	30	Power-on start time	1~30	8	100ms	-
6	Speed loop Kp	0~100	15	-	-	31	Current loop Kc	0~1000	300	-	-
7	Percentage of power-on lock shaft current	0~100	100	%	-	32	PEND output port function selection	0~1	0	-	-
8	Lock shaft duration	0~1500	200	1ms	-	33	Fault detection options	0~65535	65535	-	-
9	Delay of brake release	0~1500	250	1ms	-	34	Enable clear fault selection	0~1	1	-	-
10	Delay of brake closing	0~1500	250	1ms	-	35	Automatic operation after power-on	0~1	0	-	-
11	Enable control	0~1	1	-	0-high level, 1-low power flat;						
12	Fault output	0~1	1	-	0-high resistance, 1-low resistance;						
13	PEND output effective level	0~1	1	-	0-high resistance, 1-low resistance;						
14	Command pulse filter time	0~512	15	0.1ms	-						
15	Pulse edge	0~1	0	-	0-rising edge, 1-falling along						
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					OK, 1-Allow automatic operation				
					Row;				
36	Back EMF Coefficient	0~300	100	100mV/rp	-	six. Typical application wiring diagram The typical wiring diagram of the DC servo system composed of CL86H driv Recommended size range, the higher the voltage, the better the high-speed perform			
37	Weakness coefficient 0	0~255	2321	-	-				
38	Weakness coefficient 1	0~255	16722	-	-				
39	When in place, the software eliminates the position error jitter delay	0~100	3	ms	-				
40	Percentage of open loop holding current	0~100	60	%	-				
41	Longest parking time	100~10000	1000	ms	-	0-open loop mode, 2-closed Ring power angle mode; When auto tuning is off Defaults-- 0-not self-tuning, 1-self Tuning;			
42	Zero speed threshold	0~500	10	0.1r/s	-				
44	Open and closed loop mode selection	0~1	2	-	-				
45	Motor inductance value	0~10000	1499	uH	-				
46	Power-on self-tuning of current loop	0~1	1	-	-				
47	Manufacturer custom parameters 1	0~10	0	-	-				
48	Manufacturer custom parameters 2	0~10	0	-	-				

Note: The factory default parameters of the current loop, position loop and speed loop of the drive are the best for the matching motor
Generally, customers don't need to modify the parameters, they only need to select the motor subdivision number and start according to the needs of system control.
The percentage of closed-loop current is sufficient.

CL86H Digital Closed Loop Stepper Driver User's Manual

CL86H Digital Closed Loop Stepper Driver User's Manual

How to use the motor with brake

Note: **1.** When using the brake function, please use the host computer to set the "in-position output function" to "brake".
2. Modify " **PEND** output effective level" to " **1**- low impedance".
3. The motor brake must be controlled by the driver, otherwise accidents such as motor runaway may occur condition.

The relay reference wiring is as shown in the figure below. Since both the brake coil and the relay coil are inductive loads, it is recommended to add Diode, diode model can choose ordinary rectifier diode (such as: IN4007) In addition, diode polarity It must not be reversed.

It is recommended that customers use solid state relays without adding diodes. The advantages of solid state relays: fast response speed, No need to add a diode, no sound will be emitted when on and off; it is recommended to use the KS1-10DD solid state relay of "Kaiser"

Electrical appliances.

Ordinary relay is connected to the brake motor

CL86H Digital Closed Loop Stepper Driver User's Manual

1. Closed-loop stepper motor encoder lead color and definition

Pin	colour	Signal	describe
1	yellow	EB+	Encoder B channel positive output
2	green	EB-	Encoder B channel negative output
3	black	EA+	Encoder A channel positive output
4	blue	EA-	Encoder A channel negative output
5	Red	VCC	Encoder +5V power input
6	White	GND	Encoder GND input

2. Closed loop stepper motor wire color and definition

Pin	colour	Signal	describe
1	black	A+	A phase motor winding +
2	Red	A-	A phase motor winding-
3	yellow	B+	B-phase motor winding +
4	blue	B-	B-phase motor winding-

CL86H Digital Closed Loop Stepper Driver User's Manual

Lexai product warranty clause

1 year warranty

Lei Sai provides a one-year warranty from the date of shipment for defects in raw materials and workmanship. The company provides free maintenance services for defective products.

2 is not a warranty

- Inappropriate wiring, such as reverse connection of the positive and negative poles of the power
- Unauthorized modification of internal components
- Use beyond electrical and environmental requirements
- Poor heat dissipation in the environment

3 maintenance process

If the product needs to be repaired, it will be handled according to the following process:

(1) Before shipping, you need to call the customer service staff of Lei Sai to obtain the repair instructions.

(2) A written description is enclosed with the goods to explain the failure phenomenon of the product, the use environment, etc.; contact information such as name, phone number and mailing address.

(3) The prepaid postage is sent to the Leisai Intelligent Control Unit, 3rd Floor, Building 22, Leisai Co., Ltd. Zip Code: 518052. (The return postage is paid by Lei Sai)

4 Warranty Limitations

- The warranty scope of Leisai products is limited to the product's components and processes (that is, the product itself).
- Leisai company does not guarantee that its products can be suitable for the specific purpose of the user.

It is related to the conditions of use and the environment. The company does not recommend using the product in a harsh environment.

5 Maintenance requirements

When returning for repair, please fill in the "Maintenance Report" truthfully (this form can be downloaded from tech@leisai.com) to facilitate maintenance analysis. Mailing address: 22, District 5, Baiwangxin Industrial Zone, Leisai Intelligent Control Co., Ltd. Zip Code: 518052