

EC758

CLOSED-LOOP STEP MOTOR DRIVE User's Manual



1. Overview

1.1 Product Introduction

EC758 is a hybrid servo driver developed by our company based on more than ten years' stepping and closed-loop stepping experience. It adopts the latest special motor control DSP chip and applies Vector closed-loop control technology, thus completely overcome the problem of open-loop stepper motor lost step, but also can significantly improve the high-speed performance of the motor, reduce the degree of motor heating and reduce the vibration of the motor, and improve the processing speed and accuracy of the machine and reduce the energy consumption of the machine. In addition, in the motor continuous overload, the driver will output alarm signal, with the same reliability as AC servo system. The installation size of EC758 adaptor motor is fully compatible with the traditional 86 series stepping motor, and the traditional stepping drive scheme is easy to upgrade.

1.2 Characteristics

- Operating voltage: input voltage AC 20V-75V
- Maximum continuous output current 8.0A
- Acceptable differential and single-ended pulse/direction/off-line instructions
- Using FOC field orientation control and space vector pulse width modulation (of SVPWM) loop control technology
- The use of advanced technology and frequency-varying current technology, effective to reduce the heat of the motor and drive
- Fault output indication interface function
- The number of pulses per turn can be set by debugging software or by dialing (subdivision)
- It has the protection functions of overvoltage, undervoltage and overcurrent.
- Maximum control command pulse frequency is 500KHz (factory default is 200KHz)
- Pulse, direction and off-line signal input interface levels are 5-28V compatible
- USB serial TTL level (RS232 MODEL BUS protocol) debugging function, but need to use the company's dedicated serial debugging

1.3 Application areas

Suitable for all kinds of small and medium-sized automation equipment and instruments, such as: lithium battery equipment, 3C electronic equipment, engraving machine, marking machine, cutting machine, laser phototypesetting, engraving machine, plotter, CNC machine tool, automatic assembly equipment, etc. It is especially effective in applications where users expect small noise and high speed.

2 Performance Index

2.1 Electrical characteristics

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| Explanation | EC758 | | | |
|---------------------------------|---------------|---------------|---------------|--------|
| | Minimum Value | Typical Value | Maximal Value | Unit |
| Continuous output current | 1.0 | - | 8.0 | A |
| Supply Voltage (AC) | 20 | 60 | 75 | VAC |
| Logic input current | 7 | 10 | 20 | mA |
| Logical input voltage | 5 | 5 | 24 | Vdc |
| Pulse Frequency | 0 | 200 | 500 | kHz |
| Pulse high 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 | VAC |
| Insulation Resistance | 100 | - | - | MΩ |

2.2 Use environment

| Cooling Mode | | Natural Cooling or forced air cooling |
|--------------|-------------|--|
| Environment | Occasion | Can not be placed next to other heating equipment, to avoid dust, oil mist, corrosive gases, humidity is too large and strong vibration sites, prohibited combustible gases and conductive dust. |
| | Temperature | -10°C ~ +50°C |

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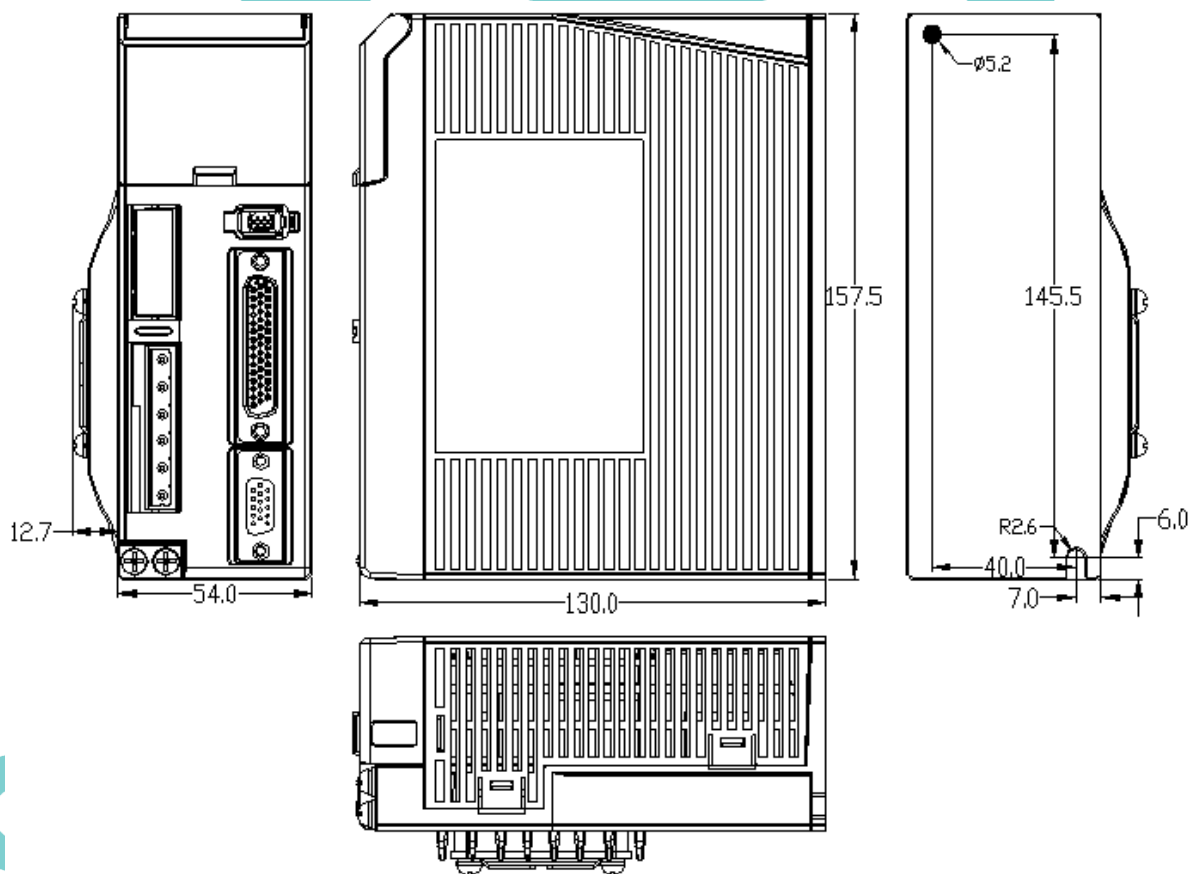
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| | | |
|---------------------|-----------|-------------------|
| | Humidity | 40 ~ 90%RH |
| | Vibration | 5.9m/s2MAX |
| Storage temperature | | -20°C~60°C |
| Use Elevation | | Below 1000 meters |
| Weight | | 0.4KG |

3 Installation

3.1 Mounting dimensions



3.2 Installation method

The reliable operating temperature of the driver is usually within 60°C, and the motor operating temperature is within 80°C.

It is recommended to use the automatic semi-flow mode when using the motor. When the motor stops, the current is automatically reduced by half to reduce the heat of the motor and the drive.

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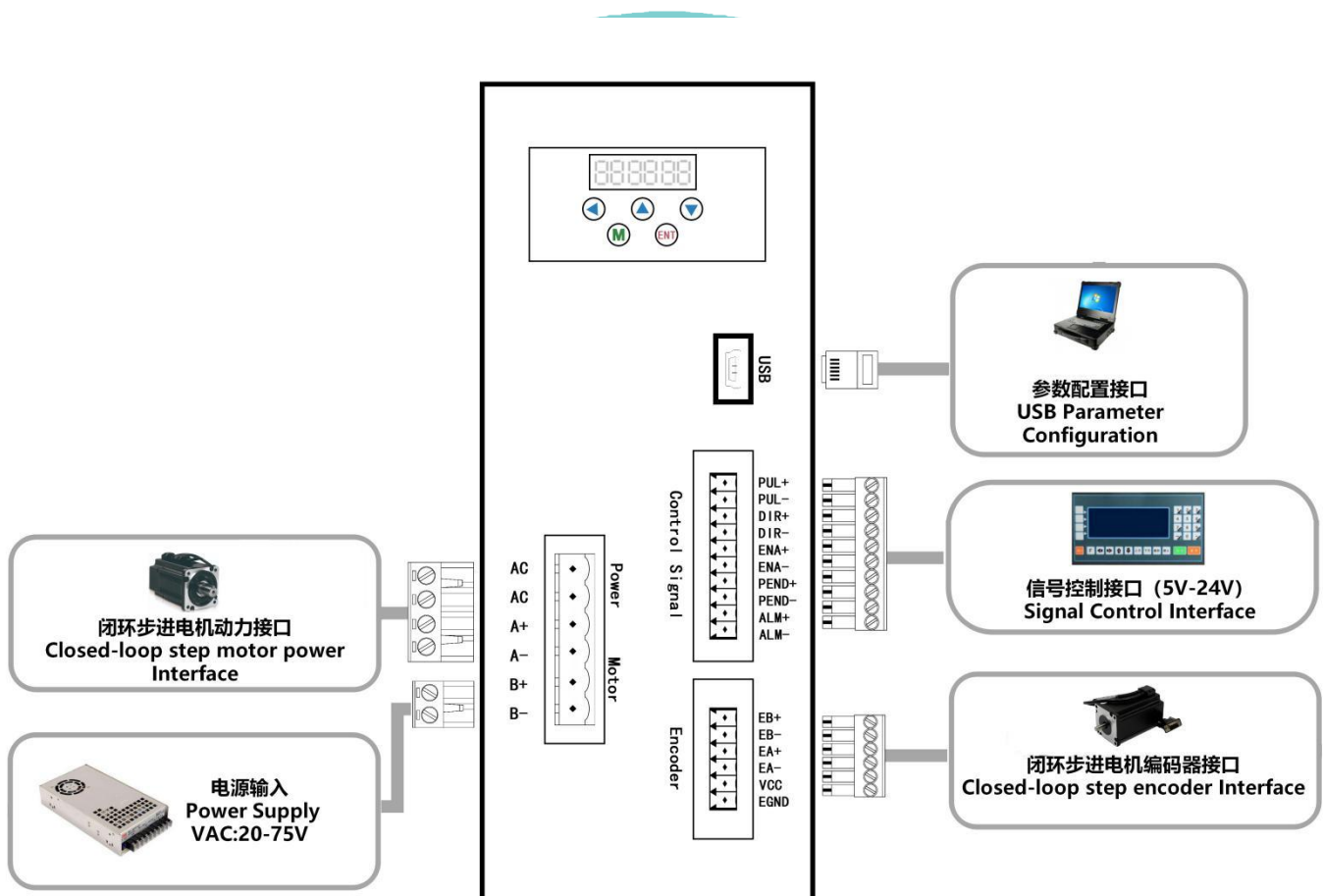
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Install the drive with vertical side mounting so that the heat dissipating teeth form a strong air convection.

Install a fan near the drive when necessary to force heat dissipation to ensure that the drive works within a reliable operating temperature range.

4 Driver ports and wiring

4.1 Schematic diagram of wiring



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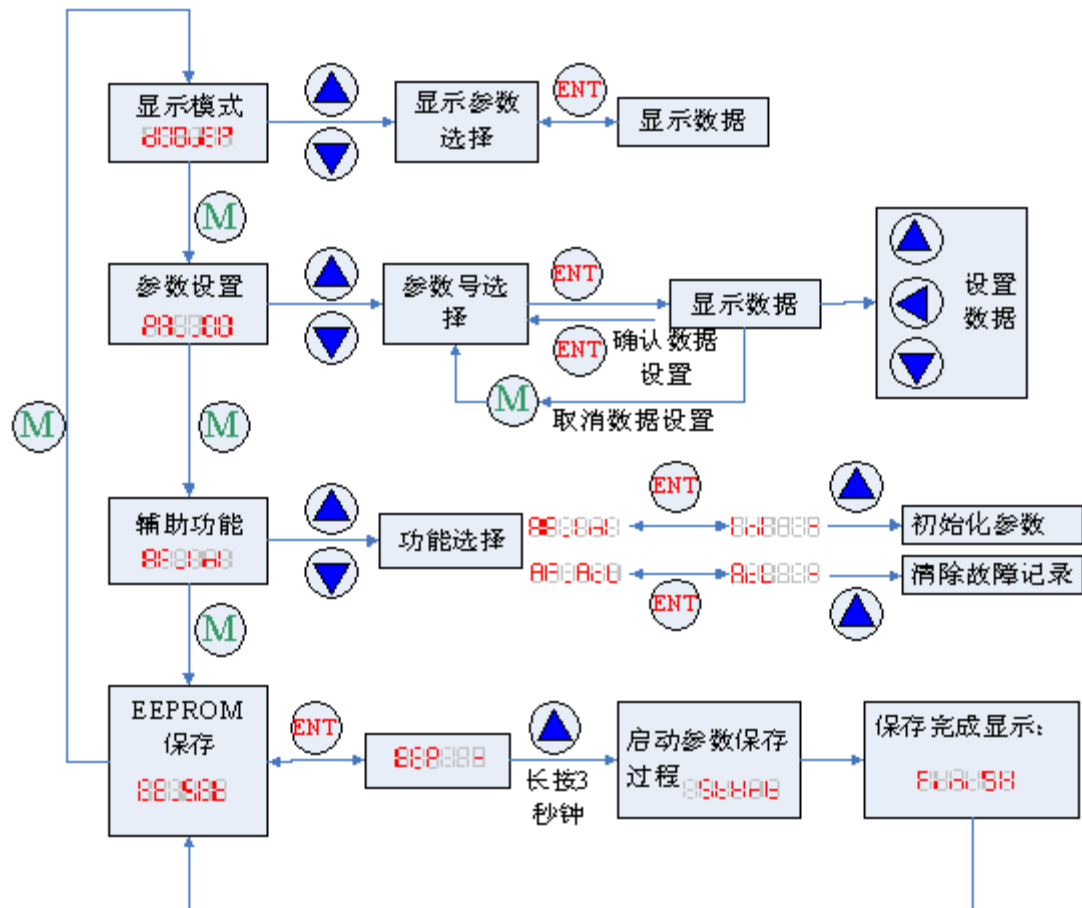
4.2 Port Definition

4.2.1 Status indication LED digital

EC758 an LED to indicate power status and six digital display, LED panel operation Please refer. Display parameters defined as follows:

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| LED display | Meaning | Remark |
|-------------|------------------|--|
| 888888 | Low Level Data | With high status and data between |
| 888888 | High Level Data | |
| 888888 | Position Error | Receives the error pulse and encoder feedback to the driver. 32-bit range. When viewing this, L and H are divided into two viewing entries represent the low and high. |
| 888888 | Motor speed: RPM | |
| 888888 | Given speed: RPM | |

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| | | |
|--------|--|--|
| 888888 | Number of pulse feedback pulses: | |
| 888888 | Pulse given number of pulses: | |
| 888888 | Peak current given: (mA) | |
| 888888 | : Drive Fault Code: 0001 -- Overcurrent Protection 0002 -- Overvoltage Protection 0008 -- Brake Fault 0020 -- Override Protection | |
| 888888 | Bus voltage after rectification: voltage = displayed data/10; | |
| 888888 | Version number of the drive: | |

4.2.2 Interface definition

Power Terminal Interface 1

| Terminal number | Symbols | Name | Explanation |
|-----------------|---------|----------------|----------------|
| 1 | AC | AC power input | Power 20-75Vac |
| 2 | AC | | |

Power Terminal Interface 2

| Terminal number | Symbols | Name | Explanation |
|-----------------|---------|---|--|
| 1 | A+ | Mixed Servo Motor Terminal (make sure the color of the terminal is correct) | Stepping motor A + phase winding interface |
| 2 | A- | | Stepping motor A-phase winding interface |

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| | | | |
|---|----|--|--|
| 3 | B+ | | Stepping motor B + phase winding interface |
| 4 | B- | | Stepping motor B-phase winding interface |

Control Signal Port (44 DB NEEDLE HEAD)

| Terminal number | Symbols | Name | Explanation |
|-----------------|---------|--|--|
| 3 | PUL+ | Pulse Positive Input | Compatible 5V- 24V level signal |
| 4 | PUL- | Pulse negative input | |
| 5 | DIR+ | Directional Positive Input | |
| 6 | DIR- | Directional negative input | |
| 7 | ALM+ | Positive output of alarm signal | OC open collector output, a pull-level maximum 24V, 100mA maximum output current |
| 8 | ALM- | Negative output of alarm signal | |
| 9 | PEND+ | position signal Positive output terminal | |
| 10 | PEND- | Position signal negative output terminal | |
| 11 | ENA+ | Enable Positive Input | |

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| | | | |
|----|------|-----------------------|--|
| 12 | ENA- | Enable negative input | |
|----|------|-----------------------|--|

Encoder Signal Port (15 DB NEEDLE HEAD)

| Terminal number | Symbols | Name |
|-----------------|---------|----------------------------------|
| 1 | EA+ | Encoder A channel positive input |
| 2 | EB+ | Encoder B channel Positive input |
| 3 | GND | Encoder GND |
| 11 | EA- | Encoder A channel negative input |
| 12 | EB- | Encoder B channel negative input |
| 13 | VCC | Encoder +5V power supply output |

The power supply voltage can work normally between the specified ranges. The driver is preferably powered by an unregulated DC power supply, or a transformer buck + bridge rectifier + capacitor filter. Note, however, that the peak voltage ripple after rectification should not exceed its specified maximum

voltage. It is recommended that the user supply power with a DC voltage lower than the maximum voltage to prevent the grid from fluctuating beyond the operating range of the driver voltage.

If using a regulated switching power supply, be aware that the output current range of the switching power supply must be set to maximum.

Please note:

When wiring, pay attention to the positive and negative poles of the power supply, do not reverse connection;

It is better to use an unstable power supply;

The output capacity of the power supply current should be greater than 60% of the set current of the driver when an unstable power supply is used;

When a regulated switching power supply is adopted, the output current of the power supply shall be

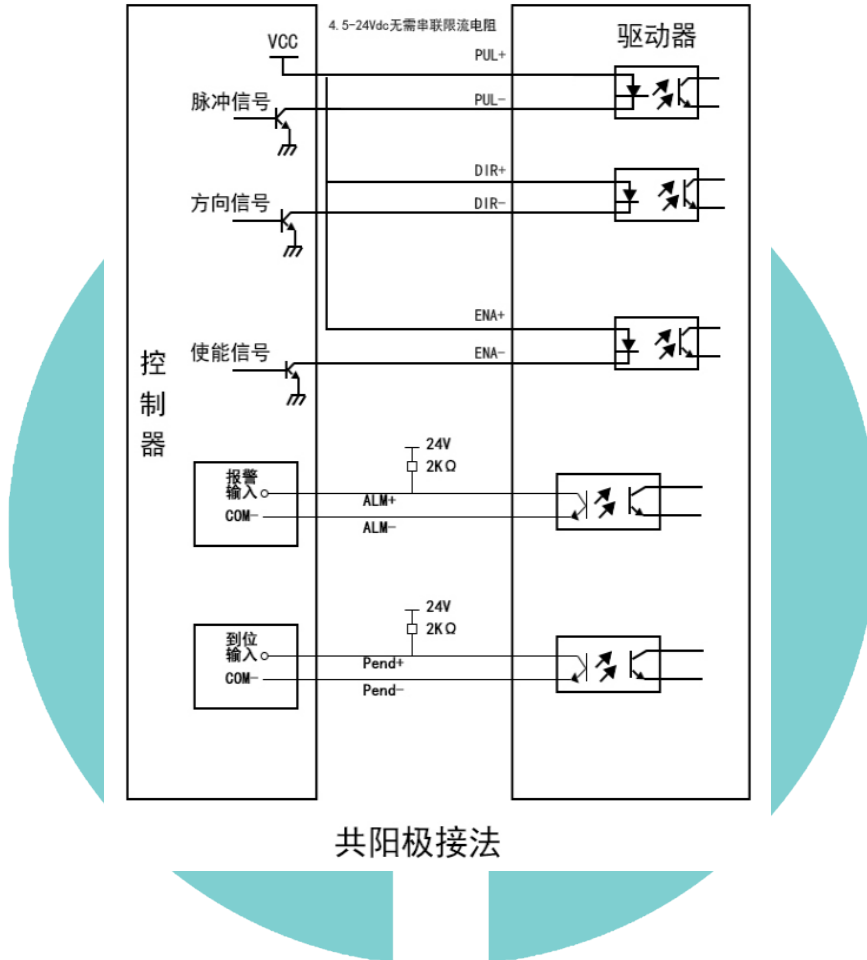
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greater than or equal to the working current of the driver;

To reduce costs, two or three drives can share a power supply, but the power supply should be large enough.

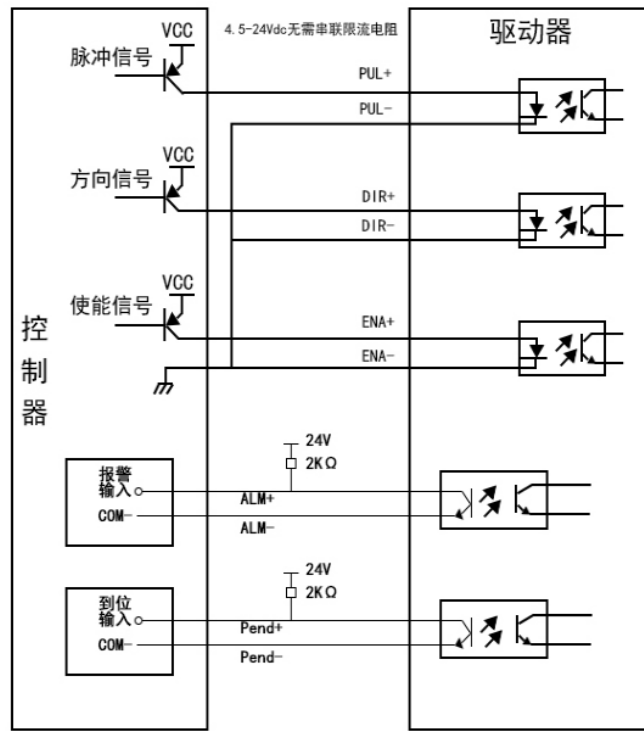
A control signal interface circuit



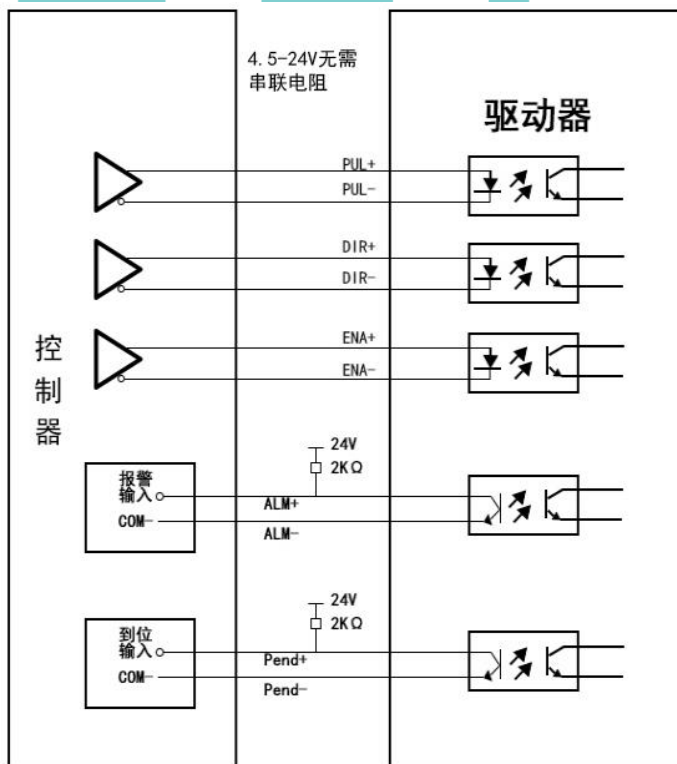
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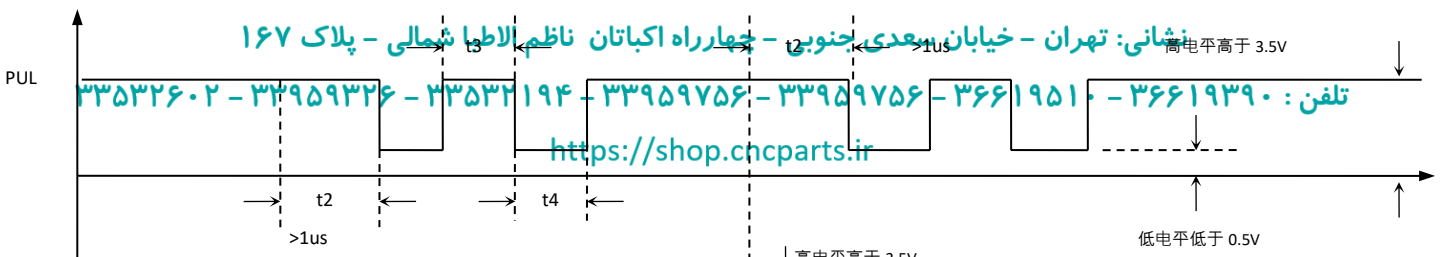


共阴极接法



差分

Control Signal Timing Drawing:



In order to avoid malfunctions and deviations, PUL-, DIR- ENA- should meet certain requirements, and, as shown below:

Comment:

t1:

t1: ENA (enable signal) DIR should advance at least 5 μ s, determined to be high. In general recommendations can be suspended;

t2: DIR PUL falling 1 μ s determined in advance of at least a high or low state;

t3: at least a pulse width of not less than 1.5 μ s;

t4: low level width not less than 1.5 μ s.

4.2.3 Encoder input port

Low voltage servo motor/Brushless dc servo motor/Hollow glass servo motor/Outer rotor servo moto/Encoder I nterface

| Interface name | Features |
|----------------|--|
| EA+ | Encoder A signal differential input interface. |
| EA- | |
| EB+ | Encoder B signal differential input interface. |
| EB- | |
| VCC | Provide a DC voltage of 5V and a current of 100mA to the encoder and Hall element o f the motor. |
| EGND | 5V reference terminal negative electrode |

4.2.4 USB serial RS232-TTL (3.3V) level communication interface

Can be connected to a PC (hot plug is prohibited) by the USB serial switching means (switching means reprovision serial) port and a dedicated USB cable. Function parameters can be the drive and the PC softwar e, as required by the customers PC software company set to any value segment, any current value, the effecti ve pulse edge, single and double pulse control, the pulse signal bandwidth, open loop motor switching, the r esponse time of the filter, etc., can also weaken the resonance point adjustment and vibration.

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| Interface name | Features | Explanation |
|----------------|------------------------------------|---------------------|
| +5V | 5V power supply | Close sense pin DIP |
| TXD | RS232-TTL (3.3V) transmitting side | |
| RXD | RS232-TTL (3.3V) receiving side | |
| GND | 5 5V power supply ground | 0V |

Note: Serial cable must be dedicated cable, depending on the user situation comes, confirm before use to prevent damage.

4.2.5 Parameter settings

EC758 drive parameters there are two methods: one is through the RS232 serial communication port of a PC, using a dedicated debugging software parameter setting is completed, another panel is set security parameters direct drive, there is an internal drive motor corresponding to the optimal default factory configuration parameters, the user need only adjust the drive to the internal breakdown of the number in accordance with the specific use, see the detailed use of the software debugging using Pro Tuner explained. DETAILED adjustable parameters and functions as follows:

| Parameter Symbol | parameter name | Parameters | Remark |
|------------------|---|------------|--|
| KcP | Current Ring Proportion Coefficient | 0~65535 | Only for factory setting, modification |
| KcI | Current Ring Integral Coefficient | 0~65535 | Only for factory setting, modification |
| KpP | Position Ring Proportional Coefficient | 0~65535 | Only for factory setting, modification |
| KpI | Position Ring Integral Coefficient | 0~65535 | Only for factory setting, modification |
| Kd | Velocity Ring Friction Coefficient | 0~100 | Only for factory setting, modification |
| Kvff | Feed forward coefficient of velocity loop | 0~100 | Only for factory setting, modification |
| | Holding current percentage | 0~100% | Factory default setting 40 |
| | Closed loop current percentage | 0~100% | Factory default setting 100 |
| | Number of encoder lines | 4000 | 4000 |
| | Tracking Error Limit | 0~65535 | Factory default setting 1000 |
| | Fine Fraction | 200~65535 | Factory default setting 4000 |

Digital display mode parameters as:



Wherein "00" represents a parameter number, the specific meaning of the following table

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| Serial number | Name | Default value | Range | Account for |
|---------------|------------------------------------|---|-----------|---|
| 00 | Current ring KP | According to the motor on the electrical default self-tuning parameters | 0~65535 | The higher the current, the faster it rises, but too much will cause the motor to vibrate and make a loud noise |
| 01 | Ki Current ring KI | | 0~65535 | Current integration |
| 02 | Current ring KC | 256 | 0~1024 | The bigger the vibration is, the smaller the vibration is, but the lower the current is. |
| 03 | Position Ring KP | 2500 | 0~65535 | |
| 04 | Position Ring KI | 500 | 0~65535 | Eliminate the static error when the motor stops |
| 05 | Position Ring KD | 200 | 0~1000 | Reduce Motor overshoot |
| 06 | Position Ring KVFF | 30 | 0~100 | Lag of compensation motor and Control Circuit |
| 07 | Given resolution of drive position | 4000 | 200~65535 | Set the number of pulses required for one revolution of the motor |

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| | | | | |
|----|-----------------------------------|-------|-----------|---|
| 08 | ENCODER resolution | 1000 | 200~65535 | Default 1000 wire encoder, 4 x frequency |
| 09 | Tracking error alarm threshold | 2000 | 1~65535 | The unit is the number of pulses, where the number of pulses is based on the encoder resolution. |
| 10 | Percent Holding Current | 65 | 0~100 | Set the motor in static Torque, but also for the motor starting current. The maximum current of the driver is 8A |
| 11 | Percentage of closed loop current | 100 | 1~100 | Set the current loop parameter attenuation ratio of the motor. Reduces startup noise |
| 12 | Hold time | 40 | 1~65535 | Set How long to enter position hold mode after stop receiving pulse. After the entry position is held, the driver ignores small error changes. The number of cycles in 50 us |
| 13 | Pulse filtering enable | 1 | 0 or 1 | 0 -- do not use an internal pulse filter 1 -- use an internal pulse filter to filter in us. The larger the time, the stronger the filtering effect, but the greater the lag. |
| 14 | Filtering time | 12000 | 50~25600 | |

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| | | | | |
|----|-----------------------------------|---|--------|---|
| 15 | Enabling level | 1 | 0 or 1 | 0 As enabling time (the motor can respond to pulses) , optically coupled on, EN port requires Input 5V signal 1 as enabling time (the motor can respond to pulses) , optically coupled off, EN port can not input signals |
| 16 | Fault output level | 1 | 0 or 1 | 0 -- Foshan -- trouble time optical coupler not on 1 -- Trouble time optical coupler on |
| 17 | Single and double pulse selection | 0 | 0 or 1 | 0 -- Pulse direction 1 -- Dual pulse mode (to be added) |
| 18 | Effective edge of pulse | 0 | 0 or 1 | Harvard University Press, Harvard University |
| 19 | Motor Direction | 1 | 0 or 1 | 0 And 1 indicate two different running directions |
| 20 | Pulse bandwidth selection | 0 | 0~300 | Limiting maximum pulse frequency |

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| | | | | |
|----|---|-----|---------|---|
| 21 | Internal acceleration | 200 | 1~2000 | Acceleration for internal testing, r/s^2 |
| 22 | Internal Velocity | 60 | 1~3000 | Speed for internal testing, RPM |
| 23 | Internal Travel | 100 | 1~65535 | Run stroke of motor in internal test = set value/100(RPM) |
| 24 | Number of internal runs | 1 | 1~65535 | The number of repetitions of the internal motor |
| 25 | Internal Start Direction | 1 | 0 or 1 | 0 And 1 represent the two startup directions, respectively |
| 26 | Internal running interval | 100 | 1~65535 | After the motor runs a trapezoid, it waits a set time, and then runs the next trapezoid again |
| 27 | Whether or not the interior runs back and forth | 1 | 0 or 1 | Sets whether to run a round trip while being tested, meaning a 0-foshan non-reciprocating operation -- a Florida reciprocating operation |
| 28 | START/STOP test | 0 | 0 or 1 | 1 -- Start Up, 0 Foshan -- stop writing to 1, the motor runs, and if the number of runs completes, this parameter automatically becomes 0 |

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| | | | | |
|----|--|---|--------|--|
| 29 | Closed-loop mode selection | 1 | 0 or 1 | 0 -- FOC Mode 1 - PM mode |
| 30 | Open and close loop mode selection | 1 | 0 or 1 | 0 -- Open loop Mode 1 -closed loop mode |
| 31 | Motor flange selection | 1 | 0 or 1 | 0-60 frame size motor, 1-86 motor |
| 32 | Automatic setting function on current ring | 1 | 0 or 1 | 0--Automatic setting Invalid 1 -- Automatic Setting valid(default) |
| 33 | close out of tolerance alarm | 0 | 0 or 1 | 0 -- -- have out of tolerance alarm function (default) 1 -- -- close the function |

Note: The factory default drive current loop, velocity loop and position loop parameters for the optimal parameters of the motor being, customers generally do not need to modify the system only need to control the need to choose a good percentage of the number of subdivisions and open and closed loop motor current in accordance with.

5 Warranty and after-sales service

Please keep the packing box for transportation, storage or need to return to the company for maintenance. One year warranty period:

From the use of this drive within one year because of the product itself caused by the damage, responsible for the warranty.

Not covered by warranty:

Damage caused by improper wiring, power supply voltage and user peripheral configuration.

Without the written authorization of the company, users make changes to the products without authorization.

Use beyond electrical and environmental requirements.

The drive serial number has been torn off or is unreadable.

The outer shell was visibly damaged.

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