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HB808C

Digital Hybrid Servo Drive  
User Manual

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Table of contents

1. Product Introduction..... 3

1. Overview..... 3

2. Features..... 3

3. Application fields..... 3

2. Electrical, Mechanical and Environmental Indicators..... 3

1. Electrical Specifications..... 3

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

3. Mechanical structure dimensions..... 3

4. Heat dissipation considerations..... 4

3. Driver interface and wiring introduction..... 4

1. Interface Description..... 4

2. Control signal interface circuit..... 5

3. Control Signal Timing Diagram..... 6

4. Control Signal Mode Setting..... 6

5. Wiring requirements..... 6

4. DIP switch setting..... 6

V. Protection Function..... 7

VI. Frequently Asked Questions..... 7

1. Common Problems and Solutions in Applications..... 7

2. Driver FAQ User Q&A..... 7

Product Warranty Terms..... 8

# HB808C

## Digital Hybrid Servo Drive

### 1. Product Introduction

#### 1. Overview

HB808C is a new low-voltage hybrid servo product developed by our company based on many years of experience in low-voltage servo systems. This product uses the latest DSP digital processing chip and advanced variable current and variable frequency control algorithm technology, It provides a cost-effective hybrid servo drive solution. HB808C has a compact structure, small size, and saves space. Reduces electromagnetic interference between lines; adopts better vibration technology and low heat generation technology, effectively solving the problem of motor and driver It solves problems such as heat, vibration and noise, and has low heat generation and is green and environmentally friendly.

#### 2. Features

- Working voltage: DC input voltage 24VDC~80VDC, recommended working voltage 36V/48V
- Maximum continuous output current 8.0A, maximum peak current 13A (advanced hybrid servo overload capability)
- Can accept differential and single-ended pulse/direction commands, with three control modes: position/speed/torque
- Adopt FOC magnetic field positioning control technology and space vector pulse width modulation (SVPWM) closed-loop control technology
- Adopting advanced variable current technology and variable frequency technology, effectively reducing the heat generation of motor and driver
- The number of pulses per circle can be set by debugging software or pulling code (subdivision)
- With overvoltage, undervoltage, overcurrent and over-difference protection functions
- Single/double pulse mode, pulse effective edge optional (selected through serial port connection to host computer)
- The maximum pulse frequency of the control command is 500KHz (factory default is 200KHz)
- Pulse, direction and enable signal input interface level is 4.5-28V compatible
- It has serial port RS232 debugging function, but it needs to use the company's special serial port debugging cable
- Performance: stable speed, small overshoot, small tracking error, low heat generation of motor and driver

### 3. Application areas

Suitable for various small and medium-sized automation equipment and instruments, such as: screw locking machine, wire stripping machine, winding machine, terminal machine, laser Machines, inkjet printers, small and medium-sized engraving machines, electronic processing equipment, automatic gripping equipment, special CNC machine tools, packaging equipment and machines Robots, etc. It is particularly effective in devices where users expect low noise and high speed.

### 2. Electrical, Mechanical and Environmental Indicators

#### 1. Electrical indicators

| parameter                       | HB808C |       |     |         |
|---------------------------------|--------|-------|-----|---------|
|                                 | Min    | Typ   | Max | Unit    |
| Continuous output               | 0.5    | -     | 13  | A       |
| current Supply voltage (DC)     | 24     | 36/48 | 80  | Vdc     |
| Logic input current             | 6      | 10    | 16  | m.a.    |
| Logic input voltage             | 4.5    | 5     | 28  | Vdc     |
| Pulse frequency                 | 0      | 200   | 500 | kHz     |
| Pulse high level width          | 1.5    | -     | -   | uS      |
| Position error Control accuracy | -      | ±1    | -   | Pulse   |
| Speed control accuracy          | -      | ±2    | -   | rpm     |
| Maximum acceleration (no load)  | -      | 100   | -   | rpm /ms |
| Overvoltage protection          | 90     | 92    | 94  | Vdc     |
| voltage Insulation resistance   | 100    | -     | -   | MΩ      |

#### 2. Usage environment and parameters

| Cooling method      |             | Natural cooling or forced air cooling                                                                                                                                                                    |
|---------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Environment   | occasion    | Do not place it near other heat generating equipment and avoid dust, oil mist, and corrosive gases.<br>Places with high humidity and strong vibration, flammable gas and conductive dust are prohibited; |
|                     | Temperature | -5℃ ~ +45℃                                                                                                                                                                                               |
|                     | Humidity    | 40 ~ 90%RH                                                                                                                                                                                               |
|                     | Vibration   | 10 ~ 55Hz/0.15mm                                                                                                                                                                                         |
| Storage temperature |             | -20℃ ~ +65℃                                                                                                                                                                                              |
| Use altitude        |             | ≤1000m                                                                                                                                                                                                   |
| weight              |             | About 1.4KG                                                                                                                                                                                              |

#### 3. Mechanical structure dimensions

HB808C drive structure can match any model of 28 base, 35 base, 42 base, 57 base

Frame, 60 frame and 86 frame two-phase hybrid servo motor, our company mainly recommends 0.3 NM, 0.4 NM,

Mix of 0.6 NM, 0.8 NM, 1.0 NM, 2.4 NM, 3.0 NM, 3.6 NM, 4.5 NM and 8.5 NM

Servo motors can also be matched with hybrid servo motors from other manufacturers. The encoder line count is 250 lines to 5000 lines.

Yes, but you need to contact our company, provide motor parameters, and match relevant programs according to different motors.

If you have higher requirements for low-speed vibration or high-speed performance, it is recommended to contact our company. We will write

By entering an algorithm that matches the motor, the motor will perform perfectly.

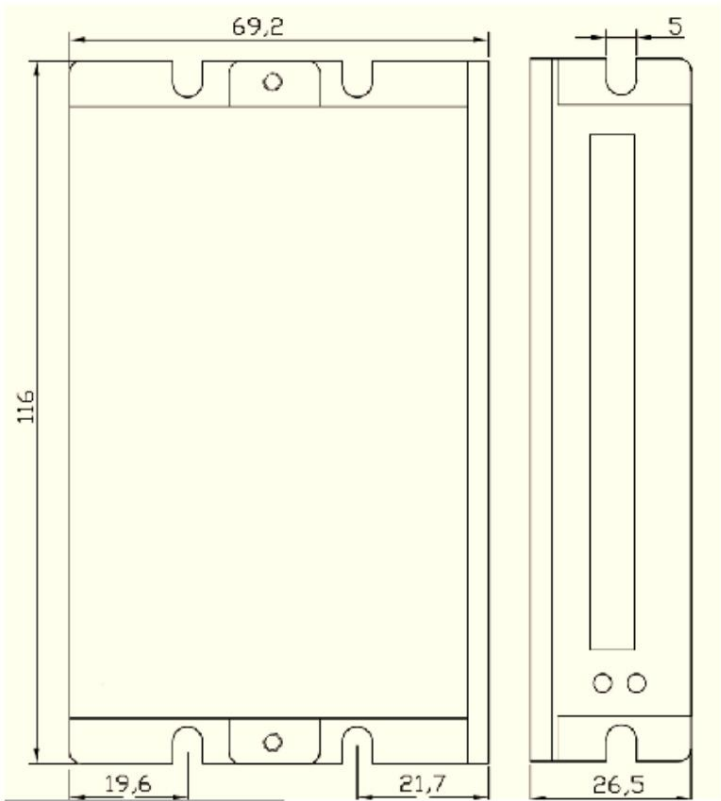


Figure 1 Mechanical structure dimensions

Figure 1 shows the dimensions of the HB808C hybrid motor driver.

4. Heat dissipation considerations

The reliable working environment temperature of the driver is usually within  $-5^{\circ}\text{C} \sim 45^{\circ}\text{C}$ , and the working temperature of the driver is within  $65^{\circ}\text{C}$ .  
The motor working temperature is within  $70^{\circ}\text{C}$ . If necessary, install a fan near the driver to force heat dissipation and ensure the driver is  
Work within reliable operating temperature range.

3. Driver interface and wiring introduction

1. Interface Description

1.1 Control Port

Green 8-pin 3.81mm spacing terminal

| Pin Number | Signal Function                                                                              | illustrate                            |
|------------|----------------------------------------------------------------------------------------------|---------------------------------------|
| 1          | PUL+ Pulse positive input terminal                                                           | Compatible with 4.5V~28V level signal |
| 2          | PUL- pulse negative input terminal                                                           |                                       |
| 3          | DIR+ Direction positive input terminal                                                       |                                       |
| 4          | DIR- Direction negative input terminal                                                       |                                       |
| 5          | ENA+ Enable positive input                                                                   |                                       |
| 6          | ENA- Enable negative input                                                                   |                                       |
| 7          | ALM+ Alarm signal positive output terminal open collector OC output, maximum pull-up voltage | 24V, maximum output current 100mA     |
| 8          | ALM- Alarm signal negative output terminal                                                   |                                       |

1.2 Power port

Use green 3-pin 3.81mm spacing with screw terminals (pay attention to the positive and negative poles of the power supply, do not connect the positive and negative poles in reverse!!!)

| Pin Number | Signal function description                                   |
|------------|---------------------------------------------------------------|
| 1          | +VDC Power input positive terminal, input voltage is 24~80Vdc |
| 2          | GND Negative power input terminal                             |
| 3          | NC does not receive any signal                                |

1.3 Power port

Use green 6-pin 3.81mm spacing with screw terminals (pay attention to the positive and negative poles of the power supply, do not connect the positive and negative poles in reverse!!!)

| Pin Number | Signal                      | Functional Description |
|------------|-----------------------------|------------------------|
| 1          | EB+ Encoder signal B+ input |                        |
| 2          | EB- Encoder signal B- Input |                        |
| 3          | EA+ Encoder signal A+ input |                        |

|   |                                              |
|---|----------------------------------------------|
| 4 | EA- Encoder signal A- Input                  |
| 5 | VCC driver +5V output, powering the encoder  |
| 6 | EGND Driver GND output, powering the encoder |

#### 1.4 Serial RS232 communication interface

It can be connected to a PC through a serial port adapter (serial port adapter is available separately) and a dedicated serial port cable (powered on is prohibited).

The functions and parameters of the driver can be set through PC software, such as the subdivision and current value required by the customer.

The effective edge, etc. can also be adjusted to eliminate the resonance point.

| Terminal No. | symbol | name                       | illustrate            |
|--------------|--------|----------------------------|-----------------------|
| 1            | +5V    | 5V power positive terminal | For external STU only |
| 2            | TXD    | RS232 Transmitter          |                       |
| 3            | RXD    | RS232 Receiver             |                       |
| 4            | GND    | 5V power ground            | 0V                    |



Note: TS808D serial port cable must be a dedicated cable, which will be provided according to the user's needs. Please confirm before use to avoid any

damage.

#### 1.5 LED status indication

The green LED is the power indicator. When the driver is powered on, the LED is always on. When the driver is powered off, the LED is always on.

The LED goes out. The red LED is a fault indicator. When a fault occurs, the indicator flashes in a cycle of 5 seconds.

When the fault is cleared by the user, the red LED is always off. The red LED flashes at a frequency of 2Hz, where the LED is on for 200ms and off for 200ms.

300ms. The number of times the red LED flashes within 5 seconds represents different fault information, and the specific relationship is shown in the following table:

| Serial number | flashing times Red indicator | flashing waveform | Fault Description                     |
|---------------|------------------------------|-------------------|---------------------------------------|
| 1             | 1                            |                   | Overcurrent fault (I peak > 25A)      |
| 2             | 2                            |                   | Overvoltage fault (Vdc > 90V)         |
| 3             | 5                            |                   | Tracking error out of tolerance fault |

When the drive fails, it will stop and prompt the corresponding fault code. The user needs to turn off the power and then turn it on again.

When a drive fails, the drive will save the latest fault in the drive in a queue.

The drive can store up to 10 latest historical faults in the EEPROM of the drive. Users can use PC and text display to

Read the corresponding fault code.

#### 2. Control signal interface circuit

The HB808C driver signal input interface can be differential signal input, common anode signal single-ended input and common cathode signal single-ended input.

Terminal input, built-in high-speed photoelectric isolation coupler; output is triode open collector OC output, the interface connection method is as follows:

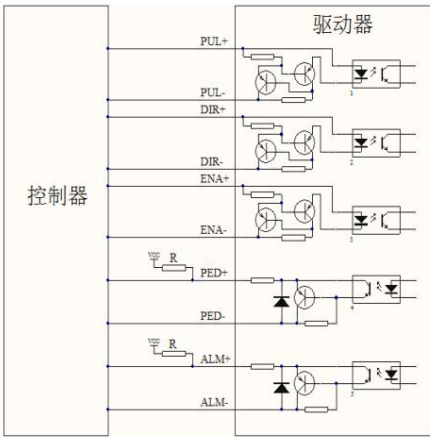


Figure 2 Input signal differential connection method

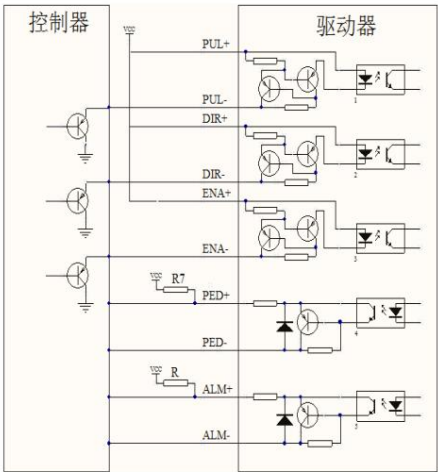


Figure 3 Input signal single-ended common anode connection

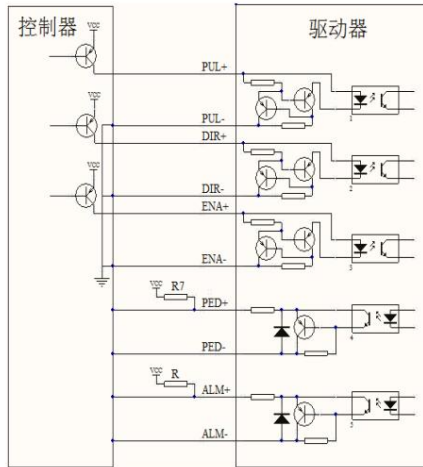


Figure 4 Input signal single-ended common cathode connection

Note: The voltage range of the signal input interface in the figure is 4.5~28Vdc, regardless of single-ended or differential connection.

No current limiting resistor is required. The maximum pull-up voltage for the output interface is 28Vdc, and the maximum output current is

100mA, select the appropriate pull-up resistor according to the external pull-up voltage, basic parameter value, if the external pull-up voltage is 24Vdc,

The pull-up resistor is 2K. If the external pull-up voltage is 12Vdc, the pull-up resistor is 1K. If it is driving a relay or an electric

For motor brake coil, please consult our relevant application engineers.

### 3. Control signal timing diagram

In order to avoid some false actions and deviations, PUL-, DIR- and ENA- should meet certain requirements, as shown in the following figure:

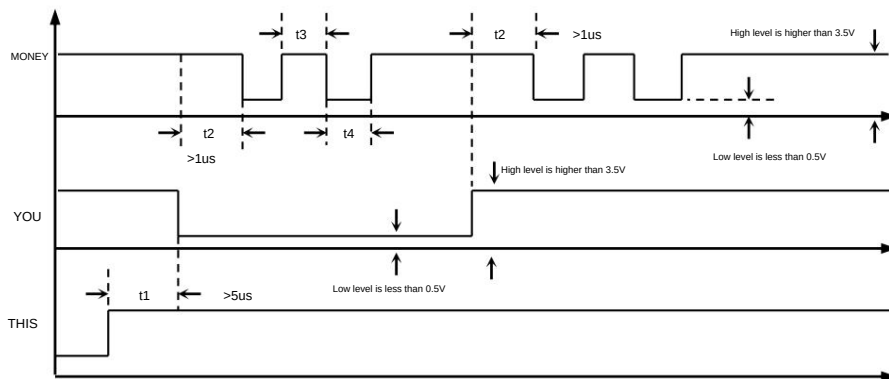


Figure 5 Control signal timing diagram

Notes:

- 1) t1: ENA (enable signal) should be at least 5μs ahead of DIR and determined to be high. In general, it is recommended to leave it floating;
- 2) t2: DIR determines its high or low state at least 1μs ahead of the falling edge of PUL;
- 3) t3: pulse width is at least 1.5μs;
- 4) t4: Low level width is not less than 1.5μs.

### 4. Control signal mode setting

Pulse trigger edge selection: Set the pulse rising edge or falling edge trigger to be effective through PC software.

Single or double pulse selection: Single pulse or double pulse is effective when set through PC software.

Direction selection: Set the initial running direction of the motor through PC software.

### 5. Wiring requirements

- 1) In order to prevent the driver from being disturbed, it is recommended that the control signal use a shielded cable and short-circuit the shield layer with the ground wire, except for special In addition to the requirements, the shielded wire of the control signal cable is grounded at one end: the host computer end of the shielded wire is grounded, and the driver end of the shielded wire is grounded. The same machine is only allowed to be grounded at the same point. If it is not a real ground wire, serious interference may occur.

The shielding layer is not connected. If conditions permit, thermal grounding technology is the most effective for shielding.

- 2) The pulse and direction signal wires are not allowed to be bundled together with the motor wires. It is better to separate them by at least 10cm. Otherwise, the motor Noise can easily interfere with the pulse direction signal, causing inaccurate motor positioning, system instability and other faults.

- 3) If one power supply is used to supply multiple drives, they should be connected in parallel at the power supply. Chain connection from one drive to another is not allowed.

Type connection.

- 4) It is strictly forbidden to plug or unplug the driver terminals while the power is on. When the motor stops, there is still a large current flowing through the coil. Pulling or plugging the terminals will cause huge The instantaneous induced electromotive force will burn out the driver.

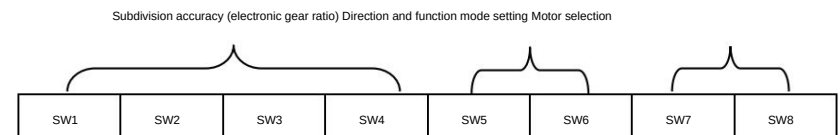
- 5) It is strictly forbidden to connect the wire end to the terminal after tinning it, otherwise the contact resistance may increase and the terminal may be damaged by overheating.

- 6) The wiring ends must not be exposed outside the terminals to prevent accidental short circuits and damage to the driver.

### 4. DIP switch setting

HB808C digital integrated low voltage servo driver uses 8-bit DIP switch to set subdivision accuracy (electronic gear ratio).

Motor rotation initial direction, self-test and function mode selection. Detailed description is as follows:



| Pulse/rev | S1  | S2  | S3 | S4 |
|-----------|-----|-----|----|----|
| 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  |
| 500   | 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 |
| 3600  | On  | Off | Off | Off |
| 7200  | Off | Off | Off | Off |

Subdivision accuracy (electronic gear ratio): When S1, S2, S3, and S4 are all on, the driver microstep subdivision adopts the driver

The internal default microstep subdivision number is 400Pulse/rev, which can also be adjusted by debugging.

The software sets the electronic gear ratio. SW5 sets the motor direction. When it is ON, the motor rotates clockwise (CW).

When OFF, the motor rotates counterclockwise (CCW); SW5 function mode selection, when OFF, the drive is space vector

Control mode (FOC), when it is on, the driver is in point motion mode (PM), which has a better start-stop effect.

HB808C driver factory default matching hybrid servo motor

|               |     |     |
|---------------|-----|-----|
| Motor         | SW7 | SW8 |
| TC42          | ON  | ON  |
| TC57          | OFF | ON  |
| TC60          | ON  | OFF |
| Default/TC86y | OFF | OFF |

Note: Hybrid servo motors from other manufacturers can be matched, and other bases, such as 28 base, 35 base, etc.

All can be matched, but you need to contact our company!

## 5. Protection function

### 1) Overvoltage protection

HB808C When the input voltage is higher than 90Vdc, the driver will stop working. At this time, you must eliminate the fault and re-power on.

Reset.

### 2) Undervoltage protection

HB808C When the input voltage is lower than 15Vdc, the driver will stop working. At this time, you must eliminate the fault and re-power on.

Reset.

### 3) Overcurrent protection

When overcurrent occurs, the driver will stop working. At this time, the fault must be eliminated and the power must be turned on again to reset.

### 4) Tracking error exceeds tolerance

HB808C When the tracking error exceeds the tolerance, the driver stops working. At this time, the fault must be eliminated and the power must be turned on again to reset.

y Note: Since the driver does not have the power supply positive and negative polarity reverse connection protection function, please confirm again before powering on.  
The positive and negative poles of the power supply must be connected correctly. Reverse connection will burn out the fuse in the driver!

## VI. Frequently Asked Questions

### 1. Common problems and solutions in the application

| Phenomenon                         | Possible issues                                          | Solution                                                                |
|------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------|
| Motor does not rotate              | The power light is off                                   | Check the power supply circuit and make sure it is normal.              |
|                                    | Motor shaft is weak                                      | The pulse signal is weak, and the signal current is increased to 7-16mA |
|                                    | Segment is too small                                     | Choose the right segment                                                |
|                                    | Drive Protected                                          | Restart the power supply                                                |
|                                    | Enable signal is low                                     | This signal is pulled high or not connected                             |
|                                    | No response to control signals                           | No power                                                                |
|                                    | The motor line is broken                                 | Check and connect                                                       |
|                                    | Voltage too high or too low                              | Check the power supply                                                  |
|                                    | Motor or driver damaged                                  | Replace the motor or drive                                              |
| Inaccurate location                | Signal interference                                      | Eliminate distractions                                                  |
|                                    | Shield ground is not connected or not connected properly | Reliable grounding                                                      |
|                                    | The motor line is broken                                 | Check and connect                                                       |
|                                    | Segmentation fault                                       | Set segment                                                             |
| The motor stalls when accelerating | Acceleration time is too short                           | Increased acceleration time                                             |
|                                    | The motor torque is too small                            | Choose a high torque motor                                              |
|                                    | Low voltage                                              | Increase the voltage appropriately                                      |

## 2. Driver FAQ User Q&A

### 1) What are the advantages of subdivided servo drives?

•By reducing the step angle of each step, the step uniformity is improved, thus improving the control accuracy.

•It can greatly reduce motor vibration. Low-frequency oscillation is an inherent characteristic of stepper motors, and subdivision is the best way to eliminate it.

•It can effectively reduce torque pulsation and increase output torque.

The above advantages are generally recognized by users and bring them benefits, so it is recommended that you choose a subdivision driver.

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run in one direction?

•The direction signal may be too weak, or the wiring polarity may be wrong, or the signal voltage may be too high and burn out the direction current limiting resistor. •The pulse mode does not match, the signal is pulse/direction, and the driver must be set to this mode.

If you have any other questions, please contact our application engineer:

## Company Product Warranty Terms

### 1One year warranty

Our company provides a one-year warranty from the date of shipment against defects in materials and workmanship.  
Defective products are repaired free of charge.

### 2Not covered by warranty

•Improper wiring, such as reverse connection of the positive and negative poles of the power supply and plugging  
and unplugging with power on •Unauthorized modification of internal  
components •Use beyond electrical and environmental  
requirements •Poor environmental heat dissipation

### 3Maintenance Process

Please contact the relevant agent or our salesperson

### 4. Warranty Limitations

•The warranty scope of our company's products is limited to the components and processes of the products (i.e. consistency). •Our  
company does not guarantee that its products are suitable for the specific purposes of customers, because whether they are suitable is also related to the technical indicators requirements of the  
purpose and the conditions and environment of use.