

User manuel Hybrid stepper servo drive

1 Overview

Hybrid stepper servo drive system integrated servo control technology into the digital step driver. It adopts typical tricyclic control method which include current loop,speed loop and position loop. This product has theadvantage of both step and servo system, and it's a highly cost-effective motion control products.

2 Features

- 2.1 Full closed-loop control
- 2.2 Motor standard 1000 line encoder
- 2.3 Close to 100% of the output torque
- 2.4 High-speed response and high speed
- 2.5 There are a variety of input methods under Position the control mode:

Pulse + direction Pulse + reverse direction Double pulse

- 2.6 Optically isolated servo reset input interface ERC
- 2.7 Optically isolated fault alarm output interface ALM
- 2.8 Current loop bandwidth: (-3dB) 2KHz (typical value)
- 2.9 Speed loop bandwidth: 500Hz (typical value)
- 2.10 Position loop bandwidth: 200Hz (typical value)
- 2.11 Motor encoder inputs upright post: differential input (26LS32)
- 2.12 RS232 serial communication available to download or change the parameters
- 2.13 Over current, I2T, overvoltage, under voltage, over temperature, speeding, over-differential protection
- 2.14 Green light indicates running and a red light indicates that the protection or offline

3 Port description

3.1 ALM、 PEND signal output port.



Termin	Sign	Name	Description
al no.			
1	PEND+	Reserved	Reserved
2	PEND-	Reserved	Reserved
3	ALM+	Alarm input positive	OUT
4	ALM-	Alarm input negative	GND

3.2 Control signal input port



Termin	Sign	Name	Description
al no.			
1	PLS+	positive pulse input	4~5V high
			effective
2	PLS	negative pulse input	0~0.5V low
			effective
3	DIR+	positive direction	4~5V high
		input	effective
4	DIR-	negative direction	0~0.5V low
		input	effective
5	ENA+	positive enable input	4~5V high
			effective
6	ENA-	Negative enable	0~0.5V low
		input	effective

3.3 Encoder feedback signal input port



Termin	Sign	Name	Description
al no.			
1	PB+	Encoder B phase	
		positive input	
2	PB-	Encoder B phase	
		negative input	
3	PA+	EncoderA phase	
		positive input	
4	PA-	Encoder A phase	
		negative input	
5	VCC	Output power supply	50ma
6	GND	ground	

3.4 power port



Termin	identifacati	sign	Name	descripton
al no.	on			
1		A+	Motor A+	
2	Motor	A-	Motor A-	
3	phase	B+	Motor B+	
4		B-	Motor B-	
5	Power	AC1	AC Power	AC24V-75V
6	supply	AC2	supply	
6	input	AC2	AC Power	AC24V-75V
			supply	

4 Technical data

2 phase nema 23	2 phase nema 34	
24~48DC(36typical)	24~70VAC(50Vtypical)	
4.5A 20KHz PWM	7.5A 20KHz PWM	
200K	200K	
9.6Kbps The need for	additional conversion	
interfa	ace)	
 Action value over 	 Action value over 	
current peak 8A ± 10%	current peak 10A ± 10%	
 Averload I2t current 	 Averload I2t current 	
action value 100% 5S	action value 100% 5S	
 Averheating action 	 Averheating action 	
value 80 ℃	value 80 °C	
 80V overvoltage 	 130V overvoltage 	
voltage action value	voltage action value	
 Action value 18V 	 Action value 20V 	
voltage undervoltage	voltage undervoltage	
	2 phase nema 23 24~48DC(36typical) 4.5A 20KHz PWM 200K 9.6Kbps (The need for interfa > Action value over current peak 8A ± 10% > Averload l2t current action value 100% 5S > Averheating action value 80 °C > 80V overvoltage voltage action value > Action value 18V voltage undervoltage	

Overall dimensions		111.5×75.5×34	150×97.5×53
Weight		About 300 grams	About 580 grams
	Occasions	Avoid dust, oil mist and corrosive gases	
	Working	0~+70 ℃	
_	temperature		
nvi	Storage	-20 ℃ ~+80 ℃	
iron	temperature		
Humidity		40~90%RH	
nt	Cooling	Natural cooling or	forced air cooling

5 Control signal connection

5.1 Control signals using a single-ended common anode connection, as shown below:



Note: When VCC is 5V, R shorted;

When VCC is 12V, R is 1K, more than 0.125W resistance;

VCC is 24V, R is 2K, 0.125W greater resistance;

Resistance must be connected to the control signal terminal.

5.2 Control signals using a single-ended common cathode connection, as shown below:



Note: When VCC is 5V, R shorted; When VCC is 12V, R is 1K, more than 0.125W resistance; VCC is 24V, R is 2K, 0.125W greater resistance; Resistance must be connected to the control signal terminal.

5.3 Control signal use differential wiring, as shown below:

Controller]		2 phase Series Drives
	PU+	PLS+	270 Ω
	PU-	PLS-	¥#(
s 	DIR+	DIR+	270Ω
	DIR-	DIR-	¥/(
	ECR+	ENA+	270 Ω
	ECR-	ENA-	* #
		ALM OUT	
		PEND OUT]₹ ¥
]		<u>↓</u> }>₹¥

5.4 232 serial communication lines, wiring diagram, is shown below:



No.	DB9	crystal head	definition
1	2	1	TXD
2	3	2	RXD
3	5	6	GND

6 DIP switch settings subdivision

6.1 quiescent current setting

SW1 DIP switch setting quiescent current, off means half the quiescent current is set to dynamic currents, on said quiescent current and dynamic current is the same.

6.2 logical direction setting

When DIP switch SW2 is switched off or on, you can change the direction of the current motor sport, off = CCW, on = CW.

6.3 Subdivision settings

subdivision setting as the table below, When SW3, SW4, SW5, SW6 are set to on, the default internal electronic gear ratio has school, internal electronic gear ratio setting with JmcStepMotor software.

DIP switch	SW3	SW4	SW5	SW6
Encoder				
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

7 Install dimension







8 Wiring diagram

Typical wiring diagram closed loop stepper system are as follows:The driver can provide +5 V, maximum 80mA of power to the encoder. Four-octave counting mode, the encoder resolution is multiplied by four the number of pulses per servo motor revolution.



9 closed-loop stepper system para-

meter adjustment and settings

Closed-loop stepper system parameter control via a dedicated communication software serial ver set to adjust, serial ver software with system configuration, PID parameter adjustment, waveform acquisition, motion control and other functions.

9.1 connection

1) Make sure that the drive is compatible with motor Stepper drives and stepper motor to the normal operation

should be paired with each other and achieve the desired results,

before the connection should confirm whether the compatible. Or else may damage the motor and drive.

2) a hardware configuration PC (desktop or laptop) Requirements: CPU: Intel Pentium II above grade Memory: 64M or more Hard disk: 2GB or more Display: Support for the resolution of 800 \times 600 color display above

RS-232 serial communication interface: at least one

3) Software Operating System:
 Win95/Win98/WindowsNT/Windows 2000 / XP
 Servo control software: serial ver

4) Communication Cables

This product is ready to connect the drive unit is located in front of the terminal, and computer terminals dedicated RS-232 connection cable (sold separately). The cable will be connected

to the computer 232 level turn into TTL level for two different levels of communication connections.

Communications cable specifications:

PC interface: DB9 Female Device Interface: RJ-11 terminal Length: 1m



5) hardware connection

9.2 Software Installation

Double-click the package file folder JmcStepMotor directly open the application.



9.3 Software Operation

1) Software Function

serial ver digital servo drives adjust the software has a system configuration, PID parameter adjustment, waveform acquisition, motion control and other functions.

2) Configure the communication portThe default port is COM1, 9600;Make sure before you start the software driver, motor, serial cable is properly connected and powered properly.

Software to configure the default communication parameters at startup and read the drive set the display to the interface. If the drives match the communication parameters and software, the software may be successfully started, otherwise the software can not establish a connection and drives, automatic pop-up "Communication Settings" dialog box, or click on the main menu "Port Control" → "Communication Settings" dialog box appears.

Port No: COM2	Type of control	Connect
Baud: 57600	C Stepper motor	Disconect
Data Bits:	C Brush servo	Load Para. from Drive
Parity:	C Unknow	Load para, from file
Stop Bits:	T	

Enter the correct port number and baud rate, click on the "Connect", and the driver can establish a connection, then

the status bar will display ^{串口1:打开}, and read the drive's setting to the interface.

Configured to 57600 baud, temporarily can not use other baud, otherwise the communication is not normal.

3) System configure

Click on the main interface "System Configuration" pop System Configuration dialog box, set the electronic gear ratio, the numerator is the encoder resolution 4000, the denominator is the number of pulses per revolution needed columns such as:

Requirements 1600 pulse motor walk around,

The electronic gear ratio of 4000/1600, during at least some points, was 5/2,

Molecular: 5	UpLoad
enominator: 2	DownLoad
RAM->FL	FL->RAM
Init. RAM	Reset Config.
Enable	Disable

After setting the electronic gear ratio, just click to download, either the value written to the drive, the drive inside the upload parameters can be read out to confirm whether the download was successful.

4) Oscilloscope

when the motor is running, you can always viewed through An oscilloscope waveform of each parameter, you can adjust PID to improve the operating performance of the drive. **Click on the main menu, select "Wave Monitoring" to open the oscilloscope screen.**

JMC Steper Motor Control(Serial ver)				×
	Oscillosco	ope Displa	y	
0 50 100 150 200 250 30	0 350 400 450 5	00 550 600 650	700 750 800 850	900 950 1000
	m	me(ms)		
Nxg :	View Send Mag.	View Receive Mag.		
Curve Statistics	Hin Avr Gain	Vel	Current	Tine
Cni:	Pp:	Vp:	Cp:	Seenla: 100-r
Cn2: • 1 • Cn2:	Pi:	Vi:	Ci:	Subtra 10082
Cn3:	Pd:	Vd:		Digital given
Cn4:	Pff:	VEE:	UpLoad	
COM: Open Batch UpLoad Batch Download	Faraneter System Config.	Stop Monitor Port Config	Bun Status File	· [[英] ·
Connect				

a)The oscilloscope can simultaneously collect data four channels, which can display up to four parameter curve. Type and number of a graph can be flexibly set in the "Settings" tab. Sampling time and the baud rate used, the higher the baud rate, the faster sampling, it is recommended to use 115200 baud rate.

b) Monitoring the time window you can select the option to display the range of time.

c) Adjusting the PID parameters can be carried out in the "gain" tab adjustment, press the Enter key after modifying parameters can be downloaded to the drive parameters take effect immediately.

d) "Statistics" tab to see the maximum, minimum and average values for each channel in the collected data.

e) When the data display range greatly exceeds the latest collected data, you can click scale "Refresh" button to adjust the scale.

5) Position loop parameter settings

Click on the main interface "position loop" button to pop up the position loop parameter settings dialog box. You can set the

position proportion, Position feedforward,position differential, electronic gear numerator and denominator and fault protection value, modify the parameter press the Enter key or press the "OK" button to download the parameters to the

drive,parameters

take effect immediately.

Pp:	1600	Pi:	0
Pd:	0	Pff:	500
Pos. Error:	0	Filter:	0

6) The speed loop parameters

Vp:	400	continuous Vel: ⁰	
Vi:	600	Vel. Limit: 0	
Vd:	0	-	
Vff:	0		
Filter:	0	π.	

Click on the main interface "speed loop" button to pop up the speed loop parameter settings dialog box. You can set the speed ratio of the speed of integration, the rated speed and fault protection value, modify the parameter and press the Enter key or press the "OK" button to download the parameters to the drive parameters take effect immediately.

7) The current loop parameters

Cp:	0	Continuous Current: 0
Ci:	0	Current Limit: 0
	3	

Click on the main interface parameters "current loop" button to pop up the current loop parameters dialog. You can set the current ratio of current integration, modify the parameter and press the Enter key or click "download" button to download the parameters to the drive parameters take effect immediately.

8)Troubleshooting

Run:	
0∨er Crt:	Over temp.: 📲
Over Voltage:	Pos Eror: 🛛 🖺
Under Voltage:	Encoder Error:
Overload:	

During operation, if the motor stop running, in a non-enabled status, you can click "Motor enable"on "Control Panel" to make the motor back in working condition, if this motor is still in the non-enabled status, You can cut off the power of the driver, then make power on to let the driver in working condition..

9.4 motion control function and quick adjustment

1) Adjustment of PID parameters

Servo system includes three feedback loop (position loop, speed loop and torque (current) loop). The response speed of the most inner current loop is fastest, the response speed of middle part must be faster than the outside position loop. If not comply with this rule will result in shock or adverse reactions. Servo drive is designed to ensure that the current loop with a good response performance. Users only need to adjust the position loop and speed loop parameters. Between the various parameters of the system is always mutual restraint, if only the position loop gain is increased, the output command of the position loop may become unstable, resulting in the entire servo system response may become unstable. Usually can adjust the system according to following steps:

Set the position feedforward and position differential to 500,

the position gain and velocity gain first set at a lower value 1000, then under condition of no abnormal noise and vibration, gradually increase the speed gain until there is a vibration then reduce at least 500-300.

- Increase position gain until have vibration. Then increase the position differential until no vibration.
- Increase the position feedforward to have a lag and minimum overshoot.
- If the motor is running with vibration, reduce the speed gain appropriately.
- If the motor have a vibration when stopped, reduce the position gain appropriately or increase the position differential.

If the motor have electromagnetic noise, reduce the current gain appropriately.

If the entire response have no overshoot, and vibration, should set the position gain to a maximum value. Then fine-tuning speed gain,position feedforward and position differential to find the best value.

10 Common Problems and Trouble-

Shooting

10.1 Power-on Have red alert when power-on

- Check whether the feedback signal cable is connected with the motor electrical power phase cable.
- Whether the servo drive input voltage is too high or too low.

10.2 Have a red alarm after running a small angle

- In the parameter of the driver, phase motor phase sequence is properly connected. Refer incorrectly identifies the drive motor phase sequence corresponding connection.
- Pulse input speed is greater than the rated speed ,have a

position out tolerance.

10.3 Not rotate after pulse input

- Whether the connection of servo drive's pulse input terminal is reliable.
- Whether the servo driver's input mode is related with the pulse input.
- Whether the motor disabling is released.

10.4 Under speed control mode, when turning at low speed faster or slower

 Reduce the speed proportion and increase the speed integration until the speed is normal.