杰美康机电
JUST MOTION CONTROL

# 2HSS858H-N
# Stepping Servo Driver
# Instructions for use

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| version | prepared | approved |
|---|---|---|
| V1.51 | Rd | Rd |

目录

# I. Product Profile

## 1. Overview

2HSS858H-N is a new simple step servo driver perfectly integrated into servo technology. The stepper servo driver adopts the latest 32-bit DSP and integrates advanced power angle closed-loop control algorithm. Compared with the traditional stepper driver, it can avoid the step loss problem to the greatest extent, effectively suppress the motor temperature rise, obviously reduce the motor vibration, and greatly enhance the motor high-speed performance. The driver cost is 50% of AC servo system, and the motor size is compatible with traditional stepping motor, which is convenient for customers to replace and upgrade. In short, this step servo driver set no lost step, low temperature rise, high speed, high torque, low cost and other advantages in one, is a cost-effective motion control products.

## 2. Technical characteristics

- ◆ No missing steps, accurate positioning
- ◆ 100% rated torque drive motor
- ◆ Variable current control technology, high current efficiency

- ◆ Small vibration, stable operation at low speed
- ◆ Built-in acceleration and deceleration control to improve start-stop smoothness
- ◆ User-definable segmentation
- ◆ Compatible with 1000 and 2500 line encoders
- ◆ General application parameters need not be adjusted
- ◆ Phase loss protection, over current protection, over voltage protection and over-differential protection
- ◆ Six-digit digital tube display, easy to set parameters and monitor motor running state

## 3. Application fields

Suitable for all kinds of automatic equipment and instruments with large torque requirements, such as engraving machine, stripping machine, marking machine, cutting machine, laser typesetting, plotter, CNC machine tool, automatic assembly equipment, etc. It works particularly well in devices where users expect low noise and high speeds.

## II. Technical indicators

## 1. Electrical, mechanical and environmental indicators

| | | |
|---|---|---|
| input voltage | | 50~90VAC |
| continuous current output | | 6.0A |
| maximum pulse frequency | | Can be set via internal parameters |
| logic input current | | 7~20mA (10mA typical) |
| default communication rate | | 57.6Kbps |
| protection | | ● Peak value of over current action value 16A± 10%<br>● Over voltage action value 200VDC<br>● Excessive difference alarm thresholds can be set via the driver's front panel |
| m ak e wi th rin | occasions | Try to avoid dust, oil mist and corrosive gases |
| | operating temperature | 70℃ max. |
| | storage temperature | -20℃~+65℃ |
| | humidity | 40~90%RH |

| | | |
|---|---|---|
| g re al m | cooling method | Natural cooling or forced cooling |

## 2. Mechanical installation size drawing

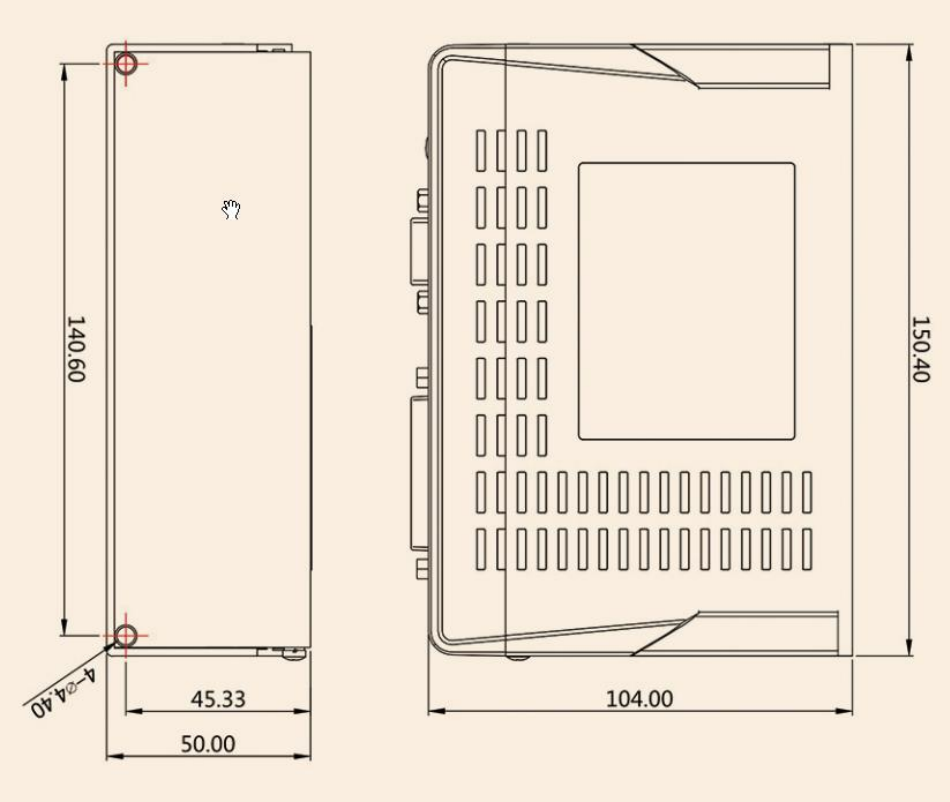



Figure 1 Mechanical installation size diagram (unit:mm)

**When designing installation size, consider terminal size and ventilation and heat dissipation.**

## 3. Strengthen the heat dissipation method

(1) The reliable working temperature of the driver is usually within 60 ° C, and the working temperature of the motor is within 90 ° C;

(2) When installing the drive, please use vertical side

installation to form strong air convection on the surface of the radiator; if necessary, install a fan near the drive to force heat dissipation to ensure that the drive works within a reliable working temperature range.

## III. Fault code

| Fault display | cause of issue |
|---|---|
|  | Motor overcurrent alarm |
|  | Voltage reference alarm |
|  | Parameter upload alarm |
|  | Power overvoltage alarm |
|  | Position out of tolerance alarm |
|  | Motor phase loss alarm |
|  | Drive offline |

OOErr Alarm Handling:

1、Alarm on power-up:

check the wiring first, confirm that there is no short circuit between the motor adapter wire and the motor wire. Otherwise, try replacing the drive or motor.

2、Alarms during operation:

a. Check the wiring to confirm that there is no short circuit between the motor transfer wire and the motor wire;b. Check whether there is electromagnetic interference outside;c. Reduce the speed and lengthen the acceleration and deceleration time.

## 11Err, 22Err Alarm Handling:

Power on again, alarm or replace the driver;

## 33Err Alarm Handling:

1、Alarm on power-on: first confirm whether the power supply voltage is too high, exceeding AC 114V and DC 160 V. Verify that the voltage is OK and try replacing the drive.

2、Alarm during operation: a. Check whether there is electromagnetic interference outside;b. Reduce speed and lengthen acceleration and deceleration time;

## 44Err Alarm Handling:

**原因 1**：检查接线，电机线和编码器线，是否有接错或者接触不良；

处理方法：保证接线接触良好及定义正确；

**原因 2**：检查速度及加速度时间，速度过快和加速度时间过短，可能引起报警；

处理方法：适当降低速度，延长加速时间；

**原因 3**：检查结构及负载，结构是否有卡死，负载是否过重，可能引起报警；

处理方法：调整结构，保证行程间顺畅，减驱负载测试；

**原因 4**：以上没问题，更换电机或驱动器。

处理方法：更换同型号产品做排除法测试。

## 55Err Alarm Handling:

1, check whether the motor power line is not connected well, or poor contact.

2. Modify P30 to 0 and power on again.

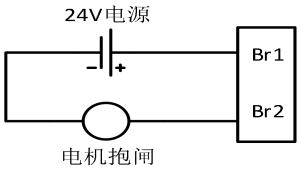
**EnOFF processing:**

Check if ENA signal is connected.

## IV. Driver interface and wiring introduction

### 1. Interface definition

1) Brake interface (relay welded only for interface of driver model 2HSS858H-N-SC)

| symbol | name | description |
|---|---|---|
| Br1 | brake interface (Built-in relay) |  |
| Br2 | | |

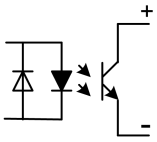
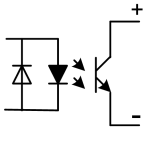


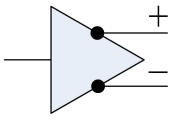
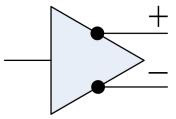
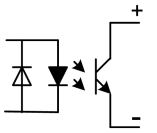
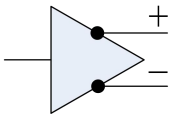
2) Power terminal interface 1

| terminal number | symbol | name | description |
|---|---|---|---|
| 1 | AC1 | Power input L | L and N Indirect AC 50~90VAC |
| 2 | AC2 | Power Input N | |
| 3 | A+ | Motor A+ wiring | |
| 4 | A- | Motor A-wiring | |
| 5 | B+ | Motor B+ wiring | |
| 6 | B- | Motor B-wiring | |

3) Control signal port (44-pin DB head)

| terminal number | symbol | name | description |
|---|---|---|---|
| 1 | IN1+ | Input interface 1 positive | function preservati |

| | | | |
|---|---|---|---|
| | | | on |
| 2 | IN1- | Input interface 1 negative | function preservation |
| 3 | PUL+ | Pulse input positive | Compatible with 5V and 24V |
| 4 | PUL- | pulse input negative | |
| 5 | DIR+ | Direction input positive | Compatible with 5V and 24V |
| 6 | DIR- | Direction input negative | |
| 7 | ALM+ | Alarm output positive |  |
| 8 | ALM- | Alarm output negative | |
| 9 | PEND+ | Position signal output positive |  |
| 10 | PEND- | Position signal output negative | |
| 11 | ENA+ | enable input positive | Compatible with 5V |

| | | | |
|---|---|---|---|
| 12 | ENA- | Enable input negative | and 24V |
| 13 | OUTZ+ | encoder Z phase positive |  |
| 29 | OUTZ- | Encoder Z phase negative | |
| 14 | OUTB+ | Encoder B phase positive |  |
| 15 | OUTB- | Encoder B phase negative | |
| 32 | BRAKE+ | Brake signal positive |  |
| 31 | BRAKE- | Brake signal negative | |
| 44 | OUTA+ | Encoder A phase positive |  |
| 30 | OUTA- | Encoder A phase negative | |

4)status indication

(1) Key panel: (composed of 4 keys plus 5 LED displays)


2HSS858H-N uses LED to indicate power supply and six-digit digital tube to display status. The operation of digital tube panel is shown in the table below.

| key symbol | illustrate |
|---|---|
| M key | Undo exit, function switching function |
| ENT key (short press) | Shift function |
| ENT key (long press) | OK, save function |
| ▲ | Adjust parameters and add functions |
| ▼ | Parameter adjustment, reducing functions |

Select the display mode by pressing "M", and select the status of monitoring motor operation by pressing up and down keys. The following table shows the meaning represented by each monitoring code.

| LED display | meaning |
|---|---|

| | |
|---|---|
| d0-Sr | Reference Speed |
| d1-SF | feedback speed |
| d2-Er | position error |
| d3-Pr | given position |
| d4-PF | position feedback |
| d5-u. | bus voltage |
| d6-Ld | given current |
| xxErr | drive failure |
| EnOFF | Drive offline |

Description:Switch to this function through 'M'; i.e. parameter display function; long press 'ENT' key to view parameter value (power-on display is the parameter value you finally view), press '▼' key or '▲' key to switch function;(''key is invalid) Exit this function and go to the next function Press 'M' key.

## 2. Control signal interface circuit diagram

Control signal input and output interface circuit diagram, as shown in the figure below.

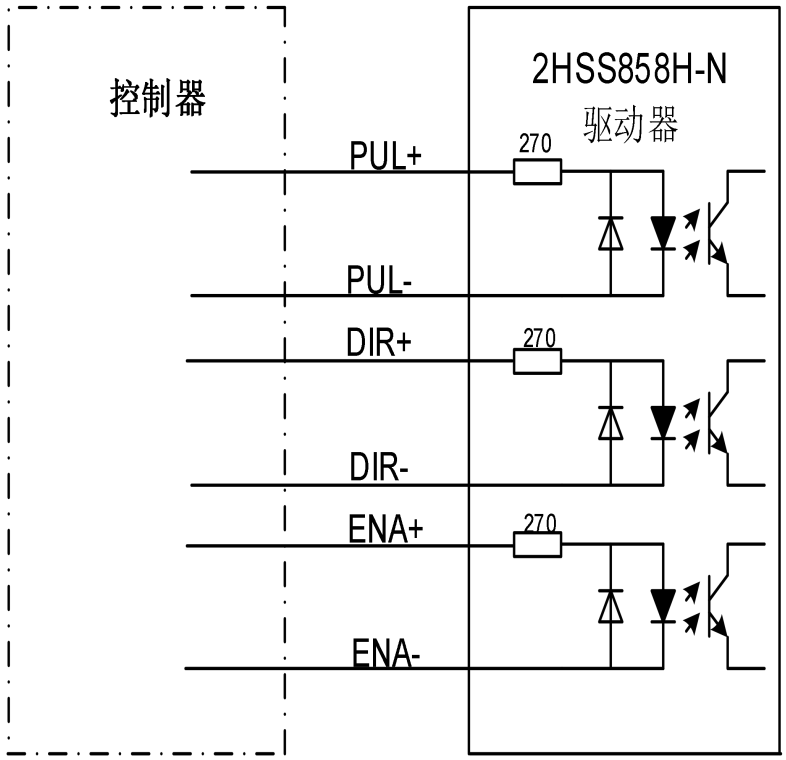



Figure 2 Differential signal connection

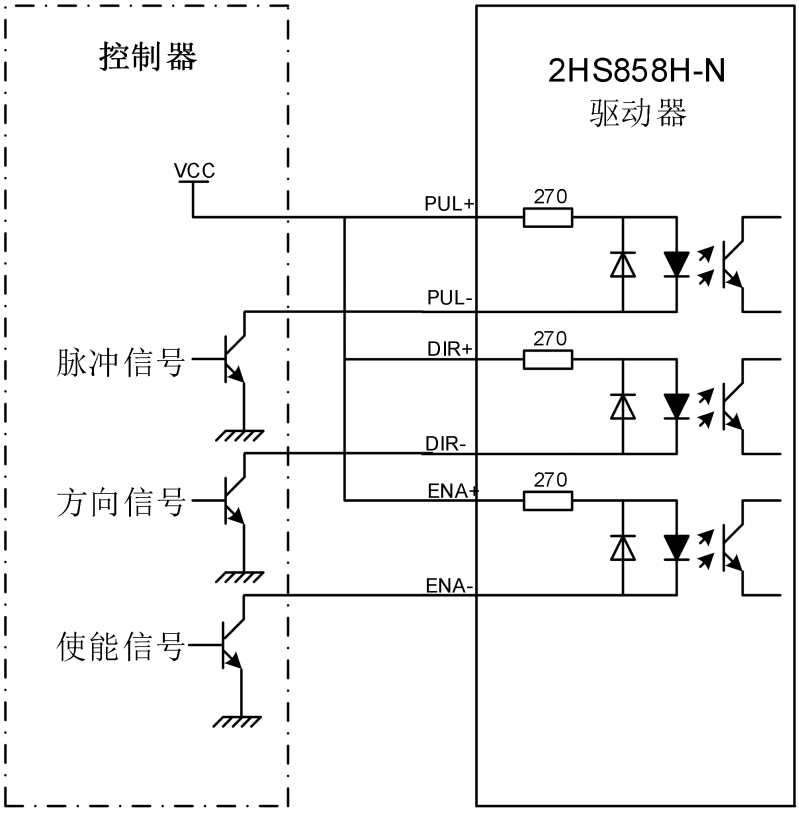



Figure 3 Common anode connection

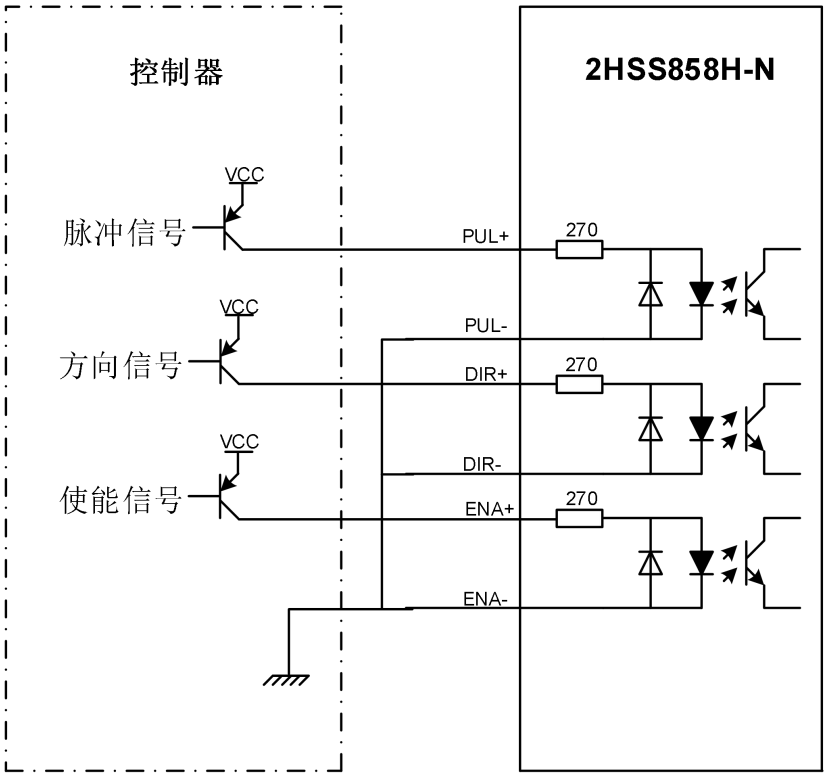



Fig. 4 Common cathode connection

Note:Control signal levels are compatible with 5V and 24V.

## 3. Control signal timing diagram

To avoid some misoperations and deviations, PUL, DIR and ENA should meet certain requirements, as shown in Figure 3 below:

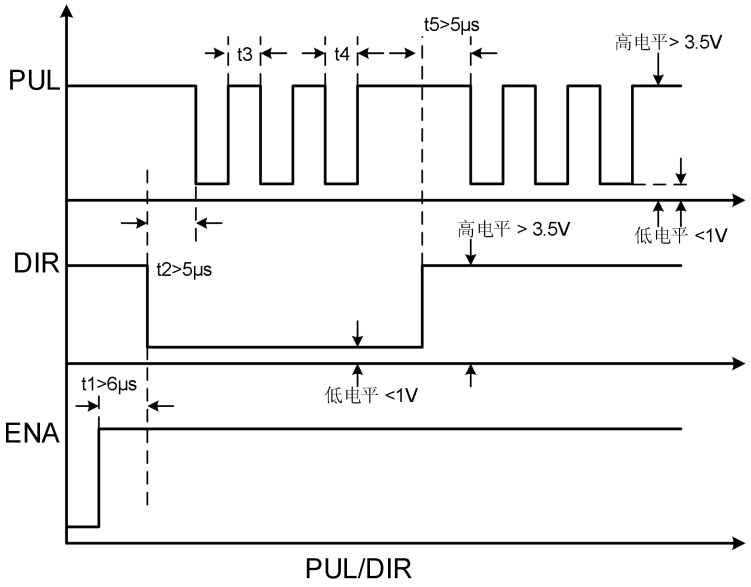



Figure 5 Control Signal Timing Diagram

Notes:

(1) t1: ENA (enable signal) shall be determined high at least 6μs ahead of DIR. ENA+ and ENA-are generally recommended.

(2) t2: DIR determines its status high or low at least 5μs ahead of PUL falling edge.

(3) t3: pulse width is at least 2.5μs.

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

(5) t5: DIR lags PUL rising edge by at least 5μs to maintain its state high or low.

## 4. Control signal mode setting

**Pulse trigger edge selection:**Set the pulse rising edge or falling edge trigger valid through the driver's front panel.

## 5. Encoder wiring

Encoder wiring is provided by our 15-pin extension cable

and motor encoder cable, which connects directly to the motor and driver without customer wiring. The following table shows the 2HSS 858H-N encoder interface definitions.

| DB header pin | signal | described |
|---|---|---|
| 1 | EA+ | Encoder ChannelA Input Positive |
| 2 | EB+ | EncoderB channel input positive |
| 3 | GND | Encoder inputGND |
| 11 | EA- | Encoder ChannelA Input Negative |
| 12 | EB- | Encoder ChannelB Input Negative |
| 13 | VCC | Encoder power input+5V |

## V. Driver parameter setting

2HSS 858H driver parameter setting method: parameters can be set through the front panel of the driver. There is a set of default factory configuration parameters corresponding to the best motor inside the driver. Users only need to adjust the internal subdivision number of the driver according to the specific use situation. See the following table for specific parameters and functions:

Actual value of parameter = set value × corresponding dimension

| serial number | name | range | dimensional | restart drive | default parameters |
|---|---|---|---|---|---|
| P1 | **Current loop proportional gain** | **0-9000** | **0.0001** | **is** | **1000** |
| P2 | **Current loop integral gain** | **0-2000** | **0.0001** | **no** | **100** |
| P3 | **actuator** | **0-1000** | **0.0001** | **no** | **50** |

| | | | | | |
|---|---|---|---|---|---|
| | **damping coefficient** | | | | |
| P4 | **position loop proportional gain** | **0-5000** | **0.001** | **no** | **2000** |
| P5 | **position loop integral gain** | **0-1000** | **0.01** | **no** | **200** |
| P6 | **speed loop proportional gain** | **0-5000** | **0.00001** | **no** | **300** |
| P7 | **velocity loop integral gain** | **0-1000** | **0.00001** | **no** | **1000** |
| P8 | **Driver open-loop current** | **0-60** | **0.1** | **no** | **40** |
| P9 | **Driver closed-loop** | **0-40** | **0.1** | **no** | **20** |

| | | | | | |
|---|---|---|---|---|---|
| | **current** | | | | |
| P10 | **Driver alarm level** | **0-1** | **1** | **is** | **1** |
| P11 | **driver direction level** | **0-1** | **1** | **no** | **1** |
| P12 | **pulse edge selection** | **0-1** | **1** | **is** | **0** |
| P13 | **Driver enable level** | **0-1** | **1** | **is** | **0** |
| P14 | **Driver bit level** | **0-1** | **1** | **is** | **1** |
| P15 | **Encoder line number selection** | **0-1** | **1** | **is** | **0** |
| P16 | **Drive position out of tolerance** | **0-3000** | **10** | **no** | **400** |
| P17 | **Drive subdivision options (shown in** | **0-15** | **1** | **is** | **2** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **the table below)** | | | | | | | |

| **parameters** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|---|
| **number of divisions** | Custom subdivision | 800 | 1600 | 3200 | 6400 | 12800 | 25600 | 51200 |
| **parameters** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| **number of divisions** | 1000 | 2000 | 4000 | 5000 | 8000 | 10000 | 20000 | 40000 |

| | | | | | |
|---|---|---|---|---|---|
| P18 | **proportional coefficient** | **0-10000** | **0.01** | **no** | **100** |
| P19 | **driver command smoothing** | **0-10** | **1** | **no** | **2** |
| P20 | **User-defined segmentation** | **0-1000** | **50** | **is** | **8** |
| P21 | **Driver power-on display** | **0-4** | **1** | **no** | **0** |
| P22 | **back electromotive force compensation** | **0-10000** | **0.01** | **no** | **100** |

| | | | | | |
|---|---|---|---|---|---|
| P23 | **coefficient Drive Enable** | **0-1** | **1** | **is** | **0** |
| P24 | **Lock open-loop angle compensation** | **0-10000** | **0.0001** | **no** | **0** |
| P25 | **Open-closed loop superposition ratio** | **0-100** | **1** | **no** | **20** |
| P26 | **bit output threshold** | **0-4000** | **1** | **no** | **10** |
| P27 | **Open-closed loop mode selection** | **0-1** | **1** | **is** | **1** |
| P28 | **factory parameters** | **reservations** | **reservations** | | **reservations** |
| P29 | **factory parameters** | **reservations** | **reservations** | | **reservations** |
| P30 | **Driver** | **0-1** | **1** | **is** | **1** |

| | | | | | |
|---|---|---|---|---|---|
| | **phase loss detection** | | | | |
| P31 | **PWM mode** | **0-9000** | **1** | **is** | **0** |
| P32 | **factory parameters** | **reservations** | **reservations** | | **reservations** |
| P33 | **factory parameters** | **reservations** | **reservations** | | **reservations** |
| P34 | **half-flow slope** | **0-10** | **0.00001** | **no** | **30** |
| P35 | **half-flow downtime** | **0-1500** | **10** | **no** | **1000** |
| P36 | **shutdown threshold** | **0-4000** | **1** | **no** | **100** |
| P37 | **shutdown current setting** | **0-60** | **0.1** | **no** | **25** |
| P38 | **shutdown half-flow enable** | **0-1** | **1** | **no** | **1** |
| P39 | **PWM arrangement** | **0-2** | **1** | **is** | **0** |

| | | | | | |
|---|---|---|---|---|---|
| P40 | **Overvoltage judgment time** | **0-4000** | **200** | **no** | **200** |
| P41 | **current variation threshold** | **0-4000** | **1** | **no** | **10** |
| P42 | **current variation limit** | **0-4000** | **1** | **no** | **50** |
| P43 | **directional hysteresis selection** | **0-1** | **1** | **is** | **1** |

There are 43 parameters, which can be modified via the front panel of the drive. The parameter settings are described below:

Parameters P1, P2, P3, P4, P5, P6, P7 are used to set the parameters of current loop, system damping, position loop and velocity loop respectively.

Parameters P8 and P9 are used to set open-loop current and closed-loop control current respectively. (Actual current = open loop current + closed loop current)

Parameter P10 is used for alarm output level selection. Parameter 1 indicates that the optocoupler output transistor

is off during normal operation; the optocoupler output transistor is on during driver alarm. And vice versa.

Parameter P11 is used for directional level selection. By setting this parameter, the control direction of the control terminal level can be changed.

Parameter P12 is used for pulse edge selection. By setting this parameter, the effective edge of pulse can be changed.

Parameter P13 is used to select the level of the enable signal, generally 0, low level enable, that is, no external enable input signal is required. And vice versa.

Parameter P14, select the position output level, 1 means that the driver meets the position condition when the optocoupler output transistor is turned off; when the position condition is not met, the optocoupler output transistor is turned on. And vice versa.

Parameter P15, line number selection of encoder, 0 means 1000 lines, 1 means 2500 lines.

Parameter P16 sets the threshold for position deviation. (Actual = setpoint ×10)

Parameter P17, Subdivision setting of drive

| **parameters** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|---|
| **number of divisions** | Custom subdivision | 800 | 1600 | 3200 | 6400 | 12800 | 25600 | 51200 |
| **parameters** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |

| number of divisions | 1000 | 2000 | 4000 | 5000 | 8000 | 10000 | 20000 | 40000 |
|---|---|---|---|---|---|---|---|---|

Tip: In addition, the driver also provides the user with any subdivision that can be freely set, and the specific parameters are set bymode P20.

Parameter P19, Command Smoothing Coefficient

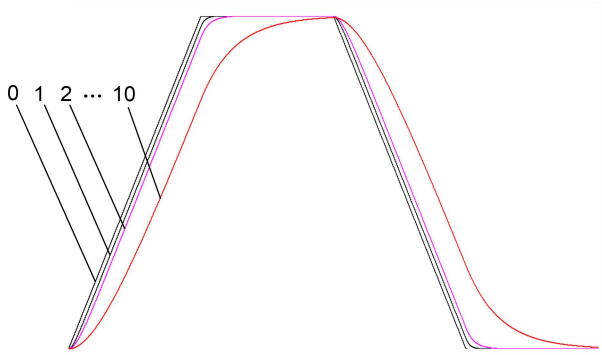



**Figure 7 Command smoothing coefficient**

Parameter P20 is used for user-defined subdivision number. The user-defined subdivision value is P20*50. For example, the user needs to set the subdivision to 6100. First, set P17=0, and then set P20=122.

Parameter P21, driver power-on display.

| parameters | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| display information | Reference Speed | feedback speed | position error | reference position | feedback position |

Parameter P23, **driver enable lock**, when this parameter is 0, after the enable signal is given, the motor does not lock the shaft, and the driver does not count external pulses. When this parameter is 1, given the enable signal, the motor locks the

shaft and the driver does not count external pulses.

Parameter P27, **open-closed loop mode selection**, when this parameter is 0, it is open-loop mode. When this parameter is 1, it is closed loop mode.

Parameter P30, **driver phase loss detection**, 1 means ON, 0 means OFF. Limited to manufacturer maintenance.

# VI. Parameter adjustment method

## 1.Key operation method

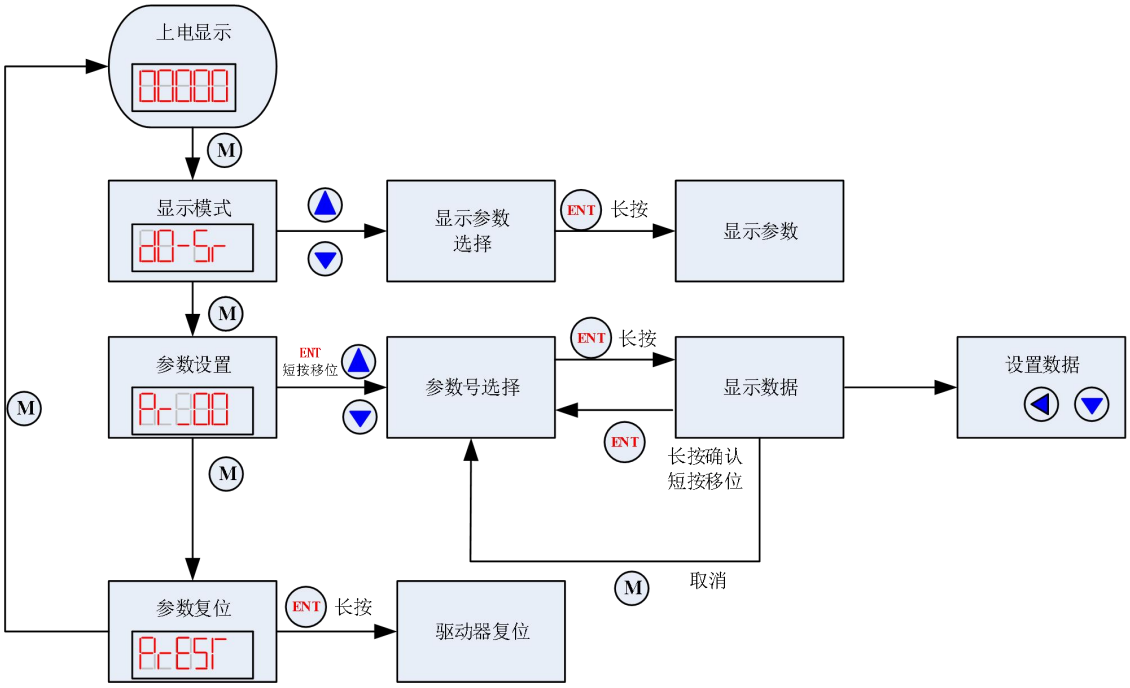



Figure 8 Flow chart of key operation

**Note: ENT key short press for shift, long press for confirmation.**

The default parameters of current ring, position ring and speed ring of the driver are the best parameters of the matching motor. Customers generally do not need to modify them. They only need to select the motor subdivision number and the percentage of open and closed loop current according to the needs of system control.

## VII. Typical application wiring diagram

A typical wiring diagram consisting of a 2HSS858H-N driver, etc. is shown in Figure 8. AC50~90V is selected according to the voltage class of matching motor.

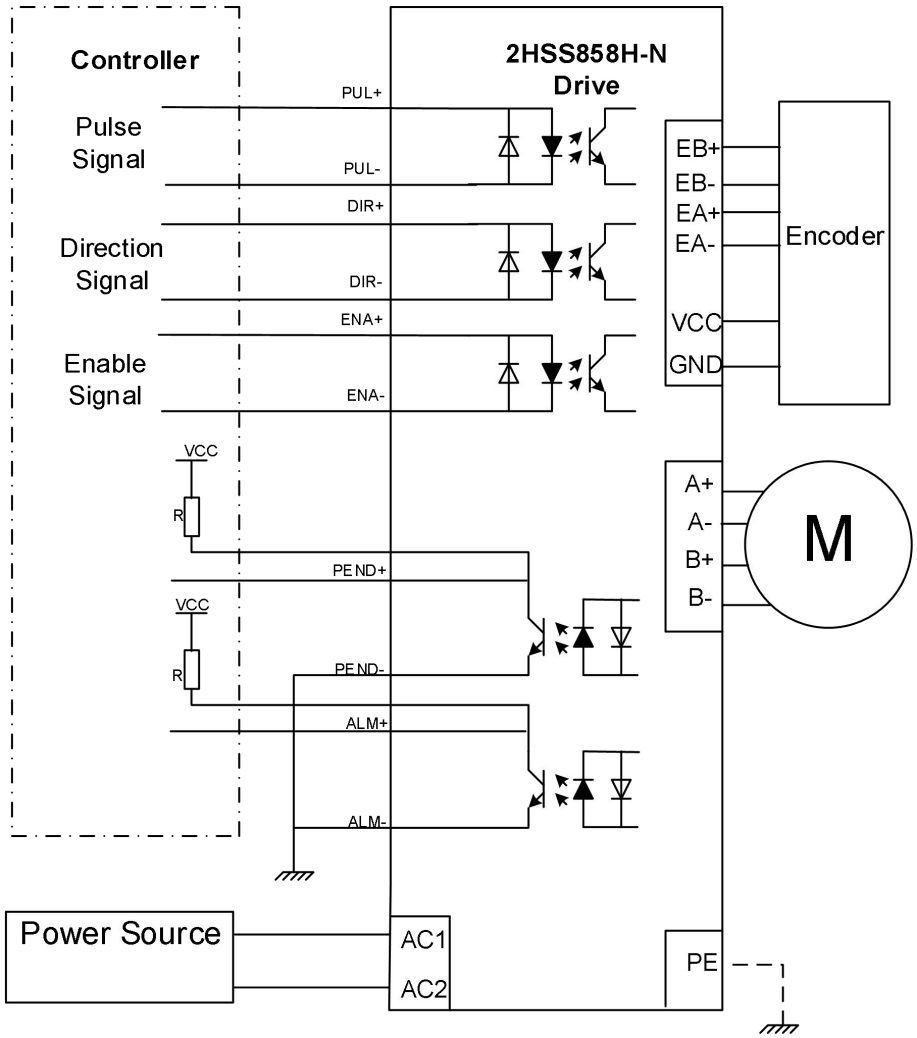



Figure 11 Typical wiring diagram

Note: Resistor R of in-place output and alarm output port is connected to control signal terminal, with resistance value of 3~ 5K.

## Eight, common problems and fault handling

### 1, power-on digital tube no display

- Input power failure, please check the power line. Is the voltage too low?

### 2. Alarm after power-on or rotation of a small angle

- Check whether the motor feedback signal wire and motor power phase wire are connected
- Step servo driver input power supply voltage is too high or too low
- Whether the phase sequence of motor is connected correctly. Incorrect Please refer to the motor identification and drive corresponding phase sequence connection
- In the drive configuration parameters, whether the motor encoder wire number is consistent with the actual parameters connected to the motor. Reset if different
- Whether the pulse input speed is greater than the rated speed of the motor, and the position exceeds the tolerance.

### 3. No rotation after pulse input

- Is the wiring of the pulse input terminal of the step servo driver reliable?
- Is the input mode in the step servo driver system configuration pulse input dependent input mode
- Does the motor enable release

## 00Err Alarm Handling:

1. Alarm on power-on: first check the wiring and confirm that the motor adapter wire and motor wire are not short-circuited. Otherwise, try replacing the drive or motor.

2. Alarm during operation: a. Check the wiring to confirm that there is no short circuit between the motor adapter wire and the motor wire;b. Check whether there is electromagnetic interference outside;c. Reduce the speed and lengthen the acceleration and deceleration time.

## 11Err, 22Err Alarm Handling:

Power on again, alarm or replace the driver;

## 33Err Alarm Handling:

1. Alarm on power-on: First confirm whether the power supply voltage is too high, exceeding AC 114V and DC 160 V. Verify that the voltage is OK and try replacing the drive.

2. Alarm during operation: a. Check whether there is electromagnetic interference outside;b. Reduce speed and lengthen acceleration and deceleration time;

## 44Err Alarm Handling:

Reason 1: Check the wiring, motor wires and encoder wires to see if they are connected incorrectly or have poor contact;

Treatment method: Ensure that the wiring contact is good and the definition is correct;

Reason 2: Check the speed and acceleration time. Too fast speed and too short acceleration time may cause an alarm;

Treatment method: appropriately reduce the speed and extend the acceleration time;

Reason 3: Check the structure and load to see if the structure is stuck and whether the load is too heavy, which may cause an alarm;

Treatment method: adjust the structure to ensure smooth travel, and test with reduced drive load;

Reason 4: There is no problem with the above, replace the motor or driver.

Treatment method: Replace the product with the same model and do the elimination test.

## 55Err Alarm Handling:

1, check whether the motor power line is not connected well, or poor contact.

2. Modify P30 to 0 and power on again.

## EnOFF processing:

Check if ENA signal is connected.