CL-HSS86

Closed loop Hybrid Servo Driver

1. Product introduction

    The CL-HSS86 is a new hybrid stepper motor servo drive with communication capabilities. It use a new generation of 32-bit DSP control technology and vector control technology, it can prevent losing step and ensure the accuracy ; high-speed torque attenuation is much lower than that of ordinary open-loop drivers, which can greatly improve the high-speed performance and torque of stepper motors; The current control technology effectively reduces the temperature rise of the motor and prolongs the service life of the motor; the position error alarm function ensures the safe operation of the processing equipment. It is an ideal upgrade for traditional open-loop stepper drives and can replace some traditional AC servo systems at a price of only 50% of the AC servo system.

2.Features

★ Advanced 32-bit motor control dedicated DSP chip and vector closed-loop control technology

★ The default work is in closed loop mode, without losing step, and it also supports working in open loop mode;

★ Increase the output torque and running speed of the motor;

★ The current level is intelligently adjusted according to the load, which reduces the temperature rise , locks the current, and the peak current is adjustable;

★ Adapt to various mechanical load conditions (such as pulleys) without adjusting the parameters;

★ The software can set the position command, smooth the filtering time, the motor runs smoother, the vibration is lighter, and the dynamic performance of acceleration and deceleration is improved;

★ Zero-speed static capability without vibration after positioning is completed;

★ Support Nema 34 series 4N.m, 8N.m, 12N.m closed-loop stepper motor;

★ Support single and double pulse input, pulse response frequency up to 200KHZ;

★ Support 15 fixed subdivisions, and support software to set any subdivision;

★ Support modbusRTU protocol on RS232, support position and speed control controlled by communication

★ Supports monitoring of motor operating conditions, including speed, positional deviation, bus voltage, and operating current.

★ Voltage range: AC20~80V or DC30V~110V;

★ With overcurrent, overvoltage, position tolerance and other protection;

3.Application

Suitable for all kinds of small and medium-sized automation equipment and instruments, such as industrial robots, textile machinery, special industrial sewing machines, wire stripping machines, marking machines, dispensers, cutting machines, laser phototypesetting, plotters, CNC machine tools, engraving machines, automatic assembly Equipment, etc.

4.Software installation and parameter settings

(1).Connect the CLHSS86 and Computer through the RS232 serial cable, open the ESS folder, and double click "ESS ProTuner.exe"

(2).Select the **serial port number** in the software (check below picture)

(3).Click "**read parameters**"   Driver's data will be showed in the software as below picture.

Communication interface

5.Parameter setting table

No.	Function	Funciton description	Setting Range	Default	Remark
0	Driver model	Read only	86,60,57,42		Automatic identification
1	Open model and closed model change	0-Open model，1-Closed model	0~1	1	In open loop mode, set the motor current with parameter 11, the value of the open loop holding current. In closed loop mode, the current is automatically adjusted according to the load.
2	Motor type	Read only	0~2	0	Read only
3	Current loop proportional gain Kp	Read only			Read only
4	Current loop integral gain Ki	Read only			Read only
5	Position loop proportional gain Kp		0~1000	300	If setting lager . The gain will be higher .but the value is too large to cause oscillation or overshoot.
6	Speed loop proportional gain Kp		0~1000	400	If the load is too large, you can adjust it with this parameter.
7	Speed loop integral gain Ki		0~300	80	If setting lager . The gain will be higher .but the value is too large to cause oscillation or overshoot.
8	The number of pulses per revolution corresponding to the default file on the driver		200~65535	400	Any number of other subdivisions other than the 15 fixed subdivisions
9	Encoder resolution	Read only	200~20000	4000	Read only
10	Tracking error alarm value	Encoder pulse number	40~65535	1000	In the case of some tracking error alarms, this value can be solved by raising this value.
11	Open loop holding current	Unit 100mA	0~80	45	
12	Closed loop hold current peak	Unit 100mA	0~80	80	
13	Pulse command filtering time	Unit 50us	0~600	30	The larger the value, the smoother the motor runs and the noise, but the position tracking lag time also increases.
14	Enable level polarity	Read only	0~1	1	Read only
15	Fault output level polarity	Read only	0~1	0	Read only

16	Pulse input mode	0-PUL/DIR，1-CW/CCW	0~1	0	PUL/DIR is Single pulse，CW/CCW is Double pulse
17	Pulse effective edge	0-Uphill，1-Rising edge	0~1	0	
18	PEND output function selection	0-bit output 1-Brake output	0~1	0	PEND defaults to the in-position output signal. If it is needed to control the brake device, you can set this value to 1 to control the relevant brake coil.
19	PEND output level polarity	When the 0-PEND signal is valid, the optocoupler is turned on, and when the 1-PEND signal is valid, the optocoupler is not turned on.	0~1	0	Read only
20	Low acceleration 16bit	pulse/s^2	0~2^{31}-1	6400	Trapezoidal acceleration and deceleration
21	High acceleration 16bit			0	
22	Low deceleration16bit	pulse/s^2	0~2^{31}-1	6400	Trapezoidal acceleration and deceleration
23	High deceleration16bit			0	
24	Minimum speed 16bit	pulse/s	-2^{31}~2^{31}-1	1600	The maximum speed of the trapezoidal acceleration/deceleration algorithm can be reached. In the continuous operation mode, positive and negative numbers are used to determine the positive and negative rotation.
25	Maximum speed 16bit			0	
26	Total number of pluses in the target lower 16bit	单位pulse	-2^{31}~2^{31}-1	3200	The total number of running pulses of the trapezoidal acceleration/deceleration algorithm. In the fixed-length operation mode, positive and negative numbers are used to determine the forward and reverse.
27	Total number of pluses in the target higher 16bit			0	
28	Motion control instruction	(1-position, fixed length operation, 2-speed, continuous operation, 3-deceleration stop, 4-stop immediately)	0~4	0	
29	Position mode	(0-savegain, 1-absolute)	0~1	0	It is valid in the fixed-length operation mode. Increment refers to the current position as the

					reference for each stroke, and absolutely refers to the zero position of the above electricity as a reference.
30	Absolutely position lower 16bit	pulse，read Only		0	
31	Absolutely position higher 16bit			0	
32	Internal pulse state	Internal pulse state (1-internal pulse is sent, 0-internal pulse has not occurred)	0~1	1	Read-only, indicating the current motion control status
33	Save parameter	Write 1 save parameter to EEPROM	0~1	0	
34	Restore factory settings	Write 1 to factory settings	0~1	0	

Communication cable standard: RS232 serial cable (for desktop computer), laptop computer needs to be equipped with a USB to RS232 conversion line.

6. Electrical, mechanical and environment

(1). Electrical environment

Power supply	AC20~80V or DC30~110V
Output current	Peak 8.0A(current varies with load)
Rated input current	7~20mA
Frequency	0~200KHz
Match motor	86HSE12N，86HSE8N，86HSE4N
Encoder resolution(PPR）	1000
Resitance	>=500MΩ

(2).Use environment and parameters

Cooling methode	Natural cooling or external heat sink	
Use environment	Use occasion	Avoid dust,oil etc
	Temperature	0~50℃
	humidity	40~90%RH
	vibration	5.9m/s²Max
Storage temperature	-20℃~65℃	
Weight	about 560g	

(3.).Mechanical installation dimension drawing : 152mm*98mm*53mm
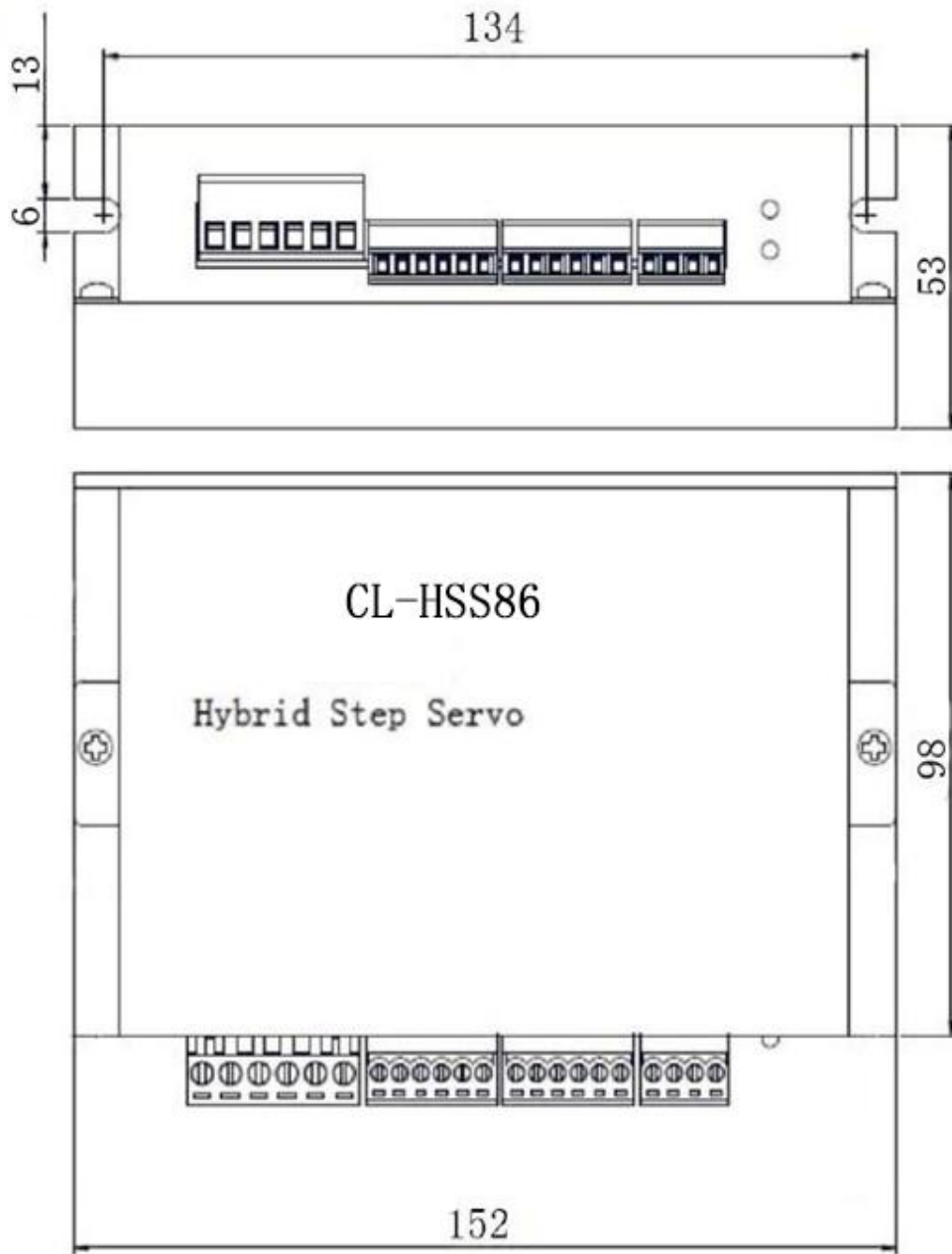
7. Drive interface

（1） Motor and power input port

Terminal No	Symbol	Name	Description (cable color)
1	A+	A phase motor winding +	Red
2	A-	A phase motor winding -	Green
3	B+	B phase motor winding +	Yellow
4	B-	B phase motor winding -	Blue
5	AC1	Input power	AC20~80V or
6	AC2		DC30~110V

（2） Encoder input port

Terminal No	Symbol	Name	Description (cable color
1	EB+	encoder B phase positive input	yellow
2	EB-	encoder B phase negative input	green
3	EA+	encoder A phase positive input	black
4	EA-	encoder B phase negative input	blue
5	VCC	power supply (+5V)	red
6	EGND	power supply (0V)	white

The encoder line is connected incorrectly, causing damage to the drive or damage to the motor encoder end)

（3） Control signal port

Terminal No.	Symbol	Description
1	PUL+	Support 5~24V
2	PUL-	
3	DIR+	
4	DIR-	
5	ENA+	
6	ENA-	
7	PEND+	In-position signal is outputting OC gate output, and closing indicates positioning is completed. The open circuit indicates that the positioning is not completed.
8	PEND-	
9	ALM+	alarm signal is output OC gate output, closed indication has alarm signal, The open circuit indicates that there is no alarm signal.
10	ALM-	

8. Status indication

PWR：The green indicator lights when power is applied.

9. Alarm indication

ALM：Fault indicator. Red light flashes 1 time within 3 seconds: Overcurrent or phase-to-phase short-circuit fault; red light flashes continuously 2 times in 3 seconds: Overvoltage fault; red light flashes continuously in 7 seconds 7 times: position error tolerance alarm.

10. DIP switch setting

SW1：Motor selection. on=86HSE8N、86HSE4N，off=86HSE12N。

SW2：Direction setting. on=CW，off=CCW。

SW3、SW4、SW5、SW6：Mircostep setting

Step/resolution	SW3	SW4	SW5	SW6
Default（400）	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

The default Mircostep is 400, which can be modified by software.

11．Wiring diagram
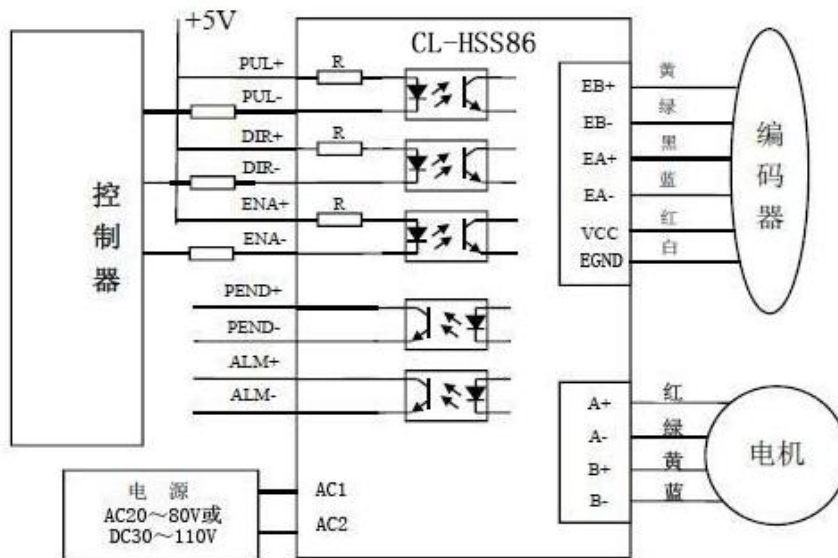
12．Encoder cables

Standard configuration 3 m shielded cable (can be customized according to customer requirements).