2HSS2208H-KH

High Voltage Digital Stepper Servo Drive

Manual

Email:info@jmc-motion.com

Address: Floor2, Building A, Hongwei Industrial Zone No.6,

Liuxian 3rd Road, Shenzhen. China

Shenzhen Just Motion Control Electro-mechanics Co., Ltd

TEL:+86-0755-26509689

FAX:+86-0755-26509289

www.jmc-motion.com

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Shenzhen Just Motion Control

Electro-mechanics Co., Ltd

Version	Editor	Verifier

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1. Brief Introduction

1.1 Overview

The 2HSS2208H-KH hybrid stepper servo drive system integrates the servo control technology into the digital stepper drive perfectly. And this product adopts an optical encoder with high speed position sampling feedback of 25μ s, once the position deviation appears, it will be fixed immediately. This product is compatible the advantages of the stepper drive and the servo drive, such as lower heat, less vibration, fast acceleration, and so on. This kind of servo drive also has an excellent cost performance.

1.2 Features

➢ Without losing step, High accuracy in position

➢ 100% rated output torque

➢ Variable current control technology, High current efficiency

➢ Little vibration, Smooth and reliable moving at low speed

➢ Accelerate and decelerate control inside, Great improvement in smoothness of starting or stopping the motor

➢ User-defined micro steps

➢ Compatible with 1000 and 2500 lines encoder

➢ No adjustment in general application

➢ Over current, over voltage and over position protection

➢ Six digital tube display, easy to set parameters and monitor the motor

running state

1.3 Applications

It is suitable for the automation equipment and instrumentation which require large torque, such as: engraving machine, wire-stripping machine, marking machine, cutting machine, laser photocomposing machine, plotting instrument, numerical control machine tool, automatic assembly equipment and so on.

Its unique features make the 2HSS2208H-KH an ideal solution for applications that require both low-speed smoothness and high speed performances.

2. Technical Index

2.1 Electrical and Environment Specifications

Input Voltage	180~250VAC
Maximum Output Current	8.0A
Maximum Input Frequency	200K
Signal Input Current	7~20mA（10mA Typical）
Communication Rate	57.6Kbps
Protections	● Over current peak value 12A±10% ● Over voltage value 350VDC ● The range of over position error can be set by the front panel or HISU

Overall Dimensions（mm）		140×70×56
Weight		Approximate 1500g
Environment specifications	Environment	Avoid dust, oil fog and corrosive gasses
	Operating Temperature	0~70℃
	Storage Temperature	-20℃~+80℃
	Humidity	40~90%RH
	Cooling method	Natural cooling or forced air cooling

2.2 Mechanical Specifications

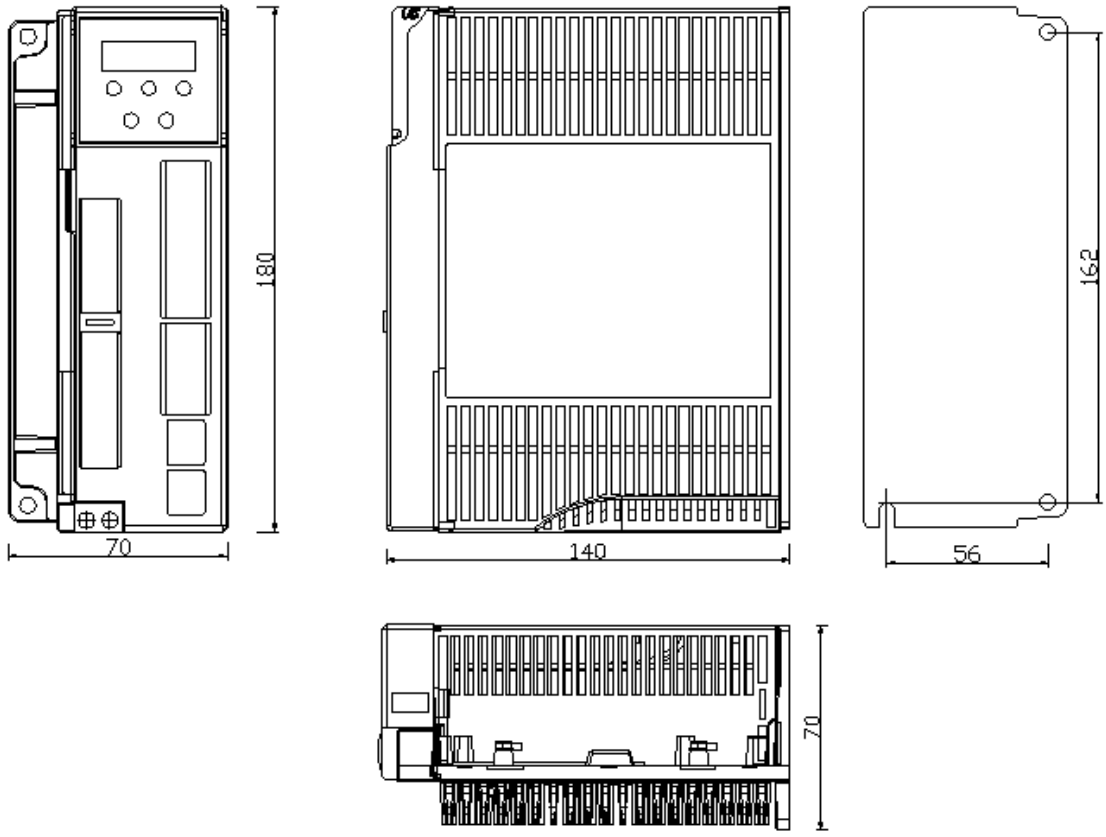


Fig. 1 Mechanical installation size (unit: mm)

Notice: Please take the terminal size and ventilation cooling while design the installation size.

2.3 Elimination of Heat

➢ Drive's reliable working temperature should be <60℃, and motor working temperature should be <90℃;

➢ It is recommended to mount the drive vertically to maximize heat sink area. Use forced cooling method to cool the system if necessary.

3. Fault Data Display

Data display	Fault cause
	Over current in the motor
	Current sensor alarm
	Parameters upload alarm
	Over voltage in power supply
	Over position error alarm
	Drive off -line

4. Ports and Connections Introduction

4.1 Ports Definition

4.1.1 Power Interface Ports1

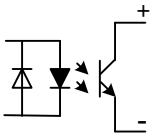
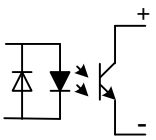
Port	Symbol	Definition	Remark
1	L	Power input port L	180~250VAC between L and N
2	N	Power input port N	
3	PE	Ground port	

4	NC	Not Connected	
5	NC	Not Connected	

4.1.2 Power Interface Ports2

Port	Symbol	Definition	Remark
1	A+	Motor connection port A+	Motor phase A
2	A-	Motor connection port A-	
3	B+	Motor connection port B+	Motor phase B
4	B-	Motor connection port B-	
5	PE	Ground port	
6	NC	Not connected	

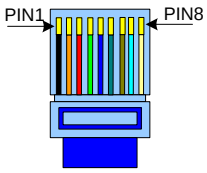
4.1.3 Control Signal Interface Ports (44 Pins DB)

Port	Symbol	Definition	Remark
3	PUL+	Pulse signal input +	Compatible with 5V and 24V
4	PUL-	Pulse signal input -	
5	DIR+	Direction signal input +	Compatible with 5V and 24V
6	DIR-	Direction signal input -	
7	ALM+	Alarm signal output +	
8	ALM-	Alarm signal output -	
9	Pend+	Position signal output +	
10	Pend-	Position signal output -	
11	ENA+	Enable signal input +	Compatible with 5V

12	ENA-	Enable signal input -	and 24V

4.1.4 RS232 Communication Interface Ports

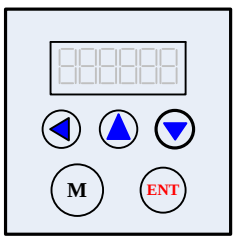
RS232 interface ports' arrangement and definition are as follows:

RS232	Connect to the PC or IHU adjuster with a special serial cable. Never disconnect or connect it while the power source is energized. It is suggested to use twisted-pair or shielded wire (less than 2m).		
Port	Symbol	Definition	Picture
1	GND	Power Ground	
2	TxD	RS232 Transmission Port	
3	5V	Serial Communication Power Port	
4	RxD	RS232 Receiving Port	
5、6	NC	Not Connection	

Attention: In case of causing any damage, please confirm the connection cables between 2HSS2208H-KH and HISU before using it.

4.1.5 Status Indicator

1. Control panel (including 5 buttons and 6 LED digital tube displays)



Users can configure the drive via the on-board front panel. This panel includes six 7-segment digits and five keys for users operation as the picture show above.

2. Functions are as follows:

Shift Setting:

‘◀’Button: Left shift Digits

‘▲’Button: Decrease or Next

‘▼’Button: Increase or Previous

Function Setting

‘ENT’Button: Enter or Confirm

‘M’Button: Exit or Mode switching

LED Display	Definition	Remark
d00SPF	Speed Feedback	
d01PLE	Position Error	
d02SPR	Speed Reference	
d03PLR	Position Reference	
d04PLF	Position Feedback	
xx_Err	Drive Failure	
En_OFF	Drive offline	

Remark: Switch to Parameter display function via ‘M’; Check the parameter via ‘ENT’ (The power on display data is the final parameter you want to check), Switch functions via ‘▼’ or ‘▲’ (While ‘◀’ is valid); Exit or switch to the next function via ‘M’.

5. Connections to Control Signal

The connections to the input and output control signals are as follows:

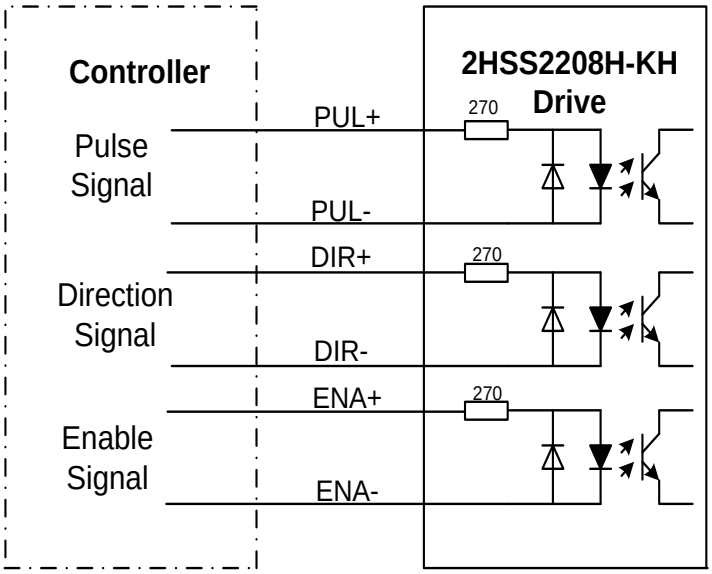


Fig. 2 Connections to differential signals

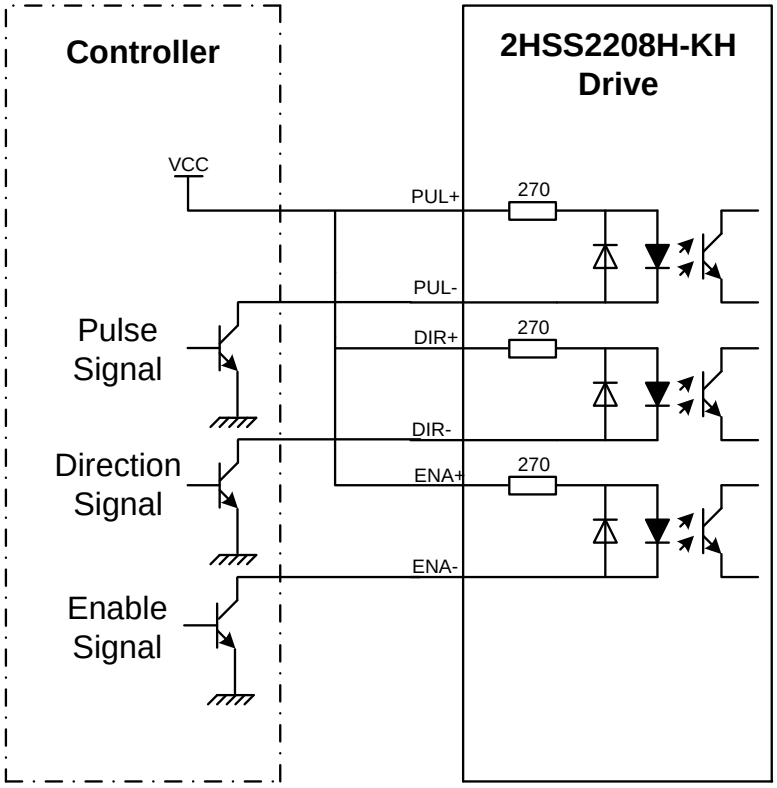


Fig. 3 Connections to common anode

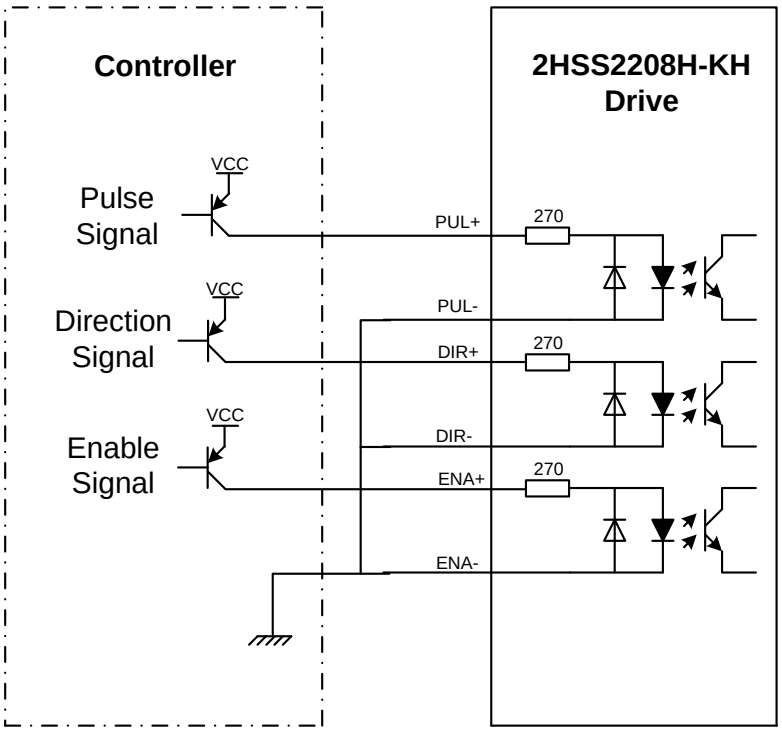


Fig. 4 Connections to common cathode

Attention: The control signal can be compatible with 5V and 24V.

6. Sequence Chart of Control Signal

In order to avoid some fault operations and deviations, PUL, DIR and ENA should abide by some rules, shown as following diagram:

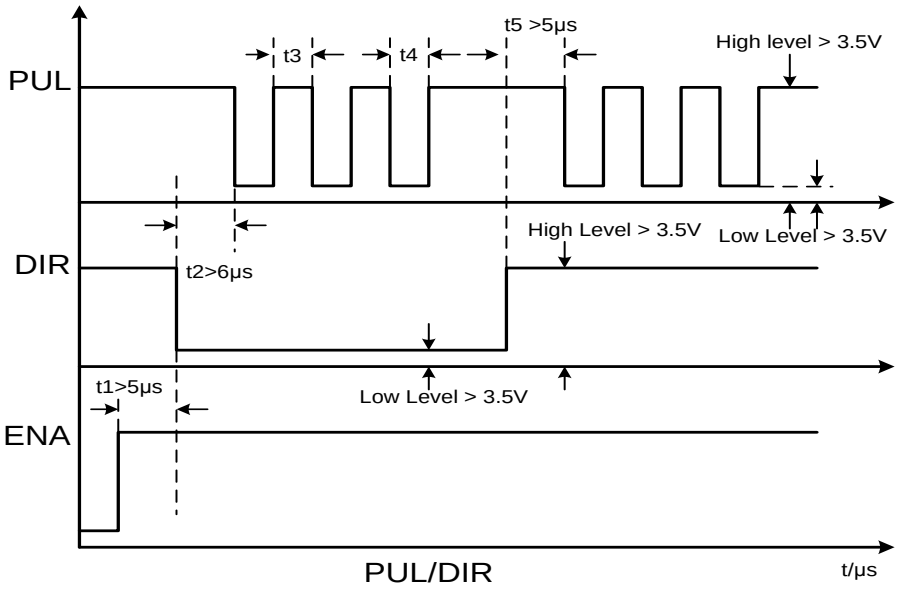


Fig. 5 Connections to common cathode

Remark：

(1) t1: ENA must be ahead of DIR by at least 5μs. Usually, ENA+ and ENA- are NC (not connected). See “Connector P1 Configurations” for more information.

(2) t2: DIR must be ahead of PUL active edge by at least 6μs to ensure correct direction;

(3) t3: Pulse width not less than 2.5μs;

(4) t4: Low level width not less than 2.5μs.

7. Connections to Encoder

The connection wires of the encoder are designed with the extension wires of 15 pins and the motor encoder wires, and these special wires are provided by our company, users no need to connect them. The definitions of the 2HSS2208H-KH encoder interface ports are as follows:

DB Port	Signal	Description
1	EA+	Encoder Chanel **A** output +
2	EB+	Encoder Chanel **B** output +
3	GND	Encoder GND Input
11	EA-	Encoder Chanel **A** output -
12	EB-	Encoder Chanel **B** output -
13	VCC	Encoder Voltage Input +5V

8. Connections to Serial Interface

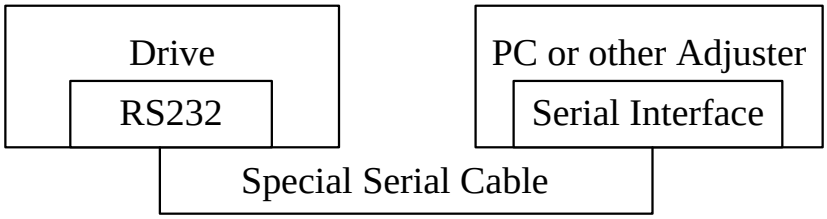


Fig. 6 Connections to serial interface

Attention:

In case of causing any damage, please confirm the connection cables between 2HSS2208H-KH and HISU before using it.

9. Drive' Parameters Configure

There two methods to configure parameters of 2HSS2208H-KH, one is set the parameters through the front panel, the other way is to connect it with the HISU.A set of the best default configure parameters has already set in the drive, user only need to configure the parameter Pulses/revolution, the detail functions are as follows:

Actual value = Set value ×the corresponding dimension

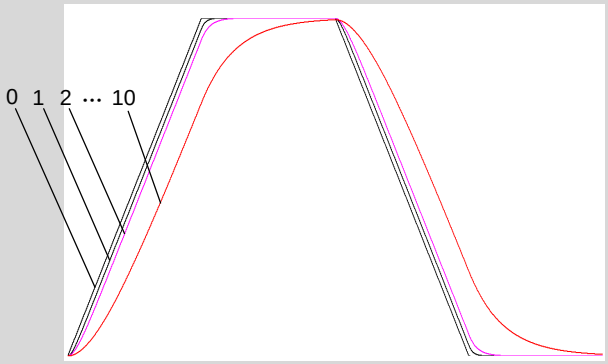
Mode	Definition	Range	Dime-nsion	Restart Drive	Default Value
P0	**Reset**	**0—100**	**11**	**N**	**0**
P1	**Current loop Kp**	**0—4000**	**1**	**N**	**1000**
P2	**Current loop Ki**	**0—1000**	**1**	**N**	**100**
P3	**Damping coefficient**	**0—500**	**1**	**N**	**100**
P4	**Position loop Kp**	**0—3000**	**1**	**N**	**1300**
P5	**Position loop Ki**	**0—1000**	**1**	**N**	**250**

P6	**Speed loop Kp**	**0—3000**	**1**	**N**	**50**
P7	**Speed loop Ki**	**0—1000**	**1**	**N**	**10**
P8	**Open-loop current**	**0—60**	**0.1**	**N**	**40**
P9	**Close-loop current**	**0—40**	**0.1**	**N**	**20**
P10	**Alarm level**	**0—1**	**1**	**N**	**0**
P11	**Direction level**	**0—1**	**1**	**Y**	**0**
P12	**Pulse edge**	**0—1**	**1**	**Y**	**0**
P13	**Enable level**	**0—1**	**1**	**N**	**0**
P14	**Arrival level**	**0—1**	**1**	**N**	**1**
P15	**Encoder line number**	**0—1**	**1**	**Y**	**0**
P16	**Position error limit**	**0—3000**	**10**	**N**	**1000**
P17	**Pulses/Revolution**	**0—15**	**1**	**Y**	**10**
P18	**Motor type**	**0—6**	**1**	**Y**	**4**
P19	**Speed smoothness**	**0—10**	**1**	**N**	**0**
P20	**User-defined p/r**	**4—1000**	**50**	**Y**	**4**
P21	**Stop lock enable**	**0—1**	**1**	**N**	**0**
P22	**Power on display**	**0—4**	**1**	**Y**	**1**

There are total 20 parameter configurations, use the HISU to download the configured parameters to the drive, the detail descriptions to every parameter configuration are as follows:

Item	Description
Reset	Writing "11" will reset the drive.
Current loop Kp	Kp is adjusted to make current rise fast or not. Proportional Gain determines the response of the drive to setting command. Low Proportional Gain provides a stable system (doesn't oscillate), has low stiffness, and the current error, causing poor performances in tracking current setting command in each step. But too large proportional gain values may cause oscillations and unstable system.
Current loop Ki	The Ki is adjusted to reduce the steady error. Gain Integral helps to overcome the static current error of the drive. A low or zero value for Integral Gain may have current errors at rest. Increasing the integral gain can reduce the error. But if the Integral Gain is too large, the system may "hunt" (oscillate) around the desired position.
Damping coefficient	This parameter is used to change the damping coefficient in case of the desired operating state is under resonance frequency.
Position loop Kp **Position loop Ki**	The PI parameters of the position loop. The default values are suitable for most of the application, you don't need to change them. Contact us if you have any question.
Speed loop Kp **Speed loop Ki**	The PI parameters of the speed loop. The default values are suitable for most of the application, you don't need to change them. Contact us if you have any question.
Open loop current	This parameter affects the static torque of the motor.
Close loop current	This parameter affects the dynamic torque of the motor. (The actual current = open loop current + close loop current)

<table>
<tr><td>Alarm Control</td><td>This parameter is set to control the Alarm optocoupler output transistor. 0 means the transistor is cut off when the system is in normal working, but when it comes to fault of the drive, the transistor becomes conductive. 1 means opposite to 0.</td></tr>
<tr><td>Stop lock enable</td><td>This parameter is set to enable the stop clock of the drive. 1 means enable this function while 0 means disable it.</td></tr>
<tr><td>Enable Control</td><td>This parameter is set to control the Enable input signal level, 0 means low, while 1 means high.</td></tr>
<tr><td>Arrival Control</td><td>This parameter is set to control the Arrival optocoupler output transistor. 0 means the transistor is cut off when the drive satisfies the arrival command, but when it comes to not, the transistor becomes conductive. 1 means opposite to 0.</td></tr>
<tr><td>Encoder resolution</td><td>This drive provides two choices of the number of lines of the encoder. 0 means 1000 lines, while 1 means 2500 lines.</td></tr>
<tr><td>Position error limit</td><td>The limit of the position following error. When the actual position error exceeds this value, the drive will go into error mode and the fault output will be activated. (The actual value = the set value × 10)</td></tr>
<tr><td>Motor type selection</td><td><table>
<tr><td>Parameter</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Motor type</td><td>User-define</td><td>86J18156EC</td><td>110J18135EC</td><td>110J18160EC</td></tr>
<tr><td>Parameter</td><td>4</td><td>5</td><td>6</td><td></td></tr>
<tr><td>Motor type</td><td>110J18190EC</td><td>130J18205EC</td><td>130J18225EC</td><td></td></tr>
</table></td></tr>
<tr><td>Speed smoothness</td><td>This parameter is set to control the smoothness of the speed of the motor while acceleration or deceleration, the larger the value, the smoother the speed in acceleration or deceleration.</td></tr>
</table>

<table>
<tr><td rowspan="3">User-defined p/r
Power on display</td><td colspan="7"> 
</td></tr>
<tr><td colspan="7">User can set the micro steps according the specific situation, the actual micro steps = the set value × 50.</td></tr>
<tr><td></td><td>Para-meter</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td></td></tr>
<tr><td></td><td>Data display</td><td>Speed reference</td><td>Position Tracking error</td><td>Speed feedback</td><td>Position reference</td><td>Position feedback</td><td></td></tr>
</table>

Remark:

① Switch to parameter configuration Mode via ‘M’

② Switch to parameter you want to configure via ‘◀’; You can also know the number which is configuring according to the left 7-segment display, for example: the display ‘1’indicates you are configuring the first number on the right; Then change the parameter via ‘▼’or‘▲’, Change the value from big to small circularly via‘▼’ , for example :”9, 8… 1, 9”; Adjust the opposite value via ‘▲’;

③ Save the set parameter via ‘ENT’ when it is set correctly according to your adjustment; repeal the parameter to the original value via ‘M’, then return.

(Attention: The button ‘▲’ may come to invalid when the set value comes to the maximum; Press the button ‘◀’to select the most significant

digit when there is only this digit, decrease this value via '▼', and in this way can change the most significant value, for example the maximum value is 100, so when it comes to 100, you have to choose the most significant digit and then to decrease it into 0, this is the only way to reconfigure this value .)

10. Parameter adjustment method

10.1 Button Panel Operation

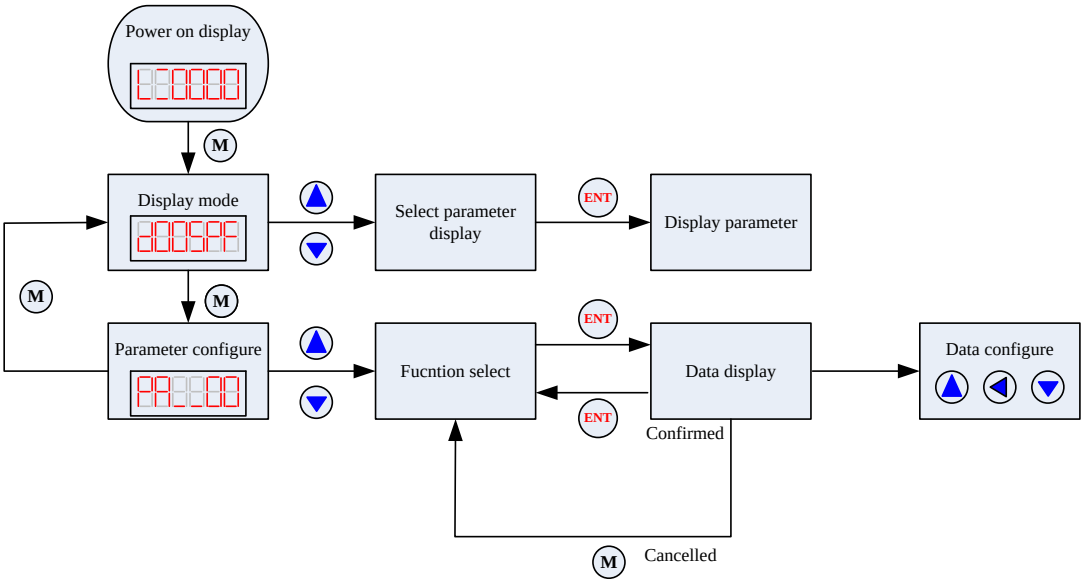


Fig. 7 Button operation flow diagram

10.2 Mode Configure Operation Example

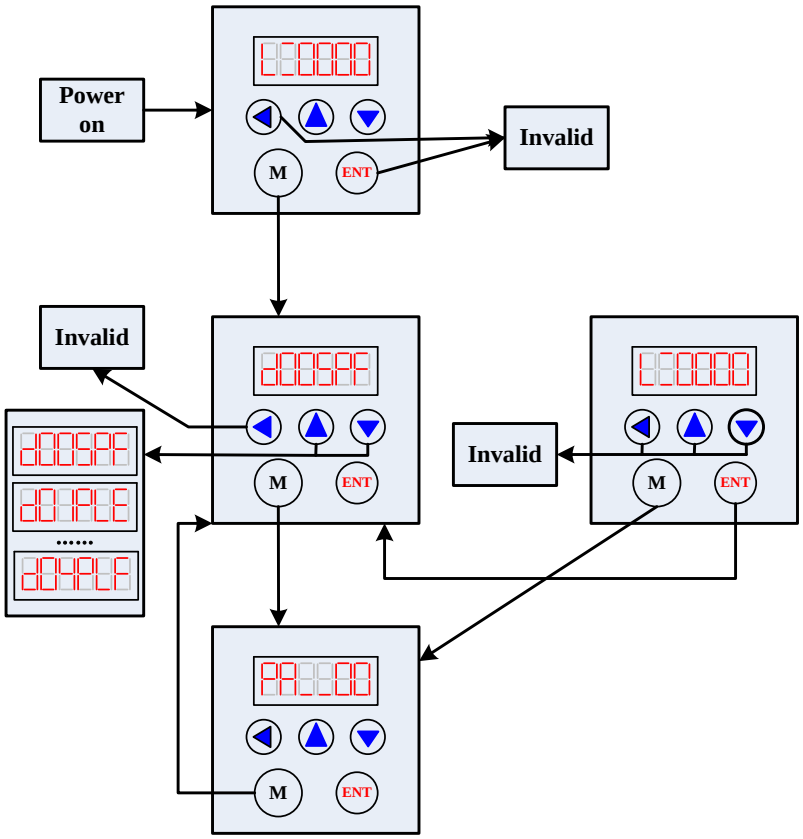


Fig. 8 Display operation flow diagram

10.3 Parameter Configure Operation Example

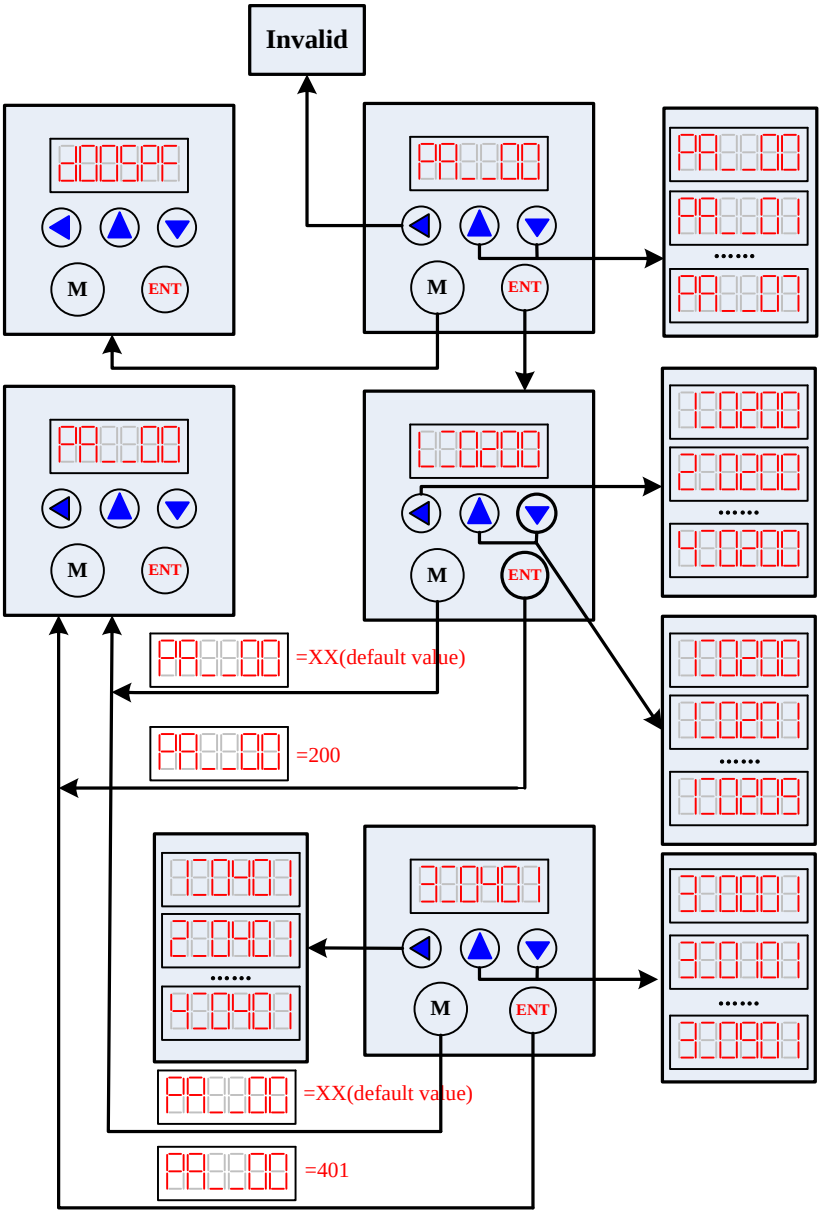


Fig. 9 Parameter configure flow diagram

Attention: The default parameters of current loop, position loop and speed loop are almost the best, user no need to change them, but to configure the parameter Pulses/revolution according to the necessity of the control system.

11. Typical Connections to 2HSS2208H-KH

The typical connections to 2HSS2208H-KH are shown in figure 10. The power source grade AC75V or AC110V selection is based on the

matching motor.

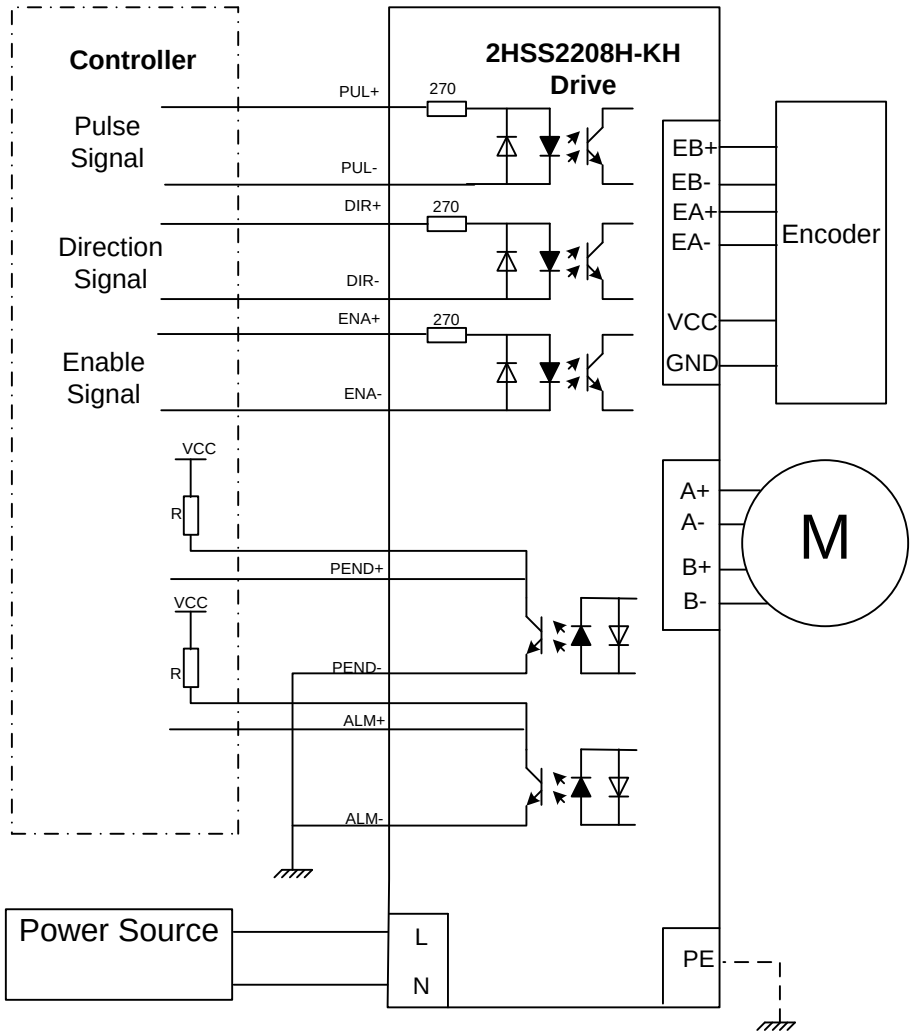


Fig. 10 Typical connections to 2HSS2208H-KH

Attention ： R (3~5K) must be connected to control signal terminal.

12. Processing Methods to Common Problems and Faults

12.1 Power on but no digital tube display

■ No power input, please check the power supply circuit. The voltage is too low.

12.2 Power on or after the motor running a small angle and fault data display

■ Please check the motor feedback signal and if the motor is connected with the drive.

- The stepper servo drive is over voltage or under voltage. Please lower or increase the input voltage.
- Please check the motor phase wires if they are connected correctly，if not， please refer to the 4.1.2 and 4.1.3 Power Ports.
- Please check the parameter in the drive if the poles of the motor and the encoder lines are corresponding with the real parameters, if not, set them correctly.
- Please check if the frequency of the pulse signal is too fast, thus the motor may be out of it rated speed, and lead to position error.

12.3 After input pulse signal but the motor not running

- Please check the input pulse signal wires are connected in reliable way.
- Please make sure the input pulse mode is corresponding with the real input mode.