**HB808C**

**Digital Hybrid Servo Driver**

**An instruction manual**

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**Please read this manual carefully before using to avoid damaging the drive.**

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**Catalog**

**First, product brief**……………………………………………………………………...2

1. overview………………………………………………………………………….….….2
2. characteristics…………………………………………………………………………2
3. application area……………………………………………………………………….2

**Electrical, mechanical and environmental indicators**…………………..3

1. electrical indicators…………………………………………………….…………...3
2. Use environment and parameters…………………………………….….….3
3. Mechanical Structure Dimension Diagram…………………………..…..4
4. Heat dissipation considerations…………………………………………….…4

**Introduction of Driver Interface and Wiring**……………………………..…5

1. interface description………………………………………………….……….…..5
2. Control signal interface circuit…………………………………………..…….5
3. Control Signal Sequence Diagram…………………………………………….6
4. Control signal mode setting…………………………………………….…..…..7
5. wiring requirements………………………………………………………….……..8

**Setting of Dial Switch**…………………………………………….………….…..…….9

**Five. Protection function**……………………………………….……………..……10

**Six, frequently asked questions…………………………………………….……11**

1. Common problems and solutions in application……………….……11
2. Driver Frequent Questions Answer User Questions and Answers….11

**Product warranty clause…………………………………………………………..12**

**HB808C**

**Digital Hybrid Servo Driver**

**Product introduction**

**1. overview**

HB808C is a new low-voltage hybrid servo product developed by our company based on years of experience in low-voltage servo system.

This product adopts the latest DSP digital processing chip and advanced control algorithm technology of variable current and frequency conversion, and is a manufacturer of equipment.

A cost-effective hybrid servo drive solution is provided. HB808C is compact, compact and space-saving.

It reduces the electromagnetic interference between wires, adopts better vibration technology and low heating technology, and effectively solves the problems of motor and driver.

Fever, vibration and noise problems, and low fever, green environmental protection.

**2. characteristics**

Operating Voltage: DC Input Voltage 24VDC-80VDC, Recommended Operating Voltage 36V/48V

Maximum continuous output current 8.0 A, maximum peak current 13A (advanced hybrid servo overload capability)

Acceptable differential and single-ended pulse/direction instructions, with three control modes of position/speed/moment

FOC magnetic field positioning control technology and space vector pulse width modulation (SVPWM) closed-loop control technology

Adopting advanced technology of converting current and frequency conversion, the heating of motor and driver is effectively reduced.

The number of pulses per cycle can be set (subdivided) by debugging software or dialing.

Over-voltage, under-voltage, over-current and over-difference protection functions

Single/double pulse mode and effective pulse edge are optional (through serial port to connect upper computer selection)

Maximum pulse frequency of control instruction is 500 KHz (default is 200 KHz)

Pulse, Direction and Enabling Signal Input Interface Level is 4.5-28V Compatible

Has the serial port RS232 debugging function, but needs to use the company's special serial port debugging cable

Performance: Smooth speed, small overshoot, small tracking error, low heating of motor and driver

**3. application area**

Suitable for all kinds of small and medium-sized automation equipment and instruments, such as: screw locking machine, stripper, winding machine, terminal machine, laser machine, spray painting machine, small and medium-sized engraving machine, electronic processing equipment, automatic grasping equipment, special numerical control machine tools, packaging equipment and robots. The application effect is better in the equipment with low noise and high speed expected by users.

2

**Electrical, mechanical and environmental indicators**

1. **electrical indicators**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **HB808C** | | | |
| **minimum value** | **Typical valuee** | **Maximum**  **value** | **Company** |
| **Continuous output current** | **0.5** | **-** | **13** | **A** |
| **Power supply voltage (DC)** | **24** | **36/48** | **80** | Vdc |
| **Logic input current** | **6** | **10** | **16** | mA |
| **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 voltage** | **90** | **92** | **94** | Vdc |
| **insulation resistance** | **100** | **-** | **-** | MΩ |

1. **Use environment and parameters**

|  |  |  |
| --- | --- | --- |
| **Cooling mode** | | **Natural cooling or forced air cooling** |
| **Use environment** | **occasion** | **It should not be placed next to other heating equipment. Dust, oil mist and corrosive gas should be avoided. Flammable gas and conductive dust should be prohibited in places with high humidity and strong vibration** |
| **temperature** | -5℃ ～ +45℃ |
| **humidity** | 40 ～ 90%RH |
| **Vibration** | 10 ～ 55Hz／0.15mm |
| **Storage temperature** | | -20℃ ～ +65℃ |
| **Using altitude** | | ≤1000m |
| **weight** | | About 1.4KG |

1. **Dimension diagram of mechanical structure**

HB808C driver structure can match any type of 28 seats, 35 seats, 42 seats, 57 seats.

Two-phase hybrid servo motors with seat, 60 seat and 86 seat are recommended by our company. The hybrid servo motors with 0.3 NM, 0.4 NM, 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 can also be matched with hybrid servo motors from other manufacturers. The number of coder lines is 250-5000, but they need to be connected with our company. System, provide motor parameters, according to different motor matching related procedures. If customer

There are higher requirements for low-speed vibration or high-speed performance. It is suggested to contact our company. Our company will write according to motor parameters.

With the algorithm of matching motor, the motor will show perfect performance.

3

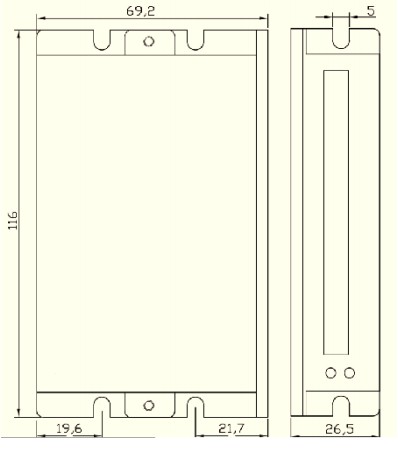


Fig. 1 Dimension diagram of mechanical structure

Figure 1 shows the size of HB808C hybrid motor driver.

1. **Cautions for Heat Dissipation**

The reliable working environment temperature of the driver is usually less than - 5 ~45 C, the working temperature of the driver is less than 65 C, and the working temperature of the motor is less than 70 C. When necessary, the fan is installed near the driver to compel heat dissipation, so as to ensure that the driver works within the reliable working temperature range.

4

**Introduction of Driver Interface and Wiring**

1. **interface description**

**1.1 control port**

3.81mm Spacing Terminal with Green 8Pin

|  |  |  |  |
| --- | --- | --- | --- |
| Pin number | signal | function | Explain |
| 1 | PUL+ | Pulse positive input end | Compatible with 4.5V~28V level signal |
| 2 | PUL- | Pulse negative input end |
| 3 | DIR+ | Directional input end |
| 4 | DIR- | Directional negative input end |
| 5 | ENA+ | Enable positive input terminal |
| 6 | ENA- | Enable negative input terminal |
| 7 | ALM+ | Alarm signal output and output | Open collector OC output, maximum pull-up level 24V, maximum output current 100mA |
| 8 | ALM- | Negative output terminal of alarm signal |

* 1. **power port**

3.81mm interval screw terminal with green 3Pin(Pay attention to the positive and negative poles of the power supply, do not connect the positive and negative poles!!! )

|  |  |  |
| --- | --- | --- |
| Pin number | signal | Function description |
| 1 | +VDC | The input voltage of the power supply is 24-80 Vdc |
| 2 | GND | Power input negative terminal |
| 3 | NC | No signal. |

* 1. **power port**

3.81mm interval screw terminal with green 6Pin(Pay attention to the positive and negative poles of the power supply, do not connect the positive and negative poles!!! )

|  |  |  |
| --- | --- | --- |
| Pin number | signal | Function description |
| 1 | EB+ | Encoder Signal B+Input |
| 2 | EB- | Encoder Signal B-Input |
| 3 | EA+ | Encoder Signal A+Input |

5

|  |  |  |
| --- | --- | --- |
| 4 | EA- | Encoder Signal A-Input |
| 5 | VCC | Driver + 5V output, power to encoder |
| 6 | EGND | Driver GND output, power to encoder |

* 1. **Serial Port RS232 Communication Interface**

PC can be connected by serial port adapter (additional serial port adapter) and special serial cable (no live plug-in and pull-out). The functions and parameters of the driver can be set by PC software, such as subdivision, current value, effective edge, etc. which customers need, and the elimination and adjustment of resonance point.

|  |  |  |  |
| --- | --- | --- | --- |
| Terminal number | Symbol | Name | Explain |
| 1 | +5V | 5V power supply end | For external STU only |
| 2 | TXD | RS232 transmitter |  |
| 3 | RXD | RS232 receiver |  |
| 4 | GND | 5V power source | 0V |

Note: TS808D Serial Port cable must be dedicated cable, attached according to the user's situation, please confirm before use, in order to avoid damage.

* 1. **LED lamp status indication**

Green LED is the power indicator lamp. When the driver is connected to the power supply, the LED is always bright. When the driver is disconnected, the LED is extinguished. The red LED is the fault indicator. When the fault occurs, the indicator flashes in a cycle of 5 seconds. When the fault is cleared by the user, the red LED often goes out. Red LED flickers at a frequency of 2 Hz, in which the LED is 200 ms bright and 300 ms dead. The number of red LED flickers in 5 seconds represents different fault information. The specific relationship is shown in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Serial number | Scintillation frequency | Scintillation Waveform of Red Indicator | Fault description |
| 1 | 1 | 123.JPG | Overcurrent Fault (I Peak < 25A) |
| 2 | 2 | Overvoltage fault (Vdc < 90V) |
| 3 | 5 | Tracking error overshoot fault |

When the driver fails, the driver will stop and prompt the corresponding fault code. The fault can be cleared only when the power is cut off and the power is restarted. When the driver fails, the driver will be queued to store the latest failures in the EEPROM of the driver, and the driver will save up to 10 latest historical failures. Users can read the corresponding fault codes through PC and text display.

6

1. **Control signal interface circuit**

The signal input interface of HB808C driver can be used for differential signal input, common anode signal input and common cathode signal input, and built-in high-speed photoelectric isolation coupler. The output is triode collector open-circuit OC output. The interface connection method is as follows:

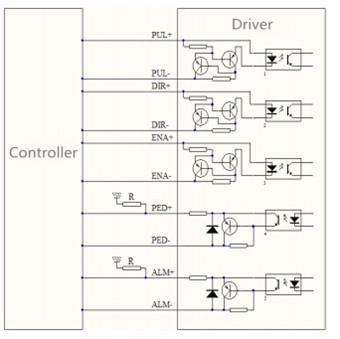


Figure 2 Input signal differential connection method

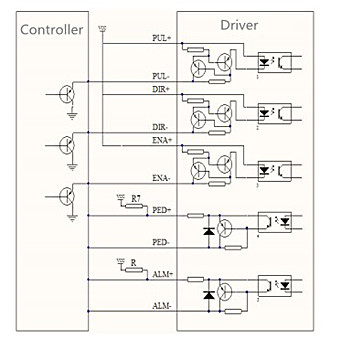


Figure 3 Single-ended common-anode connection of input signal

7

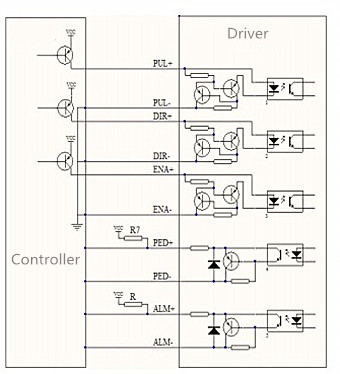


Figure 4 Single-ended common cathode connection method for input signal

Note: The voltage range of the signal input interface in the figure is 4.5~28Vdc. No series current limiting resistor is needed for either single-end connection or differential connection. For the output interface, the maximum pull-up voltage is 28Vdc and the maximum output current is 100mA. According to the external pull-up voltage, the suitable pull-up resistance is selected. The basic parameters are: if the external pull-up voltage is 24Vdc, the pull-up resistance is 2K, if the external pull-up voltage is 12Vdc, the pull-up resistance is 1K, if the drive relay is used. Electrical or motor brake coil, please consult our related application engineers.

1. **Control Signal Sequence Diagram**

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

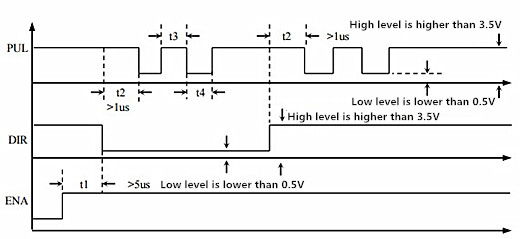


Fig. 5 Control signal timing chart

8

**Notes:**

1) t1:ENA (enabling signal) should be at least 5 mu s in advance of DIR and be determined as high. In general, it is recommended to hang in the air.

2) t2:DIR determines the high or low state of PUL at least ahead of time with a descending edge of 1 mu s.

3) t3: the pulse width is not less than 1.5 mu s;

4) t4: The low level width is not less than 1.5 mu s.

**4. Control signal mode setting**

**Pulse trigger edge selection:** Setting up the rising or falling edge of the pulse through PC software is effective for triggering.

**Single and Double Pulse Selection:** It is effective to set up single or double pulse through PC software.

**Direction Selection:** The initial direction of motor operation is set by PC software.

**5.wiring requirements**

1) In order to prevent the driver from being disturbed, it is suggested that the shielded cable should be used in the control signal, and the shielded layer should be short-connected with the cable. In addition to special requirements, the shielded cable of the control signal cable should be grounded at one end: the upper computer of the shielded cable should be grounded at one end, and the driver of the shielded cable should be suspended at one end. Grounding is allowed only at the same point in the same machine. If it is not the real grounding wire, it may cause serious interference. At this time, the shielding layer is not connected. If conditions permit, the thermal grounding technology is the most effective shielding technology.

2) Pulse and direction signal lines are not allowed to be tied up side by side with motor lines. It is better to separate them at least 10 cm or more. Otherwise, motor noise will easily interfere with the pulse direction signal, which will lead to motor positioning inaccuracy, system instability and other faults.

3) If one power supply is for multiple drives, parallel connection should be adopted at the power supply, and chain connection from one to another is not allowed.

4) It is strictly forbidden to pull out and insert driver terminals. When the live motor stops, there is still a large current flowing through the coil. The pulling and inserting terminals will cause a huge instantaneous induced electromotive force to burn out the driver.

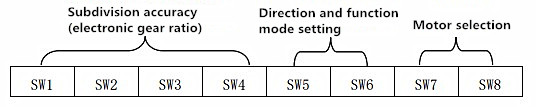
5) It is strictly forbidden to add tin to the terminal, otherwise the terminal may be damaged by overheating due to the increase of contact resistance.

6) The wiring head should not be exposed outside the terminal to prevent accidental short circuit from damaging the driver.

**Setting of Dial Switch**

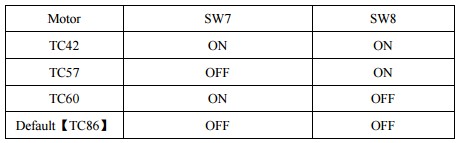
HB808C digital integrated low-voltage servo driver uses 8-bit dial switch to set subdivision accuracy (electronic gear ratio), initial direction of motor rotation, self-test and function mode selection. Detailed description is as follows:

9



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 on, the default micro-step subdivision number in the driver is adopted. The initial value of the default micro-step subdivision number in the driver is 400 Pulse/rev. The electronic gear ratio can also be set by debugging software. SW5 sets the motor direction, when ON, clockwise rotation (CW), when OFF, counter-clockwise rotation (CCW); SW6 function mode selection, when OFF, the driver is space vector control mode (FOC), when on, the driver point motion mode (PM), the start-stop effect of this mode is better. Hybrid Servo Motor with Default Matching of HB808C Driver



Note: Hybrid servo motors from other manufacturers can be matched. Other seats, such as 28 seats, 35 seats and other hybrid servo motors can be matched, but we need to contact us.

**Five, protection function**

10

1) overvoltage protection

When the input voltage of HB808C is higher than 90Vdc, the driver will stop working. At this time, the fault must be removed and reset by power-on.

2) undervoltage protection

When the input voltage of HB808C is lower than 15Vdc, the driver will stop working. At this time, the fault must be removed and reset by power-on.

3) overcurrent protection

When HB808C overcurrent occurs, the driver will stop working. At this time, the fault must be removed and reset by power-on

4) Tracking error overshoot

When the tracking error of HB808C is out of tolerance, the driver stops working. At this time, the fault must be removed and reset by power-on.

|  |
| --- |
| △Attention: Because the driver does not have the protection function of positive and negative poles of power supply, please confirm the correct connection of positive and negative poles of power supply again before power on. Positive and negative pole connection will cause burnout of the fuse in the drive! |

**Six, frequently asked questions**

1. **Common problems and solutions in application**

|  |  |  |
| --- | --- | --- |
| phenomenon | Possible problems | Solutions |
| The motor does not turn. | Power light is not bright. | Check power supply circuit, normal power supply |
| Motor shaft is weak | The pulse signal is weak and the signal current is increased to 7-16 mA. |
| Subdivision is too small. | Selection pair segmentation |
| Driver protected | Power up again |
| Enable the signal to be low. | This signal is elevated or disconnected |
| No response to control signal | Not on electricity |
| Motor line has circuit breakage. | Check and answer. |
| Overvoltage or undervoltage | Check power supply |
| Damage to motor or driver | Replacement of motor or driver |
| Misalignment | Signal interference | Elimination of interference |
| Shielded area not connected or not connected | Reliable grounding |
| Motor line has circuit breakage. | Check and answer. |
| Subdivision error | Set pair segmentation |
| Rotation blockage during motor acceleration | The acceleration time is too short. | Acceleration time lengthening |
| Torque of motor is too small. | Selecting large torque motor |
| Low voltage | Raise voltage appropriately |

**2. Driver Frequent Questions Answer User Questions and Answers**

**1) What are the advantages of the subdivision servo driver?**

11

The control accuracy can be improved by reducing the step angle of each step and improving the step uniformity.

Low frequency oscillation is the inherent characteristic of stepping motor, and subdivision is the best way to eliminate it.

It can effectively reduce the torque ripple and improve the output torque.

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

**2) Why does my motor run in only one direction?**

Perhaps the direction signal is too weak, or the connection polarity is wrong, or the signal voltage is too high to burn out the directional current limiting resistance.

Pulse mode mismatch, signal is pulse/direction, driver must be set to this mode.

If there are any other problems, please contact our company's application engineer.

**Company Product Warranty Terms**

**1 one year warranty period**

Our company provides quality assurance for raw materials and process defects of its products for one year from the date of delivery. During the warranty period, our company provides free maintenance service for defective products.

**2 is not a guarantee**.

Improper wiring, such as positive and negative pole connection and live plug-in

Unauthorized modification of internal devices

Use beyond electrical and environmental requirements

Environmental heat dissipation is too poor

**3 maintenance process**

Please contact the relevant agent or our salesman.

**4 warranty limits**

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 can be suitable for the specific use of customers, because the suitability is also related to the technical specifications and conditions of use and the environment.

12