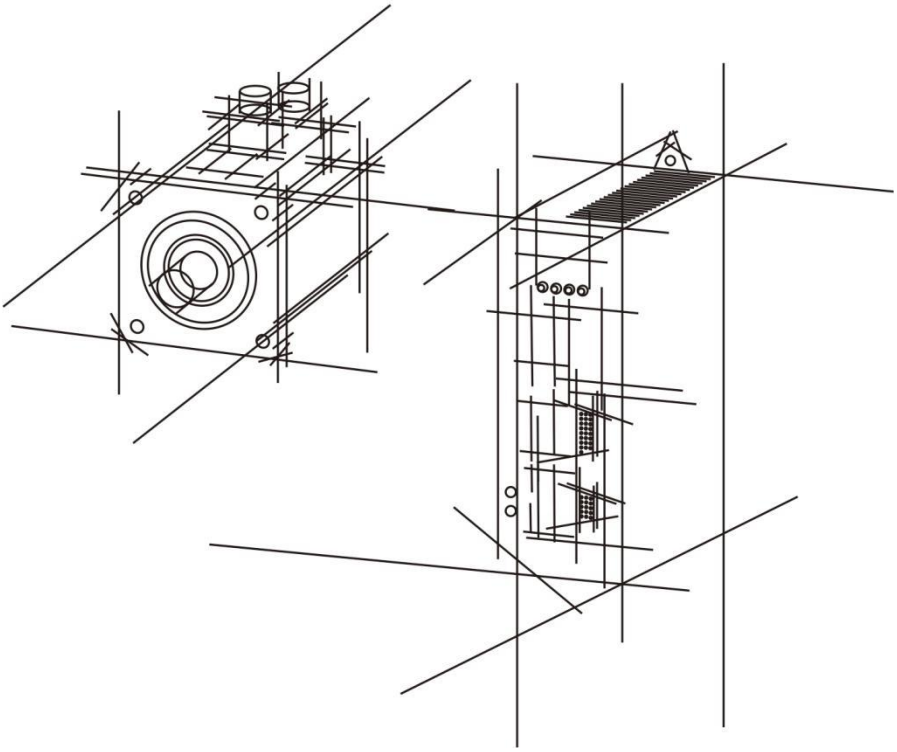
交流伺服使用手册

AC Servo Manual



Safety Precautions

Before product storage, installation, wiring, operation, inspection or maintenance, users must be familiar with and observe the following important items to ensure safe use of this product.

Danger Incorrect operation may cause danger and result in personal injury or death.

Note that incorrect operation may cause danger, cause personal injury or death, and possibly damage the equipment.

Strictly prohibited behavior is strictly prohibited, otherwise the equipment will be damaged or unusable.

1. Use occasions

Danger
1. It is forbidden to use the product in places with moisture, corrosive gas and flammable gas. Otherwise, electric shock or fire may result. 2. It is forbidden to use the product in places with direct sunlight, dust, salt and metal powder. 3. It is forbidden to use the product in places where water, oil and medicines are dripping.

2. Wiring

Danger

1. Please ground the ground terminal reliably. Poor grounding may cause electric shock or fire.
2. Do not connect the 220V driver power supply to the 380V power supply, otherwise it will cause equipment damage, electric shock or fire.
3. The U, V, W motor output terminals and the motor wiring terminals U, V, W must be connected one by one, otherwise the motor may overspeed and cause equipment loss and casualties.
4. Please fasten the power supply and motor output terminals, otherwise it may cause fire.

3. Operation

Notice
1. Before the mechanical equipment starts to run, it must be matched with the appropriate parameter settings. Failure to adjust to the proper setting may result in loss of control or malfunction of the mechanical equipment. 2. Before starting operation, please confirm whether the emergency switch can be activated at any time to stop. 3. Please test whether the servo motor operates normally without load first, and then connect the load to avoid unnecessary losses. 4. Do not turn on and off the power frequently, otherwise it will cause overheating inside the drive.

4. Run

prohibit
1. When the motor is running, it is forbidden to touch any rotating parts, otherwise it will cause personal injury or death. 2. When the equipment is running, it is forbidden to touch the driver and motor, otherwise it will cause electric shock or burns. 3. When the equipment is running, it is forbidden to move the connecting cable, otherwise it will cause personal injury or equipment damage.

5. Maintenance and Inspection

prohibit
1. It is forbidden to touch the inside of the driver and its motor, otherwise it will cause electric shock. 2. When the power is turned on, it is forbidden to disassemble the drive panel, otherwise it will cause electric shock. 3. Do not touch the terminals within 5 minutes after the power is turned off, otherwise the residual high voltage may cause electric shock. 4. It is forbidden to change the wiring or disassemble the servo motor when the power is turned on, otherwise it will cause electric shock.

6. Scope of use

Notice
The products involved in this manual are for general industrial use, and should not be used on devices that may directly endanger personal safety.

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1. Product inspection and installation

1.1 Product Inspection

This product has been fully functionally tested before leaving the factory. In order to prevent the product from being abnormal due to negligence during the delivery of the product, please check the following items in detail after unpacking:

- Check whether the model of the servo drive and servo motor is the same as the model you ordered.
- Check whether the servo drive and servo motor are damaged or scratched during transportation. If damage is caused during transportation, please do not connect to power supply.
- Check the servo drive and servo motor for loose components. Whether there are loose screws, whether the screws are not locked or come off.
- Check whether the rotor shaft of the servo motor can rotate smoothly by hand. Motors with brakes cannot rotate directly.
- Check whether the servo operation manual is included.
- Check whether the drive accessories are included in the box.

If there is any discrepancy in the content of the product, please contact the agency where you purchased it.

1.2 Product front panel

This panel introduces applicable models: SFT400W SFT750W

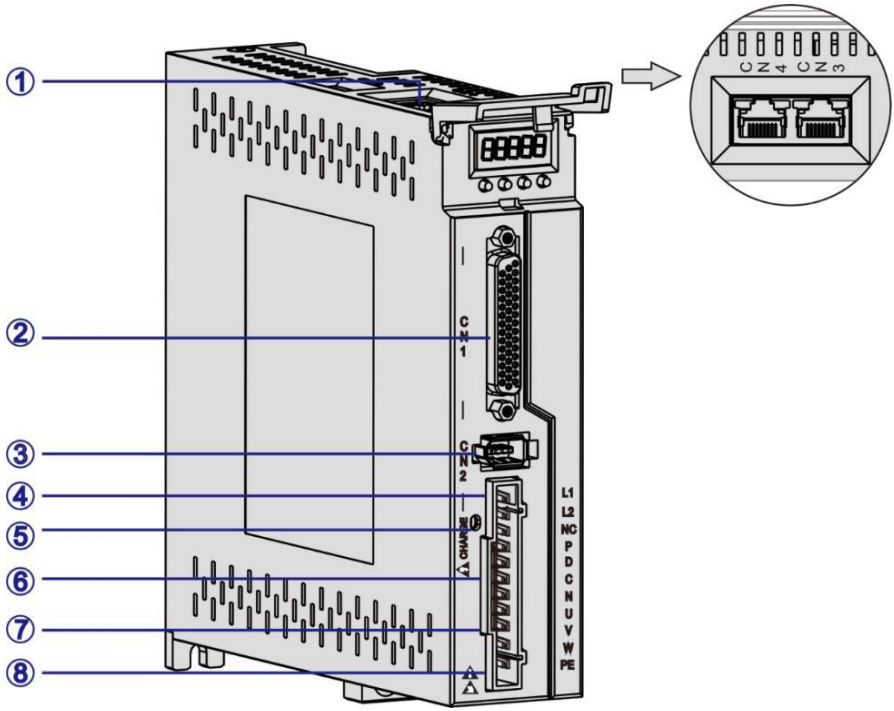


Figure 1.1 Introduction to the front panel of the P100S servo drive

serial number	Terminal name	Function Description
①	CN3, CN4	communication terminal.
②	CN1	Input and output control signal terminal.

③	CN2	The encoder signal terminal is connected to the motor encoder.
④	L1,L2	Mains power input terminal.
⑤	CHARGE	Bus voltage indicator. Used to indicate that the bus capacitor is in a charged state. When the indicator is on, even if the main circuit power is turned off, the capacitors inside the servo unit may still be charged. Therefore, do not touch the power terminals when the light is on to avoid electric shock.
⑥	P,D,C,N	Braking resistor connection terminal.
⑦	U,V,W	Servo motor connection terminal. Connect the U, V, W phases of the servo motor.
⑧	PE	Ground terminal. Connect it to the power supply and motor ground terminal for grounding.

1.3 Servo installation method

1.3.1 How to install the driver

- Installation direction

The normal installation direction of the servo drive is vertical upright.

- Installation and fixation

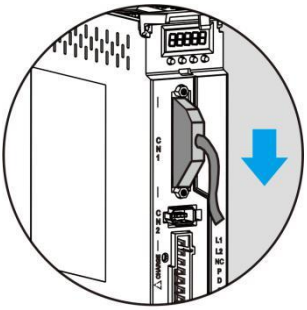
2 M4 fixing screws at the rear of the servo drive .

- Ground

Be sure to ground the grounding terminal of the drive, otherwise there may be the danger of electric shock or interference and malfunction.

- Routing requirements

When wiring the driver, please route the cable downwards (refer to the figure below) to avoid liquid on the cable on site , along the cable into the drive.



请将所接线缆按照向下方向走线

Figure 1.2 Schematic diagram of servo drive cable routing requirements

- Installation interval

Please refer to Figure 1.3 for the installation distance between drivers and other devices.

Small size, in order to ensure the performance and life of the driver, please leave as much installation space as possible.

- Heat dissipation

Servo driver adopts natural cooling method and forced cooling method .

- Installation precautions

When installing the electrical control cabinet, prevent dust or iron filings from entering the servo drive.

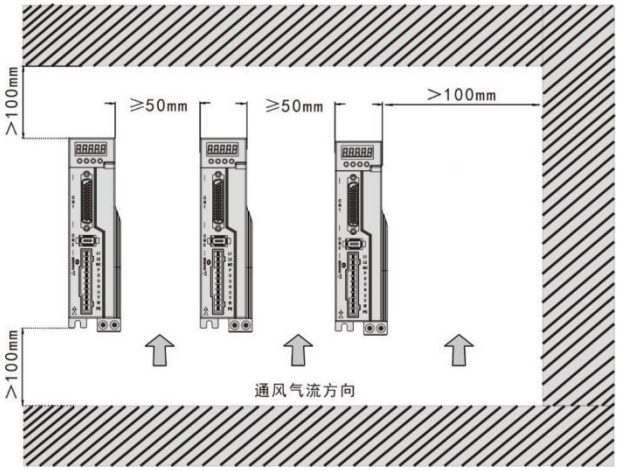


Figure 1.3 Installation interval

1.3.2 Installation environment conditions

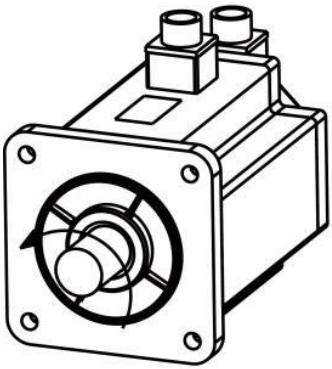
- Working environment temperature: 0~40 ℃ ; working environment humidity; below 80% (no condensation)
- Storage environment temperature: -40~50 ℃ ; Storage environment humidity: below 80% (no condensation)
- Vibration: below 0.5G.
- A well-ventilated place with less humidity and dust.
- No corrosive, flammable gas, oil and gas, cutting fluid, cutting powder, iron powder and other environments.
- Places without water vapor and direct sunlight.

1.3.3 Motor installation method

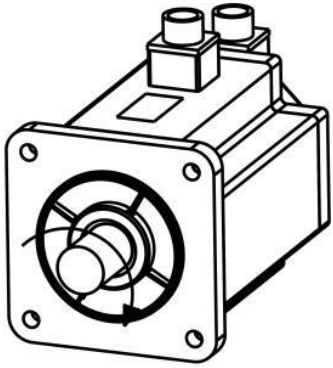
- Horizontal installation: To prevent liquids such as water and oil from flowing into the motor from the motor outlet, please place the cable outlet at the below.
- Vertical installation: If the motor shaft is installed upwards and a reducer is attached, pay attention to and prevent the oil in the reducer The stain penetrates into the motor through the motor shaft.
- The extension of the motor shaft should be sufficient. If the extension is insufficient, the motor will easily vibrate when it moves.
- When installing and removing the motor, do not hit the motor with a hammer, otherwise the motor shaft and encoder may be damaged easily.

1.3.4 Definition of motor rotation direction

The definition of the rotation direction of the motor described in this manual: facing the motor shaft, the counterclockwise rotation (CCW) of the rotating shaft is forward rotation, and the clockwise rotation (CW) of the rotating shaft is reverse rotation.



reversal
anti-clockwise



Forward rotation
Clockwise

2. Servo Specifications

2.1 Introduction to Servo Drive Specifications

model	ASD240	ASD275
Output Power	0.05KW~0.4KW	0.75KW~1KW
Main circuit input power	Simplex AC220V-15%~+10% 50/60Hz	
control method	0: Position control mode; 1: Speed control mode; 2: Torque control mode; 3: Position-speed hybrid control mode; 4: Position-torque hybrid control mode; 5: Speed-torque hybrid control mode	
Protective function	Overspeed/main power overvoltage and undervoltage/overcurrent/overload/encoder abnormality/control power abnormality/position out of tolerance	
Monitoring function	Speed/current position/command pulse accumulation/position deviation/motor torque/motor current/running status, etc.	
control input	1: Servo enable 2: Alarm clear 3: CCW drive prohibition 4: CW drive prohibition 5: Deviation counter cleared 6: Command pulse prohibited 7: CCW torque limit 8: CW torque limit	
control output	Servo ready/servo alarm/positioning complete/mechanical brake	
Dynamic braking	Built-in and external support	
Applicable load	Less than 3 times of motor inertia	
show	5-digit LED digital tube display, 4 operation buttons	

action		
communication method	RS485	
position control	Input	0: pulse + direction
		1: CCW/CW pulse
		2: A/B two-phase quadrature pulse
		3: Internal position control
	input electron gear ratio	Gear ratio numerator: 1-32767
		Gear ratio denominator: 1-32767

2.2 Servo drive naming rules

ASD	2	40	E
①	②	③	④

serial number	meaning
①	ASD series AC servo driver
②	2: 220V , 3:380V
③	The specific power of the servo below 1KW, 40: 50W~400W; 75: 600W~1000W
④	None: Pulse type , E: Ethercat type , C: Canopen , M: Modbus

2.3 Servo motor naming rules

60	SS P	40	G	13	30	□
①	②	③	④	⑤	⑥	⑦

number	meaning
①	Frame size: 40(mm); 60(mm); 80(mm).
②	Motor Type, SS: Standard servo motor , SB: Ball screw of shaft SK: Hollow shaft , SF: Telescopic shaf ; P: With off power brake
③	10 represents 100W, 40 represents 400W, 75 represents 750W and 100 represents 1000W
④	none: 17 bit Single-turn absolute encoder G: 17bit magnetic Multi-turn absolute encoder
⑤	13: 1.3nm , Standard can be omitted
⑥	30: 3000rpm , Standard can be omitted
⑦	Special customization requirements code

1.For example, the performance parameter "750W" means that the rated torque is 2.4Nm, and the rated speed is 3000rpm.
2. Rated power calculation formula: P=0.1047 × N × T=0.1047 × 2.4 × 3000=753.84W≈0.75KW, "T" is rated torque, "N" is rated speed.

2.4 Adaptation table of servo motor and servo driver

Machine base	Model	power (W)	RPM	Drive	Encoder
40mm	40SS05	50	3000	ASD240	17-bit single-turn absolute encoder
	40SS10	100	3000		
60mm	60SS20	200	3000		
	60SS40	400	3000		
	60SS60	600	3000		
80mm	80SS40	400	3000	ASD240/275	
	80SS75	750	3000	ASD275	
	80SS100	1000	3000		

3. Drive and Motor Dimensions

3.1 Drive Dimensions

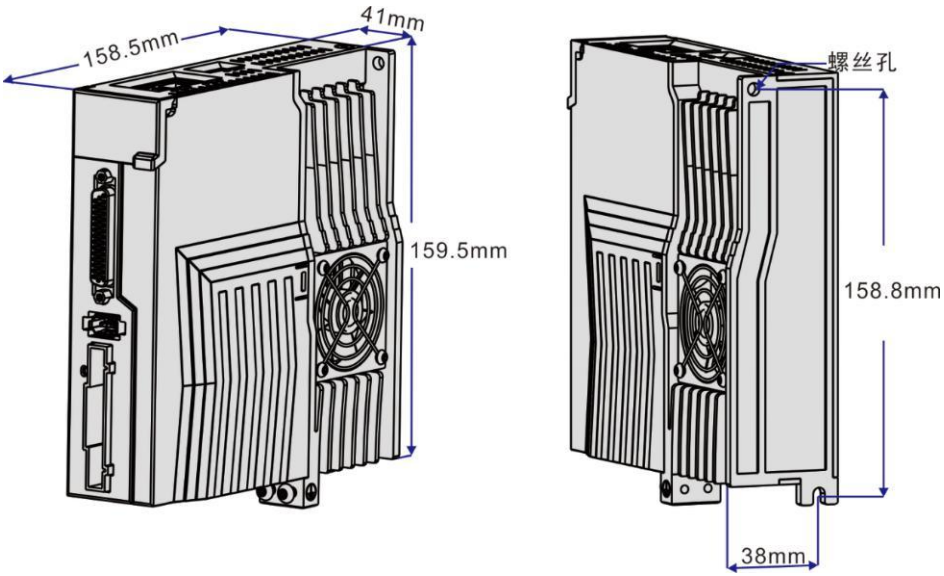


Figure 3.1 Dimensions of SFT400W/SFT750W series

3.2 Motor size

- Installation dimensions of 60-frame motor (see Figure 3.2 and Table 3-1)

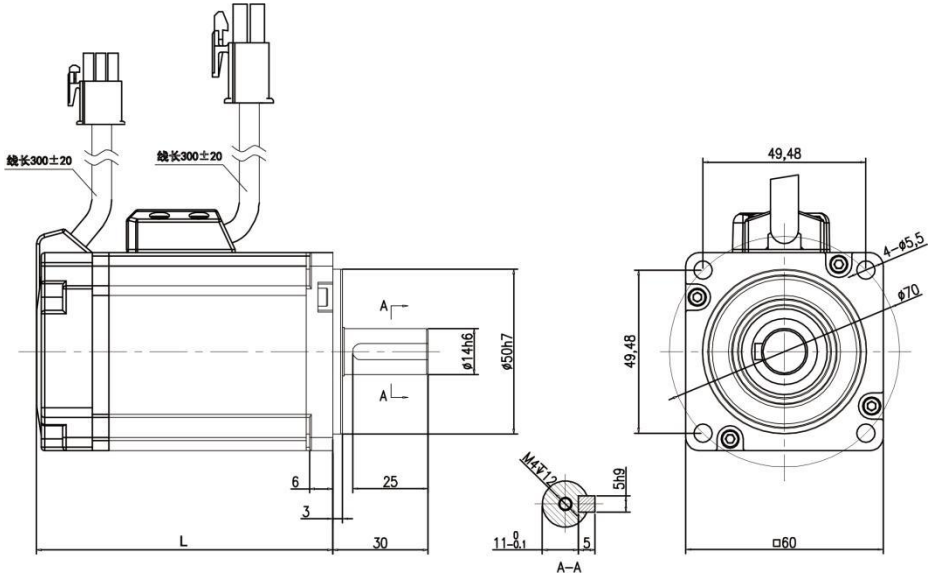


Figure 3.2 60 Motors and Table 3-1

model	60SS	60SS40	60SS60
L (mm)	74	90	--

- Installation dimensions of 80-frame motor (see Figure 3.3 and Table 3-2)

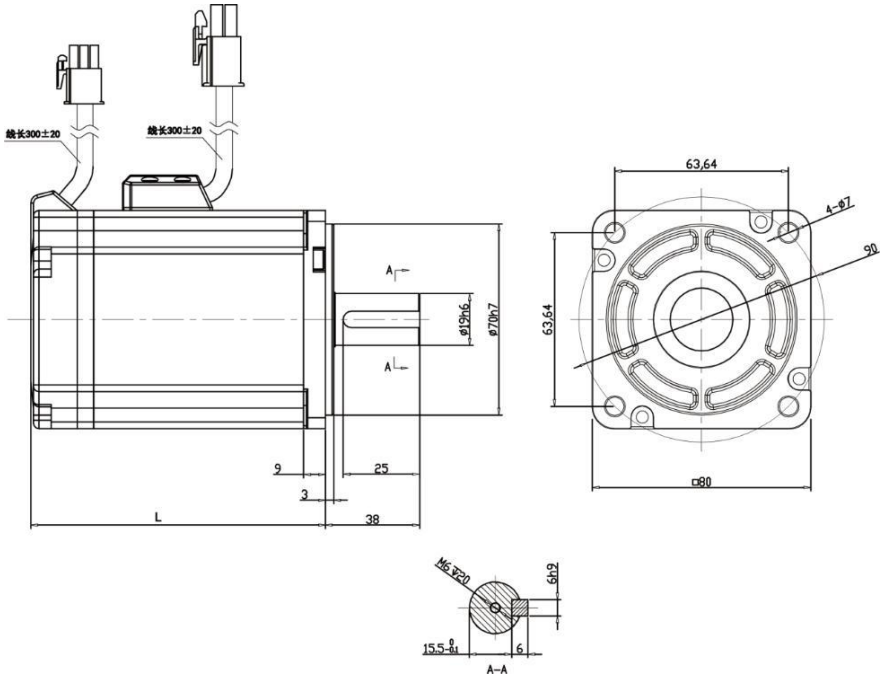


Figure 3.3 80 Motors and Table 3-2

model	80SS40	80SS75	80SS100
L (mm)	--	100	134

4.Drive system wiring and composition

4.1 Servo system wiring

4.1.1 Servo drive wiring diagram

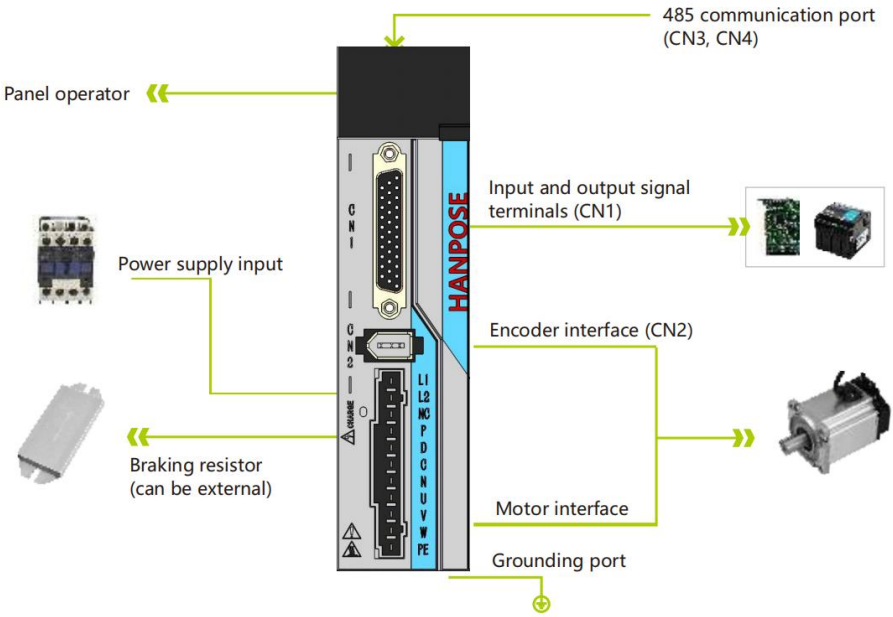


Figure 4.1 Wiring diagram of servo system

4.1.2 Wiring Instructions

Wiring Precautions:

- Cable length, command cable within 3m, encoder length within 20m.
- Check whether the power supply and wiring of L1 and L2 are correct. If the driver only supports single-phase 220VAC, please do not connect it.

380VAC power supply.

- The phase sequence of the motor output U, V and W terminals must be in one-to-one correspondence with the corresponding terminals of the driver.

Can not turn or fly. The motor cannot be reversed by exchanging the three-phase terminals, which is different from the asynchronous motor.

- Since the high-frequency switching current flows through the servo motor, the leakage current is relatively large, and the motor ground terminal must be connected to the

The ground terminals PE of the servo drive are connected together and well grounded.

- The direction of the diode for absorbing the relay installed in the output signal should be connected correctly, otherwise it will cause malfunction.

failure, the signal cannot be output.

- To prevent malfunction caused by noise, please add devices such as isolation transformers and noise filters to the power supply.
- Please wire the power lines (motor lines, power lines, etc. strong current circuits) and signal lines at a distance of 30cm or more.

Do not place in the same conduit.

- Please install a non-fuse circuit breaker so that the external power supply can be cut off in time when the drive fails.
- Because there are large-capacity electrolytic capacitors inside the servo drive, even if the power is cut off, the

There is still high voltage, after cutting off the power, wait at least 5 minutes before touching the drive and motor.

4.1.3 Wire Specifications

connection terminal	symbol	wire gauge
Main circuit power supply	L1, L2	1.5~4mm ^{2}
Motor connection terminal	U, V, W	1.5~4mm ^{2}
Ground terminal	⏚	1.5~4mm ^{2}
Control signal terminal	CN1	≧0.14mm ^{2} (AWG26), including shielded wire
Encoder signal terminal	CN2	≧0.14mm ^{2} (AWG26), including shielded wire
Braking resistor terminal	P, D/P, C	1.5~4mm ^{2}

Encoder cables must use twisted pairs. If the encoder cable is too long (>20m), the encoder power supply will be insufficient. The power and ground wires can be connected with multiple wires or use thick wires.

4.2 Servo driver terminal pinout

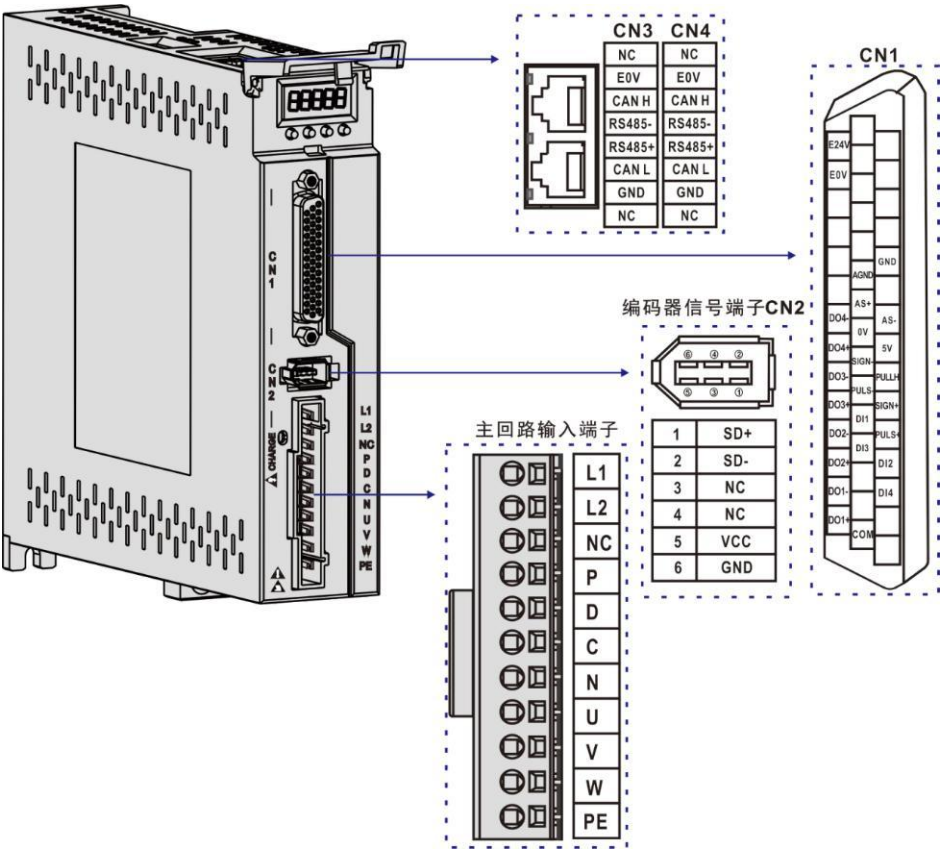


Figure 4.2 ASD240/275 terminal pinout diagram

The above illustrations are the pin layout of the built-in terminals of the drive body.

4.3 Servo drive main circuit connection

4.3.1 Introduction of main circuit terminals

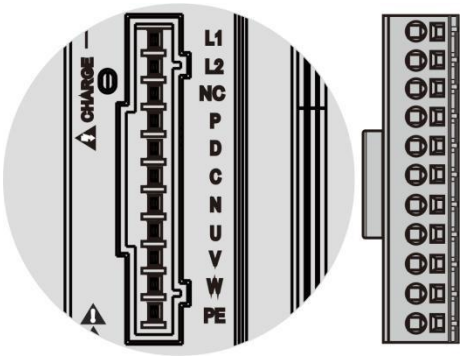


Figure 4.3 Main circuit terminal pinout

name	Terminal symbol	Detailed description
Main circuit power input terminal	L1, L2	Single-phase 220VAC -15%~+10%, 50/60Hz
	NC	empty end
Braking resistor terminal	P.D.	When using the internal braking resistor, short P and D
	P.C	When using an external braking resistor, P and D are short-circuited and disconnected, and then the external braking resistor wires are connected between P and C respectively. P and N are forbidden to connect.
Motor connection terminal	U, V, W	Connect to the U, V, W phases of the servo motor.

	⏚	The ground terminal of the drive is connected to the power supply and the ground terminal of the motor.

NOTE

Factory default internal braking resistor connection: P and D are short-circuited.

4.3.2 Braking resistor wiring instructions

If the internal braking resistor is used, the driver should short-circuit P and D, that is, it can be used normally according to the factory state, as shown in Figure A. If an external braking resistor is used, the short circuit between P and D must be removed first, and then the external braking resistor should be connected across P and C, as shown in Figure B:

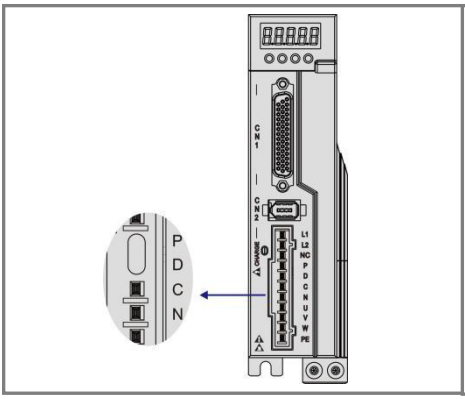


Figure A

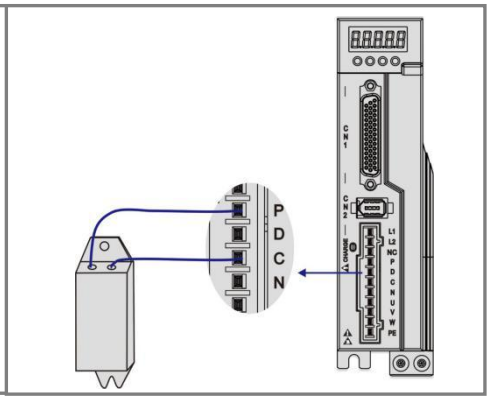


Figure B

NOTE

Precautions for braking resistor wiring:

Do not connect the external braking resistor to the positive and negative poles P and N of the busbar, otherwise it will cause explosion and fire;

Do not be less than the minimum allowable resistance value of 25Ω, otherwise it will cause the driver to alarm or damage the driver;

Please install the external braking resistor on non-combustible materials such as metal.

4.4 CN1 control signal terminal

4.4.1 CN1 control signal terminal description

The CN1 control signal terminal provides the signal required to connect with the upper controller, using the DB44 socket, the signal includes:

- 4 programmable inputs
- 4 programmable outputs
- Analog command input
- Command pulse input

4.4.2 CN1 terminal connector pinout diagram

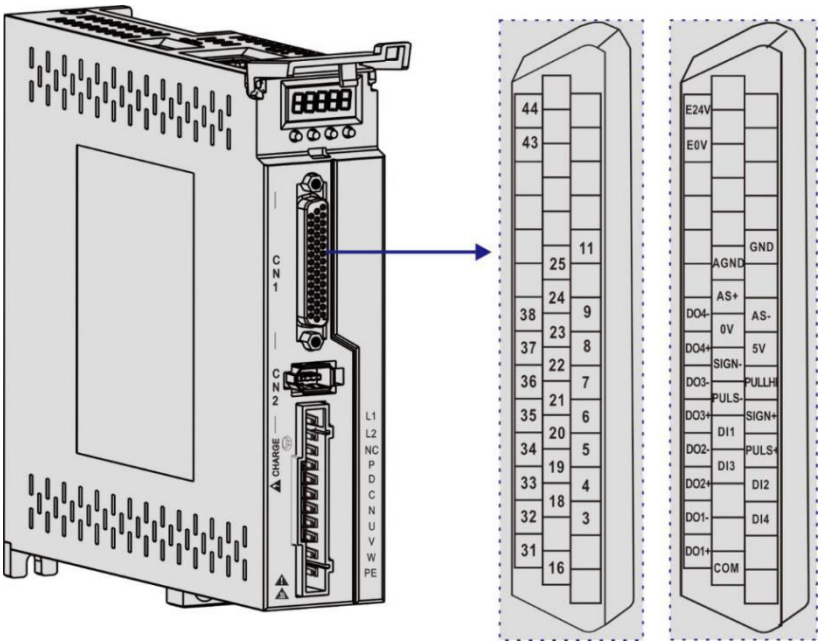


Figure 4.4 The pin distribution diagram of the CN1 terminal connection of the driver

NOTE

◆ Please use 24-26AWG cable。

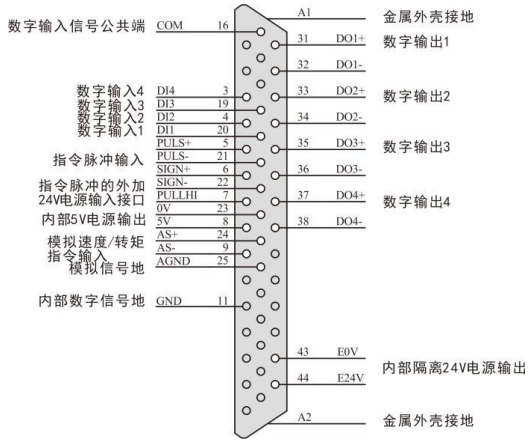


Figure 4.5 Schematic diagram of the CN1 terminal pins of the driver

4.4.3 Description of position command input signal

Signal name		PIN NO	Function
Position pulse command	PULS+	5	High-speed photoelectric isolation input, parameter PA14 setting working mode: ● pulse + direction ● CCW/CW pulse ● A, B two-phase quadrature pulse input ● Internal position control input
	PULS-	twenty one	
	SIGN+	6	
	SIGN-	twenty two	
	PULLHI	7	Additional 24V power input interface for command pulse
	GND	11	Internal digital signal ground

The command pulse output circuit on the host side can be selected from differential driver output or open collector output. The maximum input frequency and minimum pulse width are shown in the table below:

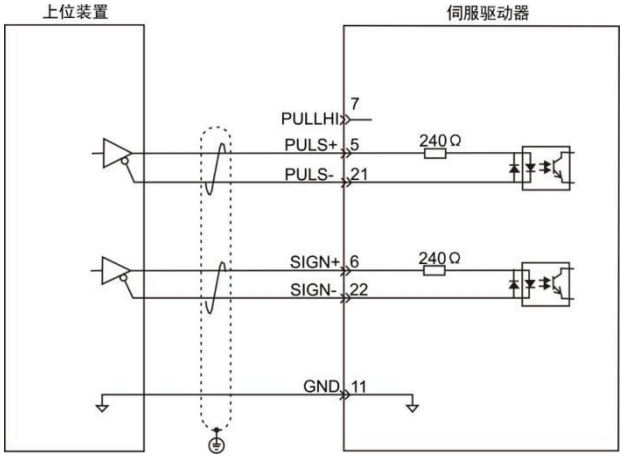
Pulse mode	Maximum frequency (pps)	Minimum pulse width (us)
difference	500k	1
open collector	200k	2.5

If the output pulse width of the host device is less than the minimum pulse width value, it will cause the drive to receive pulse errors.

The ports between PULS+ and PULS- and between SIGN+ and SIGN- only support signal level input below 5V, and external resistors must be connected in series for signals exceeding 5V, otherwise the driver will be damaged.

Schematic diagram of pulse command input circuit

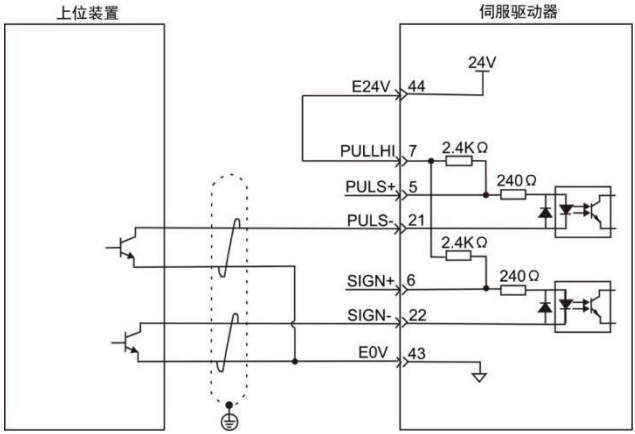
1) When in differential mode



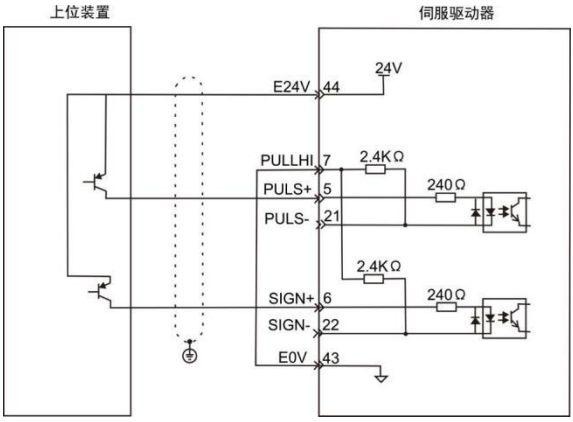
2) When in open collector mode

A) When using the internal 24V power supply of the servo drive:

- Common anode connection, such as: Mitsubishi PLC.



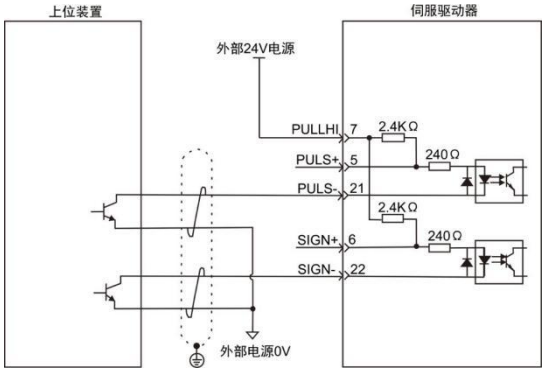
- Common cathode connection: For example: Siemens PLC.



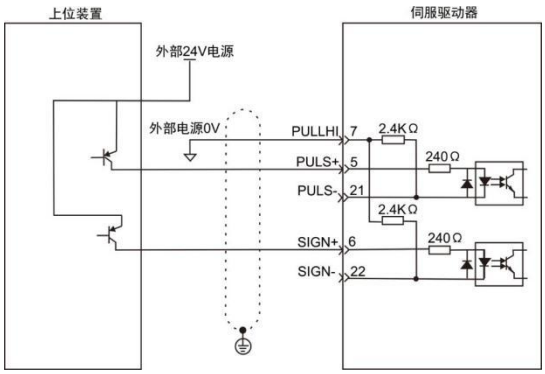
B) When using an external power supply:

Option 1: Use the driver's internal resistor (recommended solution)

- Common connection:

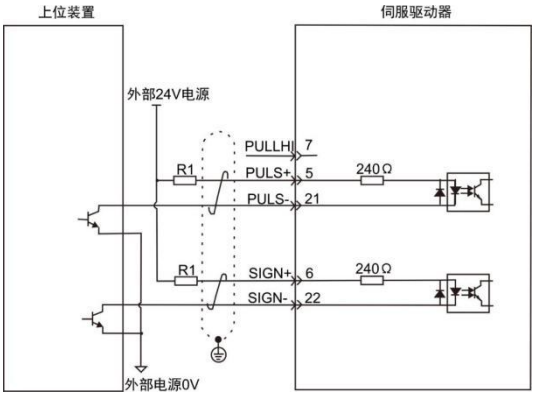


- Common cathode connection:

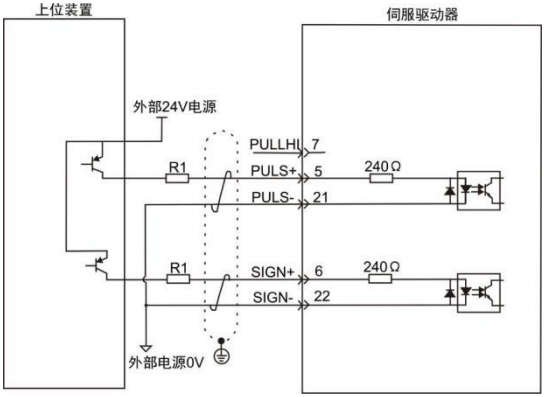


Option 2: Use driver external resistors.

- Common Yang connection:



- Common cathode connection:



NOTE

◆ Resistance R1 choose formula:

$$\frac{VCC-1.5}{R1+240} = 10m$$

4-1 recommend R1resistance

VCC	R1	R1 power
24V	2.4KΩ	0.5W
12V	1.5KΩ	0.5W

4.4.4 Description of digital input and output signals

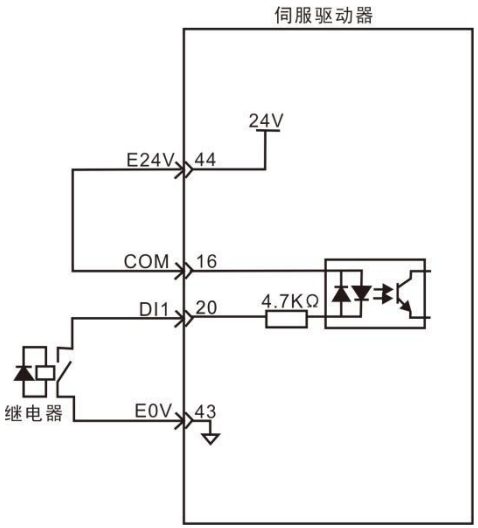
Signal name		Pin no	Default function	illustrate
number enter	DI1	20	Servo enable	Photoelectric isolation input, function programmable, defined by P3 group parameters P3-0~P3-17. Note: The COM terminal is a common anode or common cathode interface, and the input level is 12V-24V.
	DI2	4	Alarm clear	
	DI3	19	Forward drive prohibited	
	DI4	3	Reverse drive prohibited	
	COM	16	Digital input signal common terminal	
number output	DO1+	31	Servo ready	Photoelectric isolation output, function programmable, defined by P3 group parameters P3-20~P3-23.
	DO1-	32		
	DO2+	33	Alarm Output	
	DO2-	34		
	DO3+	35	Positioning completed	
	DO3-	36		
	DO4+	37	Electromagnetic brake	
	DO4-	38		
Internal isolated power output	E0V	43	Internal 0V	Internal isolated 24V power output, voltage range 20V~28V, maximum output current 100mA.
	E24V	44	Internal 24V	

- **Schematic diagram of digital input circuit**

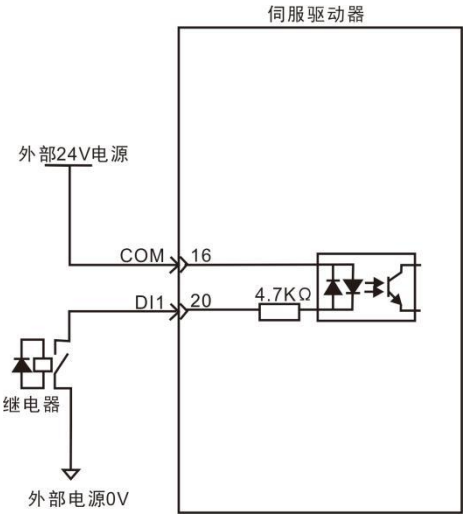
Taking DI1 as an example, the interface circuits of DI1~DI4 are the same.

1) When the host device is a relay output

A) When using the internal 24V power supply of the servo drive:

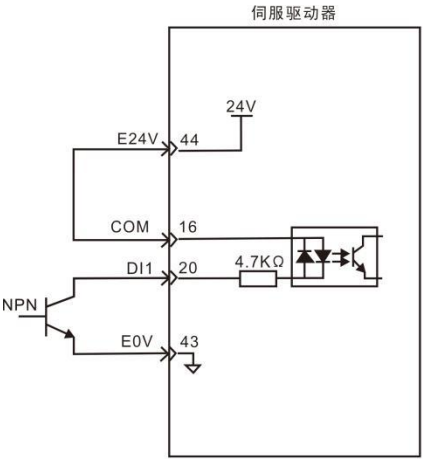


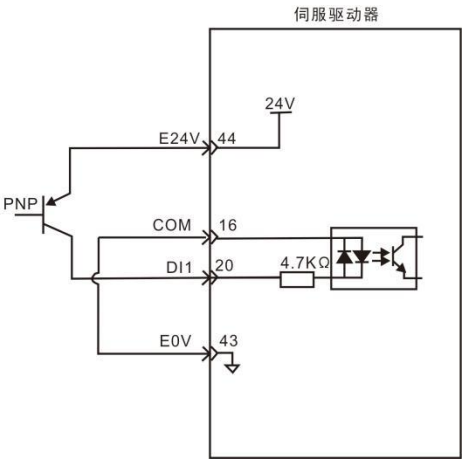
B) When using an external 24V power supply:



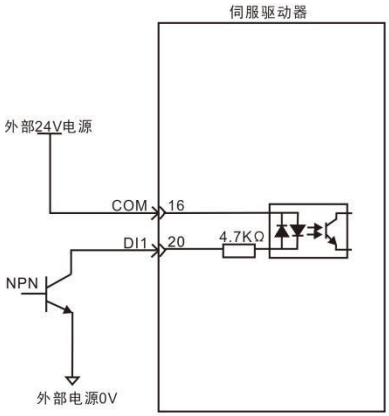
2) When the host device is open collector output

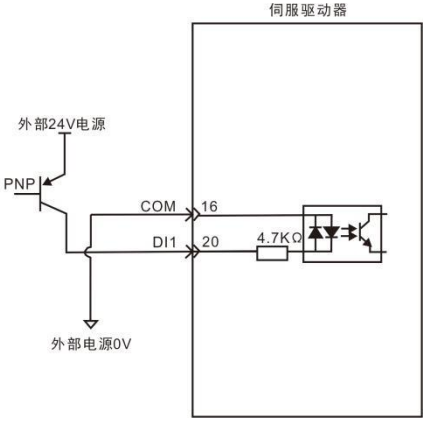
A) When using the internal 24V power supply of the servo drive:





B) When using an external 24V power supply:





注意:

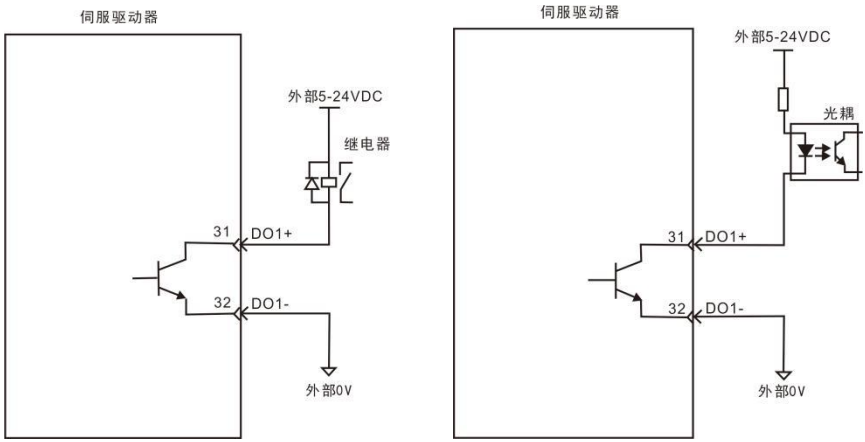
- Mixed use of PNP and NPN inputs is not supported.

- **Schematic diagram of digital output circuit**

Taking DO1 as an example, the interface circuits of DO1~DO4 are the same.

1) When the host device is a relay input (A):

2) When the host device is optocoupler input (B):



A B

NOTE

When the host device is a relay, be sure to connect a freewheeling diode, otherwise it may damage the DO port or cause strong signal interference.

The maximum allowable voltage and current capacity of the optocoupler output circuit inside the servo drive are as follows:

Voltage: DC30V

Current: DC50mA

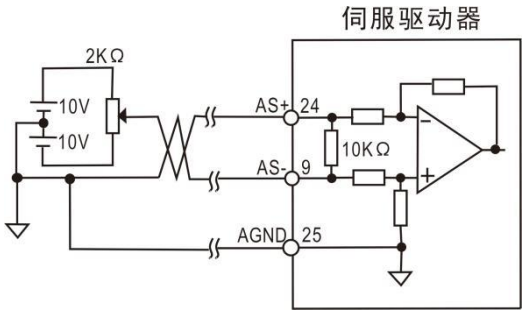
4.4.5 Description of analog command signal

Signal name		Pin No	Function
Analog command input	AS+, AT+	twenty four	Analog input of speed/rotation, range: -10V~+10V.
	AS-, AT-	9	
	AGND	25	

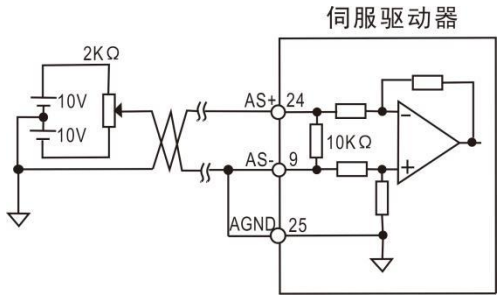
Schematic diagram of pulse command input interface

There are two connection methods: differential input and single-ended input. It is recommended to use differential input connection. Speed and torque share one analog input, input range: -10V~+10V, and input impedance is about 10KΩ. It is normal for the analog input to have a zero offset and can be compensated by parameters.

1) When it is an analog differential input



2) When it is an analog single-ended input



4.4.6 Brake Wiring Instructions

The holding brake is a mechanism that prevents the servo motor shaft from moving and keeps the motor locked in position when the servo drive is in a non-operational state, so that the moving part of the machine will not move due to its own weight or external force.

Schematic diagram of brake signal circuit

Brake wiring The connection of the brake input signal has no polarity, and the user needs to prepare a 24V power supply. The standard wiring example of the brake signal BK and the brake power supply is as follows:

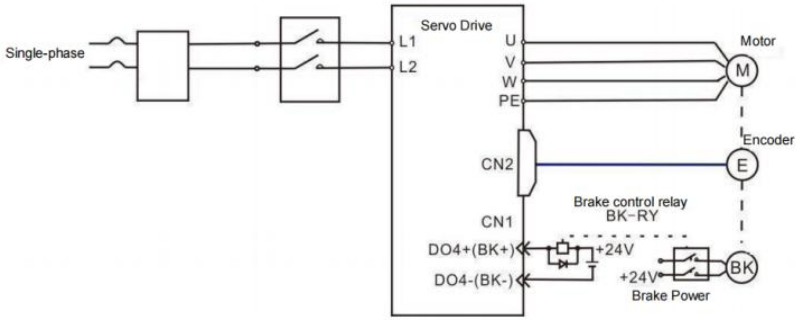


Figure 4.6 Wiring diagram of brake signal

NOTE

Notice:

The brake mechanism built into the servo motor is a non-energized action type fixed special mechanism, which cannot be used for braking purposes, and is only used to keep the servo motor in a stopped state.

The brake coil has no polarity.

After the servo motor stops, the servo on signal (Servo On) should be cut off.

When the motor with the built-in brake is running, the brake may make a clicking sound, but it has no effect on the function.

When the brake coil is energized (the brake is open), magnetic flux leakage may occur at the shaft end and other parts. Please be careful when using instruments such as magnetic sensors in motor accessories.

It is forbidden to share the power supply with other electrical appliances to prevent the voltage or current from decreasing due to the work of other electrical appliances, which will eventually cause the brake to malfunction.

It is recommended to use a cable of 0.5mm² or more.

4.5 CN2 encoder signal terminal

4.5.1 Schematic diagram of CN2 terminal plug

Connection diagram of CN2 encoder signal terminal and motor encoder.

The terminal connected to the encoder uses a 6PIN socket, and the shape and pin distribution are as follows:

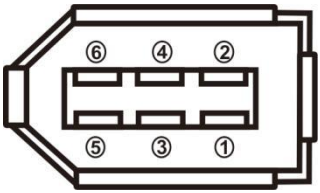


Figure 4.7 CN2 encoder signal terminal

4.5.2 Encoder terminal signal description

Signal name		pin number	Function
Encoder signal power	5V	5	The encoder uses 5V power supply (provided by the driver), when the cable is more than 20m, in order to prevent the encoder voltage from dropping, the power supply and ground wire can be connected with multi-wire or thick wire.
	0V	6	
Absolute encoder communication positive terminal	SD+	1	Absolute encoder communication positive terminal
Absolute encoder communication	SD-	2	Absolute encoder communication negative terminal

negative terminal			
empty end	NC	3	reserve
empty end	NC	4	reserve
Shielded wire protection ground	Plug metal shell		Connecting the Encoder Wire Shield

4.6 CN3 and CN4 communication interface

4.6.1 Communication port wiring diagram

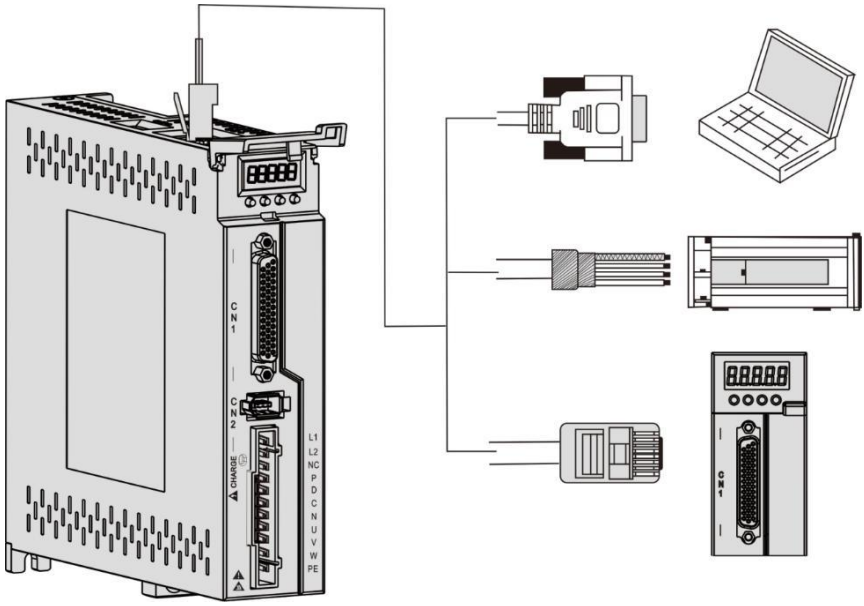
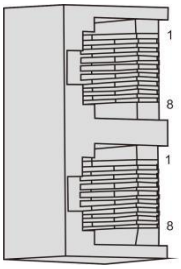


Figure 4.8 Schematic diagram of communication port wiring

4.6.2 Definition of Communication Port Pins

Through the CN3 and CN4 ports on the driver, the communication connection between the driver and the PC, PLC and the driver can be realized. The port pins of

Pin No	CN3	name	CN4	name	icon
1	NC	empty end	NC	empty end	
2	E0V	CAN signal ground	E0V	CAN signal ground	
3	CAN H	CAN bus interface	CAN H	CAN bus interface	
4	RS485 -	RS485 communication interface	RS485 -	RS485 communication interface	
5	RS485+		RS485+		
6	CAN L	CAN bus interface	CAN L	CAN bus interface	
7	GND	485 signal ground	GND	485 signal ground	
8	NC	empty end	NC	empty end	

CN3 and CN4 are defined as follows:

Notice:

It can be connected to PC or upper computer controller through a special serial port cable, and hot plugging is prohibited.

It is recommended to use twisted pair or shielded wire, and the length of the wire should be less than 2 meters.

When multiple machines are connected in series, CN3 is connected to CN4 of the previous drive, and CN4 is connected to CN3 of the next drive.

When using RS485 bus communication, when the 485 signal ground of the host computer is connected to the earth (PE), please connect the PE terminal of the host computer with the driver terminal in a reasonable grounding manner. In this case, it is forbidden to connect the 485 signal ground of the host computer To the driver 485 signal ground (GND), otherwise the driver may be damaged.

4.6.3 485 communication network connection description

1. 485 communication connection with PLC

When using the 485 communication network, the connection cables between the drive and the PLC are as follows:

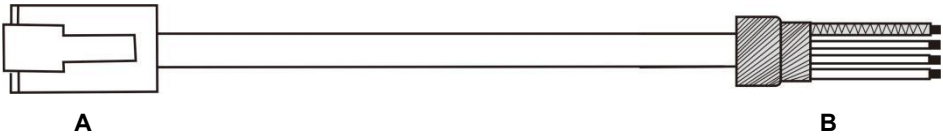


Figure 4.9 Schematic diagram of the communication cable between the servo drive and PLC

Table 4-2 The pin connection relationship between servo drive and PLC communication cable

Drive side RJ45 (A end)		PLC side (B side)	
Signal name	pin number	Signal name	pin number
RS485+	4	RS485+	4
RS485-	5	RS485-	5
GND	7	GND	7
PE (shielded mesh layer)	case	PE (shielded mesh layer)	case

2. 485 communication connection of multiple machines in parallel

When the 485 communication network is used, the connection cables of the servo drives in parallel are as follows:

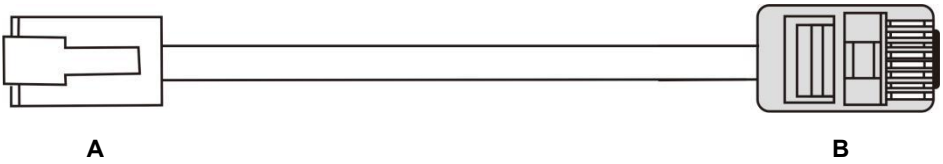


Figure 4.10 Schematic diagram of multi-machine parallel cable of servo drive

Table 4-3 The pin connection relationship of the multi-machine parallel communication cable of the servo drive

Drive side RJ45 (A end)		Drive side RJ45 (B end)	
Signal name	pin number	Signal name	pin number
RS485+	4	RS485+	4
RS485-	5	RS485-	5
GND	7	GND	7

PE (shielded mesh layer)	case	PE (shielded mesh layer)	case

3.485 Communication grounding precautions

When using RS485 communication, the connection example between the GND terminal of the host device and the GND terminal of the servo drive is shown in the following figure:

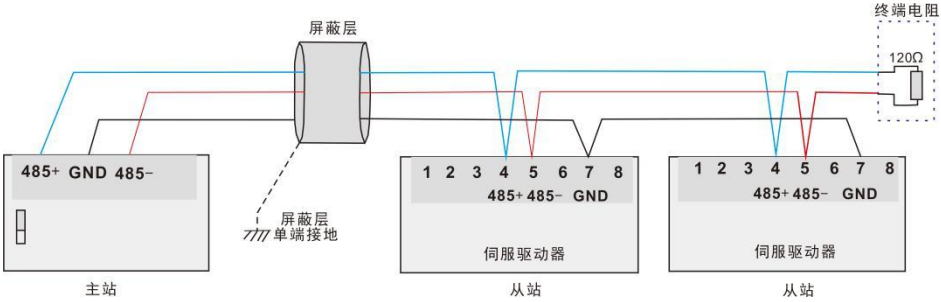
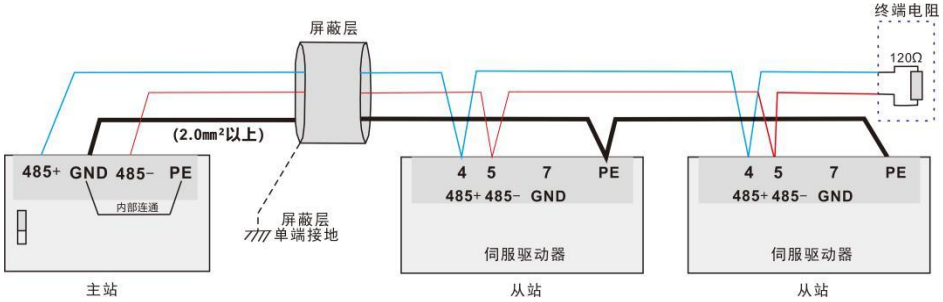


Figure 4.11 Schematic diagram of 485 communication connection

When using RS485 communication, the signal ground of the host device is connected to the ground as shown in the figure below:



NOTE

PLC built-in 485 communication terminal resistor.

It is recommended that the shielding layer be grounded at one end.

Do not connect the GND terminal of the host device with the E0V terminal of the servo drive, otherwise the machine will be damaged.

4.7 Anti-interference countermeasures for power wiring

To suppress interference, take the following measures:

- The length of the command input cable should be less than 3m, and the length of the encoder cable should be less than 20m.
- Use as thick a wire as possible for ground wiring. (2.0mm² or more)
- Please use a noise filter to prevent radio frequency interference. Please install a noise filter on the input side of the power cord when using it in a civil environment or in an environment with strong power supply interference.
- To prevent erroneous actions caused by electromagnetic interference, the following processing methods can be used:

1) Install the host device and noise filter as close to the servo drive as possible.
2) Install surge suppressors on the coils of relays, solenoids, and electromagnetic contactors.
3) When wiring, separate the strong current circuit from the weak current circuit, and keep a distance of more than 30cm. Do not put in the same pipe or bundle together.
4) Do not share the power supply with electric welding machines, electrical discharge machining devices, etc. When there is a high-frequency generator nearby, install a noise filter on the input side of the power cord.

4.7.1 Examples of anti-interference wiring and grounding treatment

1. Example of anti-interference wiring

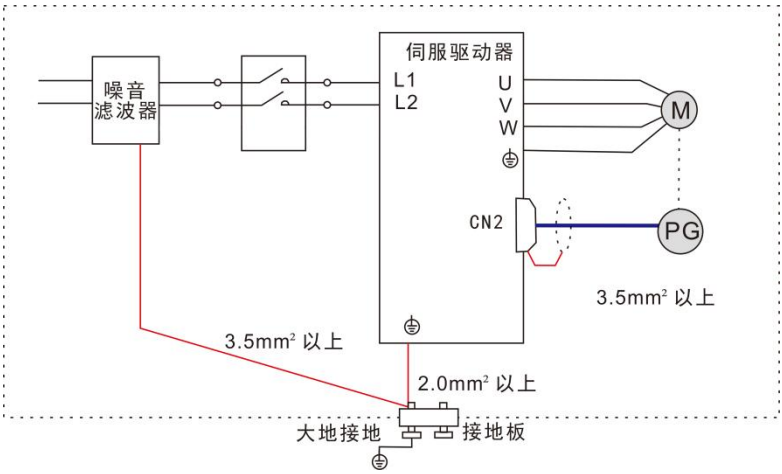


Figure 4.12 Example of anti-interference wiring

NOTE

The outer box connection wire used for grounding should be thicker than 3.5mm ² as far as possible, and braided copper wire is recommended.

When using the noise filter, observe the precautions described in "How to use the noise filter" below.

2. ground handling

To avoid possible electromagnetic interference problems, ground as follows.

1) Grounding of Servo Motor Housing

Please connect the ground terminal of the servo motor and the ground terminal PE of the servo drive together, and ground the PE terminal reliably to reduce potential electromagnetic interference problems.

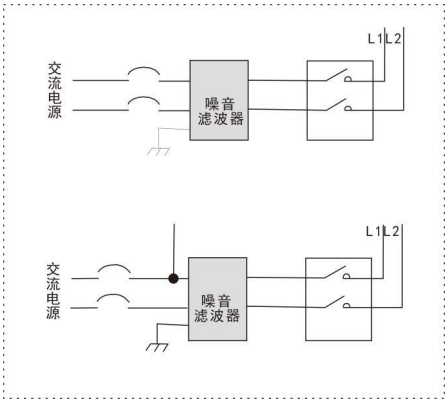
2) Encoder cable shield grounding

Ground the shield of the motor encoder cable at both ends.

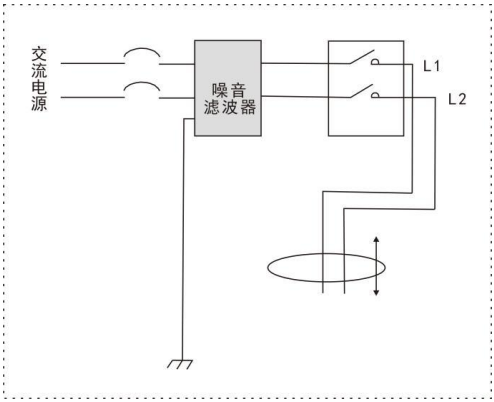
4.7.2 How to use the noise filter

In order to prevent the interference of the power line and weaken the influence of the servo drive on other sensitive equipment, please select a corresponding noise filter at the power input end according to the magnitude of the input current. Also, install noise filters on the power lines of peripheral devices as necessary. Please observe the following precautions when installing and wiring the noise filter so as not to impair the actual use effect of the filter.

- Please arrange the input and output wiring of the noise filter separately, and do not put them in the same pipe or bundle them together.



4.13



4.14

Figure 4.13 Example diagram of separation of input and output wiring of noise filter

- Route the ground wire of the noise filter separately from its output power wire.

Figure 4.14 Schematic diagram of the separation of the noise filter ground wire and output wiring

- The noise filter needs to be grounded separately with a thick wire as short as possible, and do not share a ground wire with other grounding devices.

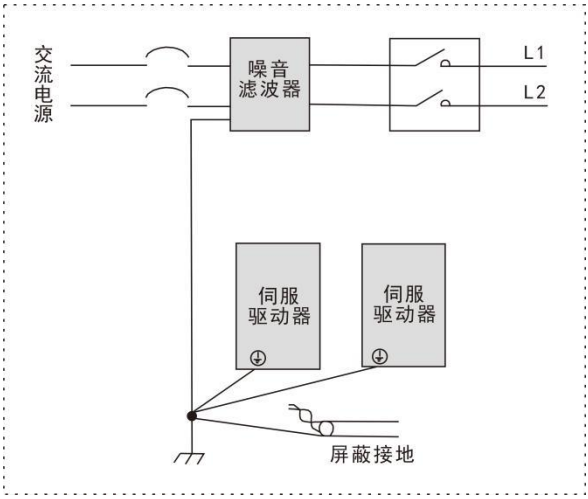


Figure 4.15 Schematic diagram of single-point grounding

- The ground wire treatment of the noise filter installed in the control cabinet.

When the noise filter and the servo driver are installed in the same control cabinet, it is recommended to fix the filter and the servo driver on the same metal plate to ensure that the contact part is conductive and well-bonded, and the metal plate is grounded.

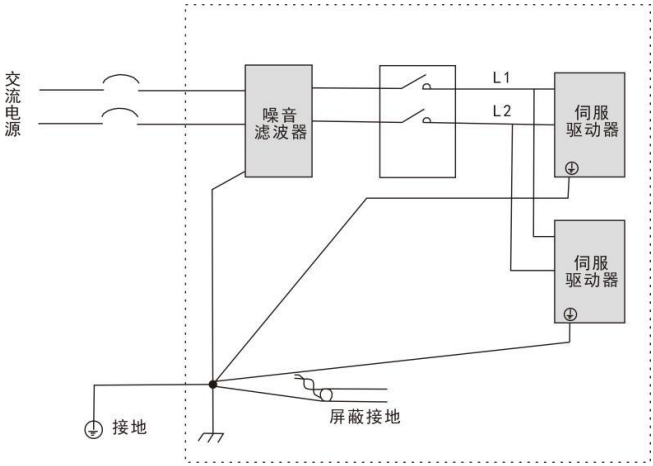


Figure 4.16 Schematic diagram of noise filter ground wire processing

Chapter 5 Operation Mode and Control Wiring Diagram

According to the command mode and operation characteristics of the servo drive, it can be divided into three operation modes: position control operation mode, speed control operation mode and torque control operation mode.

- The position control mode generally determines the displacement of the movement by the number of pulses, and the external input pulse frequency determines the size of the rotation speed. Since the position mode can strictly control the position and speed, it is generally used in positioning devices. It is the control mode with the most servo applications, mainly used for manipulators, placement machines, engraving, milling and engraving, CNC machine tools, etc.
- The speed control mode is to control the rotation speed through analog quantity setting, digital quantity setting and communication setting, which is mainly used in some constant speed occasions. For example, in the application of engraving and milling machine, the upper computer adopts the position control mode, and the servo driver adopts the speed control mode.
- Torque control mode is to control the torque size through analog quantity given, digital quantity given and communication given. It is mainly used in winding and unwinding devices that have strict requirements on the force of the material, such as some tension control occasions such as winding devices or optical fiber pulling equipment. The torque setting should be changed at any time according to the change of the winding radius to ensure The force of the material does not change with the change of the winding radius.

5.1 Position Control Mode

5.1.1 Description of Position Mode

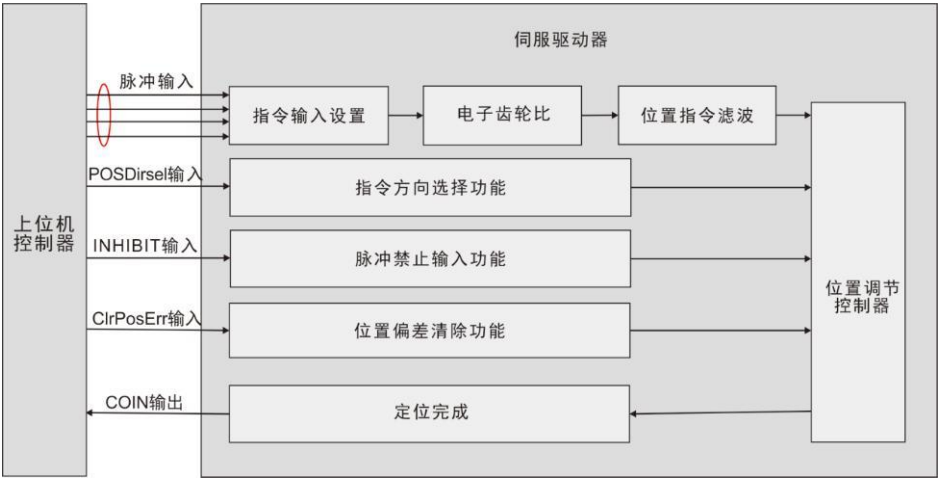


Figure 5.1 Block Diagram of Position Control Mode

Position mode is a common working mode of servo drives, and its main use steps are as follows:

1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After power-on, the servo panel displays " r 0 ", which means that the servo power supply and encoder wiring are correct.

2) Carry out the servo JOG test run by pressing the button to confirm whether the motor can run normally.

3) Refer to Figure 5.2 for wiring instructions to connect the pulse direction input and pulse command input in the CN1 terminal and the required DI/DO signals, such as servo enable, alarm clear, positioning completion signal, etc.

4) Set the position mode related settings. Set the DI/DO used according to the actual situation.

5) Servo enable, control the rotation of the servo motor through the position

command issued by the host computer. First, rotate the motor at low speed, and confirm whether the rotation direction and electronic gear ratio are normal, and then adjust the gain.

5.1.2 Position mode wiring

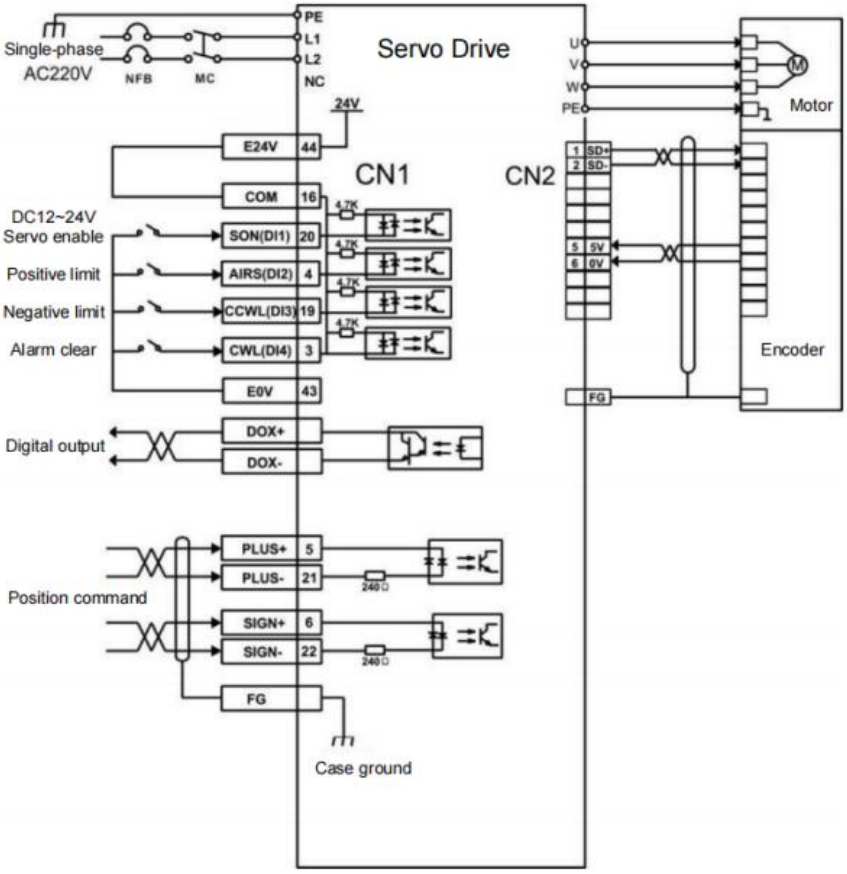


Figure 5.2 Wiring Diagram of Position Mode

NOTE

The internal +24V power supply voltage range is 20V~28V, and the maximum working current is 100mA. If you use an external 24V power supply, please connect the external power supply +24V to pin 16 (COM), and the external power supply 0V to pin 43 (E0V).

The DO output power supply needs to be prepared by the user, and

5.1.3 Parameters to be adjusted in position control mode

- **Gain and smoothing filter parameter adjustment**

Required parameters	Parameter Description	parameter value	Factory default
PA4	Control method selection	0	0
PA9	Position proportional gain	1-1000	80
PA19	Position command smoothing filter	0-1000×0.1ms	100
PA100	Command filter selection	0-1	0

- **DI input related parameter adjustment**

Required parameters	Parameter Description	parameter value	Factory default
PA11	The number of command pulses for 1 revolution of the motor	0-30000	10000
PA12	Position command pulse electronic gear first numerator	1-32767	0
PA13	Position command pulse electronic gear denominator	1-32767	10000
PA14	Position command pulse input method	0-3	0
PA15	Position command pulse direction inversion	0-1	0

PA59	Command pulse valid edge	0-1	0
PA77	Position command pulse electronic gear ratio second numerator	1-32767	0
PA78	Position command pulse electronic gear ratio third numerator	1-32767	0
PA79	Position command pulse electronic gear ratio fourth numerator	1-32767	0
PA80	Command direction signal effective level	0-1	0
PA81	Command pulse PULS signal filtering	0-15	4
PA82	Command pulse SIGN signal filtering	0-15	4

- **DO output related parameter adjustment**

Required parameters	Parameter Description	parameter value	Factory default
PA16	Positioning complete range	0-3000 pulses	130
PA17	Position out-of-tolerance detection	0-30000×100 pulses	6000
PA18	Position out of tolerance error is invalid	0-1	0
PA83	CWL, CCWL direction prohibition method	0-1	0
PA84	Positioning complete hysteresis	0-32767	65
PA85	Positioning proximity range	0-32767	6500
PA86	Positioning close to hysteresis	0-32767	650

- **Input and output terminal related parameter adjustment**

Required parameters	Parameter Description	parameter value	Factory default
PA55	Input terminal effective level control word	0000-1111	0000
PA57	Output terminal effective level control word	0000-1111	0000
PA58	IO input terminal debounce time constant	1-20ms	2
P3-0	Digital input DI1 function	0-99	1
P3-1	Digital input DI2 function	0-99	2
P3-2	Digital input DI3 function	0-99	3
P3-3	Digital input DI4 function	0-99	4
P3-15	Digital input DI is forced to be valid 1	00000000-11111111	00000000
P3-16	Digital input DI is forced to be valid 2	00000000-11111111	00000000
P3-17	The digital input DI is forced to be valid 3	00000000-11111111	00000000
P3-20	Digital output DO1 function	0-99	2
P3-21	Digital output DO2 function	0-99	3
P3-22	Digital output DO3 function	0-99	5
P3-23	Digital output DO4 function	0-99	8

- **Internal position Pr mode position command description and related parameters**

Pr position command source is the use of parameters (P4-2, P4-3)-(P4-23,

P4-24) 8 groups of built-in position command registers, which can be used with external I/O (CN1, POS0-POS 2 and CTRG) Choose one of eight groups to use as a position command :

location command	POS2	POS1	POS0	CTRG	correspond parameter	illustrate	moving speed register
P1	0	0	0	↑	P4-2	Number of turns (+/-30000)	P4-4 _ (V1)
					P4-3 _	Pulse (+/-max cnt)	
P2	0	0	1	↑	P4-5 _	Number of turns (+/-30000)	P4-7 _ (V2)
					P4-6 _	Pulse (+/-max cnt)	
P3	0	1	0	↑	P4-8 _	Number of turns (+/-30000)	P4-10 _ (V3)
					P4-9 _	Pulse (+/-max cnt)	
P4	0	1	1	↑	P4-11 _	Number of turns (+/-30000)	P4-13 _ (V4)
					P4-12 _	Pulse (+/-max cnt)	
P5	1	0	0	↑	P4-14 _	Number of turns (+/-30000)	P4-16 _ (V5)
					P4-15 _	Pulse (+/-max cnt)	
P6	1	0	1	↑	P4-17 _	Number of turns (+/-30000)	P4-19 _ (V6)
					P4-18 _	Pulse (+/-max cnt)	

P7	1	1	0	↑	P4-20	Number of turns (+/-30000)	P4- 22 (V7)
					P4-21	Pulse (+/-max cnt)	
P8	1	1	1	↑	P4-23	Number of turns (+/-30000)	P4- 25 (V8)
					P4-24	Pulse (+/-max cnt)	

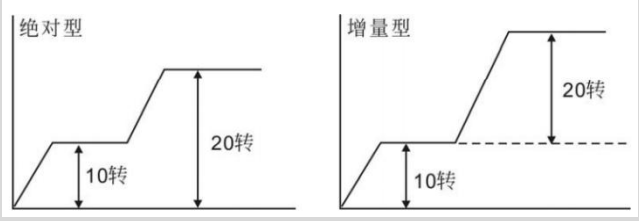
NOTE

The state of POS0-2: 0 means the contact is open (open), and 1 means the contact is closed (close). CTRG

↑ represents the moment when the connection changes from open circuit (0) to open circuit (1). max represents the command pulse for one revolution of the motor.

Absolute position registers are widely used, which is equivalent to a simple program control. The user can easily complete the periodic operation by using the above table

For example, the position command P1=10 revolutions, P2=20 revolutions,First issue position command P1, then issue position command P2. The difference between the two is shown in the following figure:



5.2 Speed Control Mode

5.2.1 Speed Mode Description

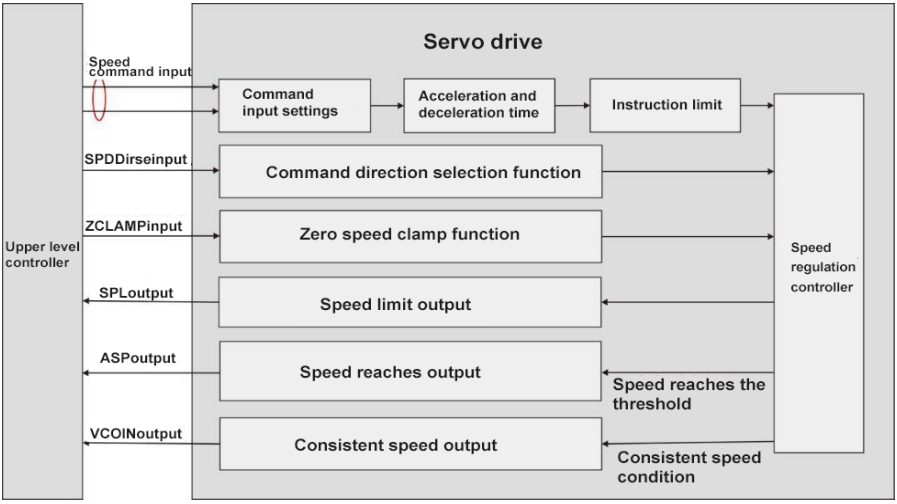


Figure 5.3 Block Diagram of Speed Control Mode

The main steps to use the speed mode are as follows:

1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After power-on, the servo panel displays " r 0 ", which means that the servo power supply and encoder wiring are correct.

2) Press the button to perform the servo JOG test run to confirm whether the motor can run normally.

3) Refer to Figure 5.4 for wiring instructions to connect the required DI/DO signals in the CN1 terminal, such as servo enable, alarm clear, positioning completion signal, etc.

4) Set the speed mode related settings. Set the DI/DO used according to the actual situation.

5) Servo enable, control the rotation of the servo motor through the position command issued by the host computer. First, rotate the motor at low speed, and confirm whether the rotation direction and electronic gear ratio are normal, and then adjust the gain.

5.2.2 Speed Mode Wiring

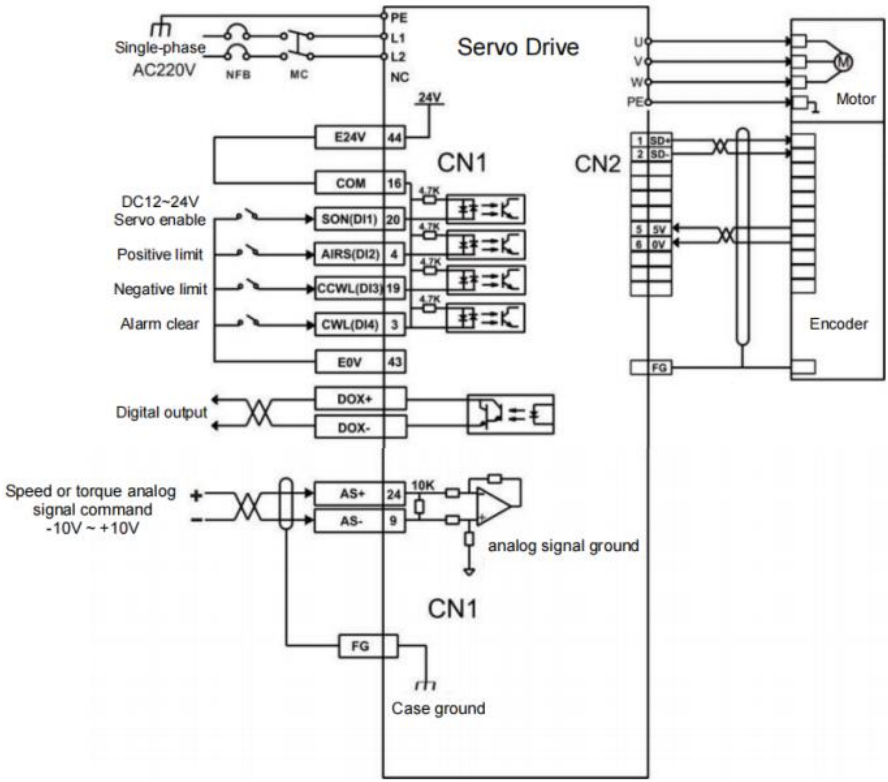


Figure 5.4 Speed Mode Wiring Diagram

5.2.3 Parameters to be adjusted in speed control mode

- **Related parameters to be adjusted in the speed control mode**

Required parameters	Parameter Description	parameter value	Factory default
PA4	Control method selection	1	0
PA5	Speed proportional gain	5-2000Hz	150
PA6	Speed integral constant	1-1000ms	75
PA22	Internal and external speed command selection	0-5	0
PA24	Internal speed 1	-6000-6000r/min	100
PA25	Internal speed 2	-6000-6000r/min	500
PA26	Internal speed 3	-6000-6000r/min	1000
PA27	Internal speed 4	-6000-6000r/min	2000
PA28	Arrival speed	0-3000r/min	3000
PA40	Acceleration time constant	1-10000ms	100
PA41	Deceleration time constant	1-10000ms	100
PA42	S-type acceleration/deceleration time constant	0-1000ms	0
PA43	Analog speed command input gain	10-3000r/min/v	300
PA44	Reverse the direction	0-1	0

	of the analog speed command		
PA45	Analog speed command zero offset compensation	-5000-5000	0
PA46	Analog speed command filter	1-300Hz	300
PA75	Zero speed detection point	0-1000r/min	10
PA76	Speed consistent setting value	0-1000r/min	10
PA87	Arrival speed hysteresis	0-5000r/min	30
PA88	Arrival velocity polarity	0-1	0
PA92	Zero speed detection hysteresis	0-1000r/min	5

5.3 Torque control mode

5.3.1 Description of torque mode

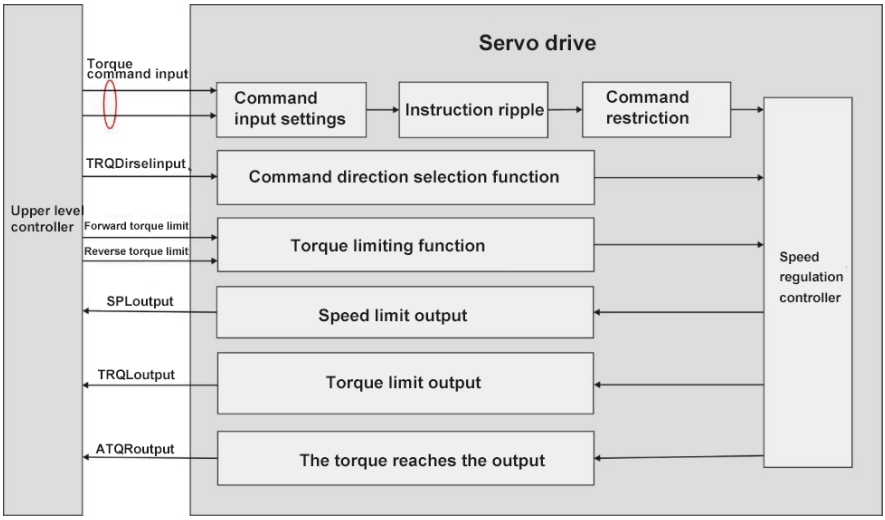


Figure 5.5 Torque control mode block diagram

The main steps of using torque mode are as follows:

1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After power-on, the servo panel displays " r 0 ", which means that the servo power supply and encoder wiring are correct.

2) Press the button to perform the servo JOG test run to confirm whether the motor can run normally.

3) Refer to Figure 5.6 for wiring instructions to connect the required DI/DO signals in the CN1 terminal, such as servo enable, alarm clear, positioning completion signal, etc.

4) Set the torque mode related settings. Set the DI/DO used according to the actual situation.

5) Servo enable, control the rotation of the servo motor through the position command issued by the host computer. First, rotate the motor at low speed, and confirm whether the rotation direction and electronic gear ratio are normal, and then adjust the gain.

5.3.2 Torque Mode Wiring

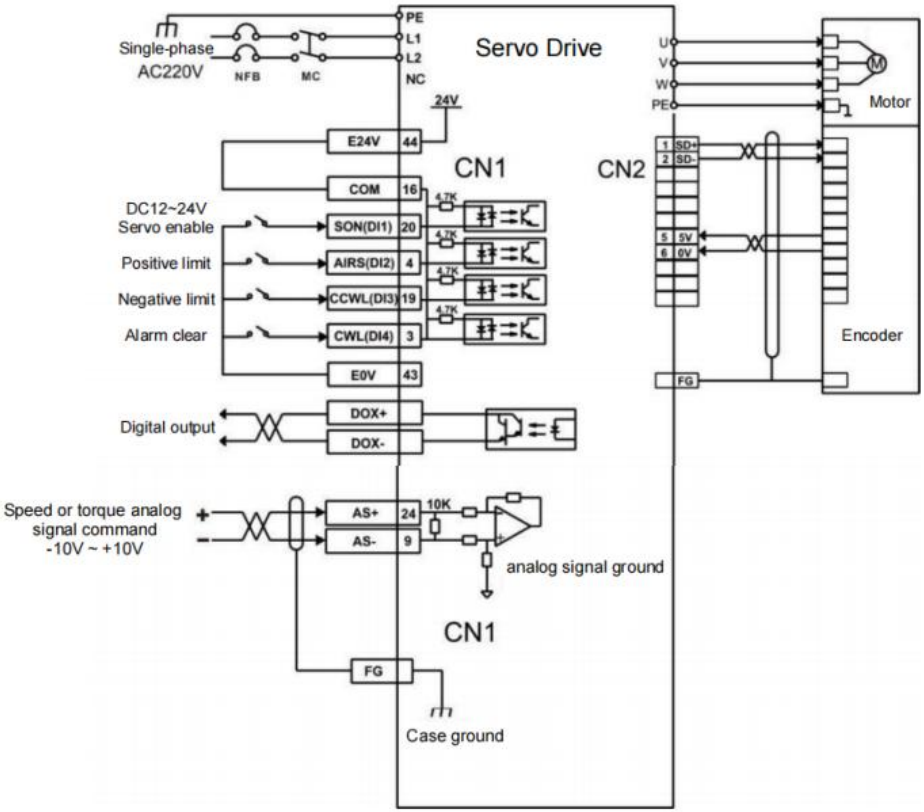


Figure 5.6 Torque Mode Wiring Diagram

5.3.3 Parameters to be adjusted in speed control mode

- **Torque control mode needs to adjust parameters**

Required parameters	Parameter Description	parameter value	Factory default
PA4	Control method selection	2	0
PA29	Analog torque command input gain	Set as needed	30
PA32	Internal and external torque command selection	0-2	0
PA33	Reverse the input direction of the analog torque command	0	0
PA39	Analog torque command zero offset compensation	0	0
PA50	Speed limit during torque control	Set as needed	Rated speed
PA64	Internal torque 1	-300-300	0
PA65	Internal torque 2	-300-300	0
PA66	Internal torque 3	-300-300	0
PA67	Internal torque 4	-300-300	0
PA83	Prohibited way	0-1	0
PA89	Arrival torque	-300%-300%	100
PA90	Reaching torque hysteresis	0%-300%	5
PA91	Arrival torque polarity	0-1	0

5.4 Origin return function and related parameter description

5.4.1 Related setting parameters

Required parameters	Parameter Description	parameter value	Factory default
P4-32	Type of origin detector and setting of search direction	0-5	0
P4-33	Short-distance movement method setting to reach the origin	0-2	0
P4-34	Origin trigger start mode	0-2	0
P4-35	Origin stop mode setting	0-1	0
P4-36	The first stage of high-speed origin return speed setting	1-2000r/min	1000
P4-37	The second stage of low-speed origin return speed setting	1-500r/min	50
P4-38	Origin return offset circles	+/-30000	0
P4-39	Origin return offset pulse number	+/-max cnt	0

5.4.2 Description of origin return mode (must be used in internal position mode)

A. Origin trigger start mode (P4-34)

The origin trigger start mode is divided into two categories: automatic execution of origin return function and contact trigger origin return function:

P4-34 =0: Turn off the origin return function. When P4-34 is set to 0, no matter what other setting values are, the origin return function cannot be activated.

P4-34 =1: Automatically execute the origin return function when the power is turned on. This function is only valid for one time when the power supply and servo start are turned on, that is, it is used under the working conditions that the return to the origin does not need to be repeated during the servo operation. Use this function to omit an input contact for performing home return.

P4-34 =2: The origin return function is triggered by the SHOM input contact. When setting this function, any register in the input pin function planning register (P3-0~P3-3) must be set as the SHOM trigger origin input function. During the servo operation, the SHOM contact can be triggered at any time, and the origin return function can be executed.

B. Type of origin detector and setting of search direction (P4-32)

The origin detector can use the left limit or right limit switch as the origin reference point, or additional detectors (such as proximity or shutter switches) can be used as the origin reference point. When the servo motor only moves within one revolution, the Z pulse can also be set as the origin reference point.

P4-32 =0: Find the origin in the forward direction, and take the CCWL limit input point as the rough reference point of the origin. When the origin positioning is completed, the CCWL will switch to the limit input function. Subsequent retriggering will generate a limit warning. When using the limit input point as the rough reference point of the origin, it is recommended to set the Z pulse (P4-33 = 0) to return to find the precise mechanical origin.

P4-32 =1: Reverse the direction to find the origin, and take the CWL limit input point as the rough reference point of the origin. When the origin positioning is completed, CWL turns to the limit input function. The subsequent retriggering will generate a limit warning. When using the limit input point as the rough reference

point of the origin, it is recommended to set the return to find Z pulse (P4-33 =0) as the precise mechanical origin.

P4-32 = 2: search for the origin in the forward rotation direction, and take ORGP (input point of external detector) as the reference point of the origin. At this time, the precise mechanical origin can be set to return to search (P4-33 = 0) or not to return to search (P4-33 =1) Z-phase pulse. When the Z-phase pulse is not used as the machine origin, the positive edge of ORGP can also be set as the machine origin (P4-33 =2).

P4-32 =3: Reverse the direction to find the origin, and take ORGP (external detector input point) as the reference point of the origin. At this time, the precise mechanical origin can be set as the Z-phase pulse for returning to search (P4-33 =0) or not to return to search (P4-33 =1). When the Z-phase pulse is not used as the machine origin, the positive edge of ORGP can also be set as the machine origin (P4-33 =2).

P4-32 = 4: Directly search for the zero point of the single-turn absolute position in the forward rotation direction. This function is usually used for the motion control of the servo motor with only one rotation range. At this time, no external detection switch is required.

P4-32 = 5: Directly search for the zero point of the single-turn absolute position in the reverse direction. This function is usually used for the motion control of the servo motor only in one rotation range. At this time, no external detection switch is required.

C. Setting of the short-distance movement method to reach the origin (P4-33)

P4-33=0: After finding the reference origin, the motor turns back and searches for the nearest single-turn absolute position zero point as the mechanical origin at the second speed.

P4-33=1: After finding the reference origin, the motor turns to the second speed and continues to move forward to find the nearest single-turn absolute position zero point as the mechanical origin.

P4-33=2: find the rising edge of the detector ORGP as the machine origin and stop according to deceleration, applicable to the setting of P4-32 value 2 and 3; or find the zero point of the absolute position of a single circle and stop according to

deceleration , applicable to the setting of P4-32 value 4 and 5.

D. Origin stop mode setting (P4-35)

P4-35=0: After the origin detection is completed, the motor decelerates and pulls back to the origin. After the origin detection signal is obtained during the second-stage speed operation, the motor decelerates and stops. After stopping, move to the machine origin position at the second speed.

P4-35=1: After the origin detection is completed, the motor decelerates and stops according to the forward direction. After the origin detection signal is obtained during the second-stage speed operation, the motor decelerates and stops. The position overrun amount after stop is no longer corrected, and the machine origin position will not change due to the difference of the position overrun amount.

5.5 Check before operation

Please first disengage the load connected to the servo motor, the coupling connected to the servo motor shaft and its related accessories. Ensure that the servo motor can work normally without load, and then connect the load to avoid unnecessary danger.

- Before running please check and make sure:

1) There is no obvious damage to the appearance of the servo drive;
2) The wiring terminals have been insulated;
3) There are no conductive objects or flammable objects such as screws or metal sheets inside the driver, and there are no conductive foreign objects at the wiring ports;
4) Servo drives or external braking resistors are not placed on combustible objects;
5) Wiring is completed and wired correctly.

- The driver power supply, auxiliary power supply, grounding terminal, etc. are correctly wired; all control signal cables are wired correctly; all limit switches and protection signals are wired correctly.

1) The enable switch has been placed in the OFF state;
2) Cut off the power circuit and the emergency stop alarm circuit to keep the channel;
3) The applied voltage reference of the servo drive is correct.

- Power on the servo drive when the controller does not send a running command signal. Check and guarantee:

1) The servo motor can rotate normally without vibration or excessive running sound;
2) All parameters are set correctly. Unexpected actions may occur according to different mechanical characteristics. Do not set extreme parameters excessively;
3) There is no abnormality in the bus voltage indicator and digital tube display.

6. Operation and display interface

6.1 Driver panel description

6.1.1 Panel Composition

The panel consists of 5 LED digital tube displays and 4 keys ▲, ▼, ◄, SET keys, which are used to display various states of the system and set parameters. Operations are hierarchical operations, which are expanded layer by layer from the main menu.

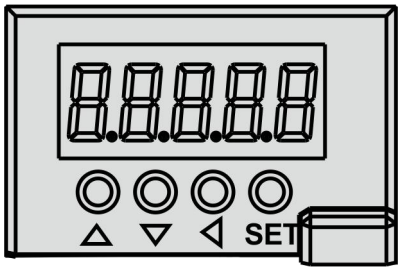


Figure 6.1 Driver panel display interface

6.1.2 Key Description

symbol	name	Function
▲	add key	Increase the serial number or value; long press has repeat effect
▼	Decrease key	Decrease number or value; long press has repeat effect
◄	Escape key	Menu exit; operation canceled
SET	Enter	Operation confirmation

6.2 Main Menu

The first layer is the main menu, and there are 8 operation modes . Press ▲, ▼to change the mode, press the SET button to enter the second layer, perform specific operations, and press the button to return to the main menu from the second layer.◄

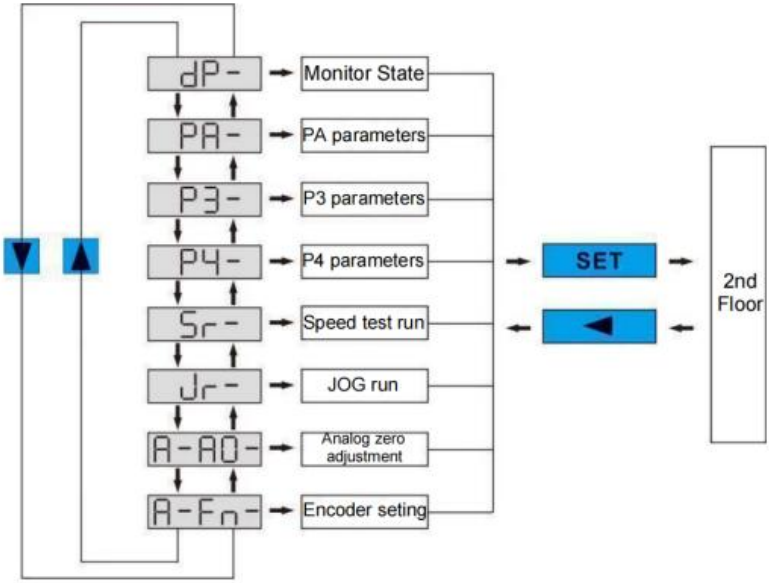


Figure 6.2 Main menu operation block diagram

6.3 Parameter setting process

The parameter is represented by parameter segment + parameter number, the hundreds digit is the segment number, and the tens and one digits are the parameter number. For example, the parameter PA53, the segment number is "PA", the parameter number is "53", and the display shows "PA-53".

Select the parameter setting "P-" in the main menu, and press the SET key to enter the parameter setting mode. First, use ▲ the and ▼ keys to select the parameter section. After selecting, press the SET key to enter the parameter number selection of this section. Next, use ▲ the and ▼ keys to select the parameter number. After selecting, press the SET key to display the parameter value.

Use ▲the and ▼keys to modify the parameter value. Press the ▲or ▼key once, the parameter increases or decreases by 1, press and hold ▲ or ▼, the parameter can increase or decrease continuously. When the parameter value is modified, press the SET key, the decimal point of the LED digital tube on the far right lights up and flashes twice, that is, the modification is completed, and the modified value will be reflected in the control immediately (some parameters need to be saved and then powered on again to take effect.).

6.4 Monitoring Status Contents

The first layer is used to select the operation mode. There are 7 modes in total. Use ▲the and ▼keys to change the mode, press the SET key to enter the second layer of the selected mode, and press the key to return to the first layer from the second layer.◀

dp-- " in the first layer , and press SET key to enter monitoring mode. There are 25 kinds of display states in total, the user ▲selects the desired display mode with the and keys, and then presses the SET ▼key to enter the specific display state.

Monitoring method	operate	Monitoring example	illustrate
P-SPd		r 1000	Motor speed 1000r/min
P-PoS		04580	Current location 124580
P-PoS.		P. 12	
P-CPo		C4581	Location Command 124581
P-CPo.		C. 12	
P-EPo		E 4	Position deviation 4 pulses
P-EPo.		E. 0	
P-tr9		t 0.70	Motor torque 70%
P- I		I 2.3	Motor current 2.3A
P-Cnt	SET	Cnt 0	Current control mode 0: position control mode
P- CS		r. 500	In speed mode, the corresponding speed of analog input is 500 r/min.
P- Ct		t 0.50	The torque corresponding to the analog input in torque mode is 50 %.
P-APo		A3265	Rotor absolute position 3265.
P-APo.		A. 0	
P- In		n ıııı	input terminal
P-oUt		oUt.ııı	output terminal
P-UdC		UC336	Bus voltage 336V
P-Err		Err 4	Alarm No. 4

Monitoring method	operate	Monitoring example	illustrate
P- rL		rL-on	Relay open state
		rL.-oF	Relay off state
		rL-Er	Relay alarm status
P- rn		rn - on	The main circuit operates normally
		rn.-oF	The main circuit is not charged
		rn-CH	The main circuit is charged but the servo is not enabled
		rn-Er	Main circuit alarm
P- US		U-on	Bus voltage is normal
		U-.LoU	Bus voltage too low
		U-Err	There is an alarm
P- AS		43210	Motor absolute position 876543210
P- AS.		A.8765	

6.5 Analog Zero Adjustment

After using this operation, the drive will automatically detect the analog zero offset and write the zero offset value into parameter PA39 (or PA45). This operation already saves the zero offset parameters to the EEPROM, so there is no need to perform a parameter write operation.

First select the analog zero adjustment "A-A0", and press the **SET** key to enter. Then ▲, ▼select speed analog zero adjustment "A-SPd" or torque analog zero adjustment "A-Trq", after selecting the operation, press and hold the **SET** button for more than 3 seconds, and activate the operation after " donE " is displayed. After finishing, you can press the button again to return to the menu selection state.◀

6.6 Encoder selection

Select "F-res" to reset the encoder and set the multi-turn information of the encoder to zero. By setting the parameter value of P3-36, the single-turn information can be cleared to achieve the purpose of setting the origin; select "F-res" clr”, to clear the alarm operation of the encoder, the No. 53 alarm caused by the power failure of the battery can be cleared through this operation. After selecting the operation, press and hold the SET button for more than 3 seconds, and after displaying "donE", activate the operation. After finishing, you can press the button again to return to the menu selection state.◄

6.7 Parameter default value restoration

In the following situations, please use the function of restoring default parameters (factory parameters):

•The parameters are messed up and the system cannot work normally.

The steps to restore default parameters are as follows:

1. Check whether the motor code (parameter PA1) is correct.
2. Change the password (PA0) to 385.
3. Enter the parameter management and perform the following operations:

All parameters are restored to their default values, and parameters modified by the user are also restored to their factory default values. ◄Press the key to return to the main menu, use ▲and ▼select the "PA-" mode, press the SET key to enter the second layer operation interface, then press again ▲to ▼make PA=0, then press the **SET** key to enter the third layer interface, and set PA0 to The value is 385, press the **SET** key to save. Next, press the key to return to the "PA-" interface, set PA1 to DEF-, and press and hold the ◄**SET** key for 5 seconds. After the LED indicator flashes several times, the default parameters are saved. The last power-on is valid.

7. Parameter function description

7.1 PA Group Parameters

serial number	name	Function	parameter range	Factory default
0	password	1. The user password is 315. 2. Model code is 385.	0-9999	315
1	model code	This parameter is read-only and cannot be modified. The driver automatically recognizes the motor model, no need to select.	40-80	See Table 7-1
2	software Version	The software version number can be viewed, but not modified.		

Table 7-1

driver	ASD240	ASD275
motor	40SS05	80SS40
	40SS10	80SS75
	60SS20	80SS100
	60SS40	--
	60SS60	--
	80SS40	--

serial number	name	Function	parameter range	Factory default
3	initial Display state	0: Display the motor speed; 1: Display the lower 5 digits of the current position; 2: Display the current position high 5 digits; 3: Display the lower 5 digits of the position command (command pulse accumulation); 4: Display the upper 5 digits of the position command (command pulse accumulation); 5: Display position deviation is 5 lower; 6: Display position deviation is 5 digits higher; 7: Display motor torque; 8: Display the motor current; 9: Current control mode; 10: Display the current temperature; 11: Display speed command; 12: Display torque command; 13: The absolute position of the rotor during one revolution is displayed by 5 lower digits; 14: Display the absolute position of the rotor in one revolution by 5 digits higher; 15: Display the input terminal status;	0-25	0

		16: Display the output terminal status; 17: Display encoder input signal; 18: Display the bus voltage value of the main circuit; 19: Display the alarm code; 20: Display the version number of the logic chip; 21: Display the relay pull-in state; 22: Display running status; 23: Display external voltage status; 24: Display the absolute value position lower 5 bits; 25: Display the absolute value position 5 bits higher.		
serial number	name	Function	parameter range	Factory default
4	control way to choose	This parameter can be used to set the control mode of the drive: 0: Position control mode; 1: Speed control mode; 2: Torque control mode; 3: Position-speed hybrid control	0-6	0

		mode; 4: Position torque hybrid control mode; 5: Speed-torque hybrid control mode; 6: Encoder zero adjustment mode.		
5	speed Proportional gain	1. Set the proportional gain of the speed loop regulator. 2. The larger the setting value, the higher the gain and the greater the stiffness. The parameter values are determined according to the specific servo drive system model and load conditions. In general, the larger the load inertia, the larger the set value. 3. Under the condition that the system does not oscillate, set it as large as possible.	5-2000 Hz	150
6	speed Integration constant	1. Set the integral time constant of the speed loop regulator. 2. The smaller the setting value is, the faster the integration speed is, and the stronger the system resists deviation, that is, the greater the stiffness, but it is easy to cause overshoot if it is too small.	1-1000 ms	75
7	torque filter	1. Set the torque command filter characteristics. 2. Used to suppress resonance caused by torque. 3. The smaller the value, the lower the cut-off frequency and the smaller the vibration and noise generated by the	20-500%	100

		motor. If the load inertia is very large, the set value can be appropriately reduced. If the value is too small, the response will be slow, which may cause oscillation. 4. The larger the value, the higher the cut-off frequency and the faster the response. If a higher torque response is required, the set value can be appropriately increased.		
8	Speed detection filter	1. Set the speed detection filter characteristics. 2. The smaller the value, the lower the cut-off frequency and the smaller the noise generated by the motor. If the load inertia is very large, the set value can be appropriately reduced. If the value is too small, the response will be slow, which may cause oscillation. 3. The larger the value, the higher the cutoff frequency and the faster the speed feedback response. If a higher speed response is required, the setting value can be appropriately increased.	20-500%	100
serial number	name	Function	parameter range	Factory default
9	Location Proportional gain	1. Set the proportional gain of the position loop regulator. 2. The larger the setting value, the higher the gain and the greater the stiffness. Under the condition of the	1-1000	80

		same frequency command pulse, the position lag will be smaller. However, if the value is too large, it may cause oscillation. 3. The parameter values are determined according to the specific servo drive system model and load conditions.		
11	The number of command pulses per motor revolution	1. Set the number of command pulses equivalent to one rotation of the motor. 2. When the setting value is 0, PA-12 (position command pulse frequency division numerator) and PA-13 (position command pulse frequency division denominator) are valid.	0-30000	10000
12	Position command pulse electronic gear first numerator	1. Set the division and multiplication frequency of the position command pulse (electronic gear). 2. In the position control mode, by setting the parameters of PA12 and PA13, it can be easily matched with various pulse sources to achieve the user's ideal control resolution (ie angle/pulse). 3. P×G=N×C×4. P: Number of pulses of the input command; G: Electronic gear ratio; G=Frequency division numerator/Frequency division denominator N: The number of	0-32767	0

<table>
<tr>
<td></td>
<td></td>
<td>revolutions of the motor; C: The number of lines/revolution of the photoelectric encoder, the system C=2500.
4. For example, when the input command pulse is 6000, the servo motor rotates once G=(N×C×4)/P=(1×2500×4)/6000=5/3
Then parameter PA12 is set to 5, and PA13 is set to 3.
5. The numerator of the command pulse electronic gear is determined by
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">Command pulse electronic gear denominator</th></tr>
<tr><th>Gear 2</th><th>Gear 1</th></tr>
<tr><td>0</td><td>0</td><td>The first molecule (parameter PA12)</td></tr>
<tr><td>0</td><td>1</td><td>Second numerator (parameter PA 77)</td></tr>
<tr><td>1</td><td>0</td><td>The third molecule (parameter PA 78)</td></tr>
<tr><td>1</td><td>1</td><td>Fourth numerator (parameter PA 79)</td></tr>
</table>
Gear1 and Gear2. The denominator is set by parameter PA13. The combination is as follows:
Note: 0 means OFF, 1 means ON.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Position command pulse electro</td>
<td>See parameter PA12.</td>
<td>1-32767</td>
<td>10000</td>
</tr>
</table>

	nic gear denomi nator			
serial number	name	Function	paramet er range	Factory default
14	Positio n comma nd pulse input Way	1. Set the input form of the position command pulse. 2. Set the parameter to one of the 3 input methods: 0: pulse + direction; 1: CCW pulse/CW pulse; 2: A, B two-phase quadrature pulse input; 3: Internal position input. Note: CCW is viewed from the axial direction of the servo motor, and it rotates counterclockwise, which is defined as forward; CW is viewed from the axial direction of the servo motor, and rotates clockwise, which is defined as reverse.	0-3	0
15	Comm and pulse directio n inversi on	Set as: 0: normal; 1: The direction of the position command pulse is reversed.	0-1	0
16	Positio ning comple te	1. Set the positioning completion pulse range under position control. 2. This parameter provides the basis for the drive to judge whether the	0-30000 pulses	130

	range	positioning is completed in the position control mode. When the number of remaining pulses in the position deviation counter is less than or equal to the set value of this parameter, the COIN (positioning completion) of the digital output DO is ON, otherwise it is OFF. 3. The comparator has hysteresis function. Set by parameter PA84.		
17	Position out-of-tolerance detection	1. Set the detection range of position out-of-tolerance alarm. 2. In the position control mode, when the value of the position deviation counter exceeds the value of this parameter, the drive will give a position alarm.	0-30000 ×100 pulse	6000
18	Position out of tolerance error is invalid	Set as: 0: Position out-of-tolerance alarm detection is valid; 1: The position out-of-tolerance alarm detection is invalid, and the detection of position out-of-tolerance errors is stopped.	0-1	0

serial number	name	Function	parameter range	Factory default
19	Position command smoothing filter	1. The command pulse is smoothed and filtered, with exponential acceleration and deceleration, and the numerical value represents the time constant. 2. The filter will not lose input pulses, but there will be a command delay phenomenon. 3. This filter is used to: (1) The host controller has no acceleration and deceleration function; (2) The frequency division and multiplication of the electronic gear is relatively large (>10); (3) The command frequency is low. 4. When the motor is running, the step jumps and the instability occurs. 5. When set to 0, the filter has no effect.	0-1000×0.1ms	100
20	Drive inhibit input is invalid	Set as: 0: CCW, CW input disable is valid. When the CCW drive prohibit switch (FSTP) is ON, the CCW drive is allowed; when the CCW drive prohibit switch (FSTP) is OFF, the CCW direction torque remains at 0; the same is true for CW. If both CCW and CW drive prohibition are OFF, a drive prohibition input error alarm	0-1	1

<table>
<tr><td></td><td></td><td>will be generated;
1: Cancel CCW, CW input prohibition. Regardless of the state of the CCW and CW drive prohibition switches, CCW and CW drive are allowed. At the same time, if both CCW and CW drive prohibition are OFF, the drive prohibition input error alarm will not be generated.</td><td></td><td></td></tr>
<tr><td>twenty one</td><td>JOG running speed</td><td>Sets the running speed of the JOG operation.</td><td>0-6000 r/min</td><td>100</td></tr>
<tr><td>twenty two</td><td>Source of speed command</td><td>During speed control, set the source of the speed command. The meaning of the parameters:
0: The analog speed command is input from the analog ports AS+ and AS-;
1: Internal speed command, determined by SP1 and SP2 of DI input:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">speed command</th></tr>
<tr><th>SP2</th><th>SP1</th></tr>
<tr><td>0</td><td>0</td><td>Internal speed 1 (parameter PA24)</td></tr>
<tr><td>0</td><td>1</td><td>Internal speed 2 (parameter PA25)</td></tr>
<tr><td>1</td><td>0</td><td>Internal speed 3 (parameter PA26)</td></tr>
<tr><td>1</td><td>1</td><td>Internal speed 4</td></tr>
</table></td><td>0-5</td><td>0</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>
<table>
<tr><td></td><td></td><td>(parameter PA27)</td></tr>
</table>
2: Analog speed command + internal speed command:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">speed command</th></tr>
<tr><th>SP2</th><th>SP1</th></tr>
<tr><td>0</td><td>0</td><td>Analog speed command</td></tr>
<tr><td>0</td><td>1</td><td>Internal speed 2 (parameter PA25)</td></tr>
<tr><td>1</td><td>0</td><td>Internal speed 3 (parameter PA26)</td></tr>
<tr><td>1</td><td>1</td><td>Internal speed 4 (parameter PA27)</td></tr>
</table>
Note: 0 means OFF, 1 means ON.
3: JOG speed command, when performing jog (JOG) operation, Setup is required.
4: Keyboard speed command, when performing keyboard speed regulation (Sr) operation,
Setup is required.
5: The IO terminal controls the jog operation.
</td>
<td></td>
<td></td>
</tr>
<tr>
<td>twenty three</td>
<td>top speed limit</td>
<td>Set the maximum speed limit of the servo motor.
1. Regardless of the direction of rotation.
2. If the set value exceeds the rated speed, the actual maximum speed limit is the rated speed.</td>
<td>0-6000r/ min</td>
<td>5000</td>
</tr>
<tr>
<td>twenty</td>
<td>internal</td>
<td>1. Set internal speed 1.</td>
<td>-6000-</td>
<td>100</td>
</tr>
</table>

<table>
<tr><td>four</td><td>speed 1</td><td>2. Speed control mode (PA22=0), when SP1 is OFF,
When SP2 is OFF, select internal speed 1 as the speed command.</td><td>6000 r/min</td><td></td></tr>
<tr><td>25</td><td>internal speed 2</td><td>1. Set internal speed 2.
2. In speed control mode (PA22=0), when SP1 is ON and SP2 is OFF, select internal speed 2 as the speed finger.</td><td>-6000-6000 r/min</td><td>500</td></tr>
<tr><td>26</td><td>internal speed 3</td><td>1. Set internal speed 3.
2. In speed control mode (PA22=0), when SP1 is OFF and SP2 is ON, select internal speed 3 as the speed command.</td><td>-6000-6000 r/min</td><td>1000</td></tr>
<tr><td>27</td><td>internal speed 4</td><td>1. Set internal speed 4.
2. In speed control mode (PA22=0), when SC1 is ON, SC2 is ON, select internal speed 4 as speed command.</td><td>-6000-6000 r/min</td><td>2000</td></tr>
<tr><td>28</td><td>arrive speed</td><td>1. When the motor speed exceeds this parameter, the ASP of the digital output DO (speed reached) ON, otherwise OFF.
2. The comparator has a hysteresis function, which is set by parameter PA87.
3. With polarity setting function:
<table>
<tr><th>PA88</th><th>PA28</th><th>Comparators</th></tr>
<tr><td>0</td><td>>0</td><td>speed regardles direction</td></tr>
<tr><td rowspan="2">1</td><td>>0</td><td>Only detect forward speed</td></tr>
<tr><td><0</td><td>Only detect reve</td></tr>
</table></td><td>0-3000 r/min</td><td>3000</td></tr>
</table>

		speed		
29	Analog torque command input gain	1. Set the proportional relationship between the analog torque input voltage and the actual running torque of the motor. 2. The unit of the set value is 0.1v/100%. 3. The default value is 30, corresponding to 3v/100%, that is, inputting 3v voltage produces 100% of the rated torque.	10-100 (0.1v/ 100%)	30
30	User torque overload alarm value	1. Set the user torque overload value, which is a percentage of the rated torque. The torque limit value is not divided into directions, and both forward and reverse directions are protected. 2. In the case of PA31>9, when the motor torque>PA30 and the duration>PA31, the drive will alarm, the alarm number is Err-29, and the motor will stop. After the alarm occurs, the drive must be powered on again to clear the alarm.	1-300	300
31	User torque overload alarm detection time	1. User torque overload detection time, in milliseconds. 2. When set to zero, the user torque overload alarm has no effect.	0-32767	0
32	Torque command	During torque control, set the source of torque command: 0: Analog torque command, input	0-1	0

<table>
<tr>
<td></td>
<td>source</td>
<td>from analog ports AS+ and AS-.
1: Internal torque command, determined by TRQ1 and TRQ2 input by DI:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">Torque comman</th></tr>
<tr><th>TRQ2</th><th>TRQ1</th></tr>
<tr><td>0</td><td>0</td><td>Internal torque (parameter PA64</td></tr>
<tr><td>0</td><td>1</td><td>Internal torque (parameter PA65</td></tr>
<tr><td>1</td><td>0</td><td>Internal torque (parameter PA66</td></tr>
<tr><td>1</td><td>1</td><td>Internal torque (parameter PA67</td></tr>
</table>
2: Analog torque command + internal torque command:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">Torque comman</th></tr>
<tr><th>TRQ2</th><th>TRQ1</th></tr>
<tr><td>0</td><td>0</td><td>Analog torque command</td></tr>
<tr><td>0</td><td>1</td><td>Internal torque 2 (parameter PA65)</td></tr>
<tr><td>1</td><td>0</td><td>Internal torque 3 (parameter PA66)</td></tr>
<tr><td>1</td><td>1</td><td>Internal torque 4 (parameter PA67)</td></tr>
</table>
Note: 0 means OFF, 1 means ON.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Analog torque command input directio</td>
<td>Invert the polarity of the analog torque input.</td>
<td>0-1</td>
<td>0</td>
</tr>
</table>

	n Negate			
34	Internal CCW torque limit	1. The setting value is the percentage of the rated torque. For example, if it is set to 2 times the rated torque, the setting value is 200. 2. This restriction is in effect at all times. 3. If the set value exceeds the maximum allowable overload capacity of the system, the actual torque is limited to the maximum allowable overload capacity of the system.	0-300%	300
35	Internal CW torque limit	1. The setting value is the percentage of the rated torque. For example, if it is set to 2 times of the rated torque, the setting value is -200. 2. This restriction is in effect at all times. 3. If the set value exceeds the maximum allowable overload capacity of the system, the actual torque is limited to the maximum allowable overload capacity of the system.	-300-0%	-300
36	External CCW torque limit	1. The setting value is the percentage of the rated torque. For example, if it is set to 1 times the rated torque, the setting value is	0-300%	100

		100. 2. This limit is valid only when the CCW torque limit input terminal (CCWL) is ON. 3. When the limit is valid, the actual torque limit is the minimum value among the maximum overload capacity allowed by the system, the internal CCW torque limit and the external CCW torque limit.		
37	External CW moment limit	Set the external torque limit value in the CW direction of the servo motor. 1. The setting value is the percentage of the rated torque. For example, if it is set to 1 times the rated torque, the setting value is -100. 2. This limit is valid only when the CW torque limit input terminal (CWL) is ON. 3. When the limit is valid, the actual torque limit is the minimum of the absolute values of the maximum overload capacity allowed by the system, the internal CW torque limit, and the external CW torque limit.	-300-0%	-100
serial number	name	Function	parameter range	Factory default
38	temperature Alarm value	Set the drive temperature to the upper limit alarm value.	200-1350	

39	Analog torque command zero offset compensation	Zero offset compensation for analog torque input.	-2000-2000	0
40	Acceleration time constant	The set value is the acceleration time of the motor from 0-1000r/min. 1. The acceleration/deceleration characteristic is linear. 2. Only used for speed control and internal position control, other control methods are invalid.	1-10000 ms	100
41	Deceleration time constant	The set value is the deceleration time of the motor from 1000-0r/min. 1. The acceleration/deceleration characteristic is linear. 2. Only used for speed control and internal position control, other control methods are invalid.	1-10000 ms	100
42	S-type acceleration and deceleration time constant	Make the motor start and stop smoothly, and set the part time of the S-shaped acceleration and deceleration curve.	0-1000 ms	0
43	Analog		10-3000	300

	speed command input gain	Set the proportional relationship between the analog speed input voltage and the actual running speed of the motor.	r/min/v	
44	Reverse the direction of the analog speed command	Invert the polarity of the analog speed input. 1. When set to 0, the analog speed command is positive and the speed direction is CCW. 2. When set to 1, the analog speed command is positive and the speed direction is CW.	0-1	0
45	Analog speed command zero offset compensation	Zero offset compensation for analog speed input.	-5000-5000	0
serial number	name	Function	parameter range	Factory default
46	Analog speed command filter	1. Low-pass filter for analog speed input. 2. The larger the setting, the faster the response speed to the speed input analog, the greater the influence of signal noise, the smaller the setting, the slower the response	1-1000 Hz	300

		speed, the smaller the influence of signal noise.		
47	Mechanical brake action setting when the motor stops	1. Define the delay time from the action of the mechanical brake (the output terminal BRK changes from ON to OFF) to the cut-off of the motor current during the motor stop. 2. This parameter should not be less than the delay time (Tb) of the mechanical brake, in order to avoid the slight displacement of the motor or the work drop.	0-200×10ms	0
48	Mechanical brake action setting when the motor is running	1. Define the delay time from the motor current cut off to the mechanical braking action (the output terminal BRK changes from ON to OFF) during the motor stop. 2. This parameter is used to make the mechanical brake act after the motor decelerates from the rotating state to a low speed to avoid damage to the brake. 3. The actual action time is the time required for PA48 or the motor to decelerate to the value of PA49, whichever is the smallest.	0-200×10ms	50
49	Mechanical brake	1. Define the speed value from the cutoff of the motor current to the action of the mechanical brake (the	0-3000 r/min	100

	action speed when the motor is running	output terminal BRK changes from ON to OFF) during the motor operation. 2. The actual action time is the time required for PA48 or the motor to decelerate to the value of PA49, whichever is the smallest.		
50	Speed during torque control limit	1. During torque control, the motor running speed is limited within this parameter. 2. It can prevent the phenomenon of overspeed at light load.	0-5000 r/min	3000
53	Servo forced enable	Set as: 0: The enable signal is controlled by the SON input of DI; 1: Software forced enable.	0-1	0
54	Servo enable delay off time	Defines the time to delay cutting off the motor current after the servo enable signal is turned off.	0-30000 ms	0

serial number	name	Function	parameter range	Factory default
55	Input terminal effective level control word	1. Set the input terminal inversion. The non-reversed terminal is valid when the switch is closed and invalid when the switch is off; the reversed terminal is invalid when the switch is closed and valid when the switch is off.	0000-1111	0000

<table>
<tr><td></td><td></td><td>2. It is represented by a 4-bit binary number. When this bit is 0, it means that the output terminal represented by it is not reversed, and 1 means that the output terminal represented by it is reversed.
The input terminals represented by binary numbers are as follows:<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr></table>0: Active high level;
1: Active low level.</td><td></td><td></td></tr>
<tr><td>57</td><td>Output terminal effective level control word</td><td>1. Set the output terminal to be reversed. For the reversed terminal, the definition of on and off is just the opposite of the standard definition.
2. Represented by a 4-bit binary number, the output terminal represented by 0 is not inverted, and the output terminal represented by 1 is inverted.
The input terminals represented by binary numbers are as follows:<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>DO4</td><td>DO3</td><td>DO2</td><td>DO1</td></tr></table>0: Active high level;
1: Active low level.</td><td>0000-1111</td><td>0000</td></tr>
<tr><td>58</td><td>IO input terminal</td><td>1. Debounce filter time for input terminals.
2. The smaller the value, the faster the terminal input response.</td><td>1-20ms</td><td>2</td></tr>
</table>

	debounce time constant	3. The larger the value, the better the anti-interference performance of the terminal input, but the slower the response.		
59	command pulse valid edge	Set as: 0: The rising edge of the pulse is valid; 1: The falling edge of the pulse is valid.	0-1	0
60	soft reset	0: Soft reset is invalid; 1: Soft reset is valid, the system will restart.	0-1	0
61	System alarm clear	Set as: 0: System alarm clearing is invalid; 1: The system alarm clearing is valid.	0-1	0

serial number	name	Function	parameter range	Factory default
62	Encoder selection	4: Single-turn absolute encoder; 5: Multi-turn absolute encoder.	4-5	determined by the motor
63	Load inertia ratio	1. Set the load inertia ratio of the corresponding motor rotational inertia. 2. The set value is: =((Load inertia + Moment of inertia)/Moment of inertia)×100.	1-500	100
64	Internal torque 1	In torque control mode (PA4=2), when TRQ1 is OFF When TRQ2 is OFF, select internal torque 1 as the torque command.	-300-300	0
65	Internal	In torque control mode (PA4=2), when TRQ1 is ON	-300-300	0

	torque 2	When TRQ2 is OFF, select internal torque 2 as the torque command.		
66	Internal torque 3	In torque control mode (PA4=2), when TRQ1 is OFF When TRQ2 is ON, internal torque 3 is selected as the torque command.	-300-300	0
67	Internal torque 4	In torque control mode (PA4=2), when TRQ1 is ON When TRQ2 is ON, internal torque 3 is selected as the torque command.	-300-300	0
71	MODBUS slave address	MODBUS communication slave address value.	1-254	1
72	MODBUS communication baud rate	MODBUS communication baud rate.	48-1152×100	96
73	MODBUS communication protocol selection	Set as: 0: 8, N, 2 (MODBUS, RTU); 1: 8, E, 1 (MODBUS, RTU); 2: 8, O, 1 (MODBUS, RTU); 3: 8, N, 1 (MODBUS, RTU). This parameter determines the communication protocol. The number 8 indicates that the transmitted data bits are 8 bits; the English letters N, E, and O represent parity:	0-3	0

		N: Indicates that this bit is not used; E: means 1 even bit; O: Indicates 1 odd bit. The number 1 or 2 means that the communication bit is 1 or 2 bits.		
74	Communication error handling	When the communication signal is wrong, select: 0: continue to run; 1: Alarm and stop operation.	0-1	0
75	Zero speed detection point	1. When the motor speed is lower than this parameter, ZSP (zero speed) of digital output DO is ON, otherwise it is OFF. 2. When ZCLAMP of digital input DI is ON, when the speed command value is lower than this value, the speed command value is forced to zero.	0-1000 r/min	10
76	same speed Settings	When the difference between the actual speed and the command speed is less than this setting, the UCO2N (speed consistent) of the digital output DO is ON, otherwise it is OFF.	0-1000 r/min	10
77	Position command pulse electronic	See parameter PA12 for details.	0-32767	0

	gear ratio second molecule			
78	Position command pulse electronic gear ratio third molecule	See parameter PA12 for details.	0-32767	0
79	Position command pulse electronic gear ratio fourth molecule	See parameter PA12 for details.	0-32767	0
80	Command directi	Set as: 0: Positive direction of high level; 1: Positive direction of low level.	0-1	0

	on signal effecti ve level			
81	Comm and pulse PULS signal filter	1. Digitally filter the pulse input PULS signal, the larger the value, the larger the filter time constant. 2. By default, the maximum pulse input frequency is 500kHz (kpps). The larger the value, the lower the maximum pulse input frequency. 3. It is used to filter out the noise on the signal line to avoid counting errors. If there is a phenomenon of inaccurate walking due to inaccurate counting, the parameter value can be appropriately increased. 4. After the parameter is modified, it must be saved, and it will be valid after re-powering on.	0-15	4
82	Comm and pulse SIGN signal filterin g	1. Digitally filter the pulse input SIGN signal, the larger the value, the larger the filter time constant. 2. The default value is the maximum pulse input frequency of 500kHz (kpps). The larger the value, the lower the maximum pulse input frequency. 3. It is used to filter out the noise on the signal line to avoid counting errors. If there is a phenomenon of	0-15	4

		inaccurate walking due to inaccurate counting, the parameter value can be appropriately increased. 4. After the parameter is modified, it must be saved, and it will be valid after re-powering on.		
83	CWL, CCWL direction prohibition method	1. When the machine encounters the mechanical limit switch and triggers the CWL and CCWL limits, this parameter is used to select the prohibition method. Parameter meaning: 0: Limit the torque in this direction to 0; 1: Disable the pulse input in this direction.	0-1	0
84	Positioning complete hysteresis	1. Set the positioning completion pulse range under position control. 2. When the number of remaining pulses in the position deviation counter is less than or equal to the set value of this parameter, the COIN (positioning complete) of the digital output DO is ON, otherwise it is OFF. 3. The comparator has hysteresis function, which is set by parameter PA85.	0-32767 pulse	65
85	Positioning proximity	1. Set the positioning proximity pulse range under position control. 2. When the number of remaining pulses in the position deviation	0-32767 pulse	6500

<table>
<tr><td></td><td>range</td><td>counter is less than or equal to the set value of this parameter, the NEAR (near positioning) of the digital output DO is ON, otherwise it is OFF.
3. The comparator has hysteresis function, which is set by parameter PA86.
4. When the positioning is about to be completed, the host computer receives the NEAR signal to prepare for the next step. Generally, the parameter value should be larger than the positioning completion range.</td><td></td><td></td></tr>
<tr><td>86</td><td>Positioning close to hysteresis</td><td>See the description of parameter PA85 for details.</td><td>0-32767 pulse</td><td>650</td></tr>
<tr><td>87</td><td>Arrival speed hysteresis</td><td>1. When the motor speed exceeds this parameter, the ASP (speed arrival) of the digital output DO is ON, otherwise it is OFF.
2. The comparator has hysteresis function.
3. With polarity setting function:
<table>
<tr><th>PA88</th><th>PA28</th><th>Comparators</th></tr>
<tr><td>0</td><td>>0</td><td>speed regardless of direction</td></tr>
<tr><td>1</td><td>>0</td><td>Only detect forward speed</td></tr>
</table></td><td>0-5000 r/min</td><td>30</td></tr>
</table>

<table>
<tr><td></td><td></td><td><table><tr><td></td><td><0</td><td>Only detect reverse speed</td></tr></table></td><td></td><td></td></tr>
<tr><td>88</td><td>reach velocity polarity</td><td>Refer to the description of parameter PA87.</td><td>0-1</td><td>0</td></tr>
<tr><td>89</td><td>Arrival torque</td><td>1.When the motor torque exceeds this parameter, the ATRQ (torque arrival) of the digital output DO is ON, otherwise it is OFF.
2.The comparator has hysteresis function, which is set by parameter PA90.
3.With polarity setting function:<table><tr><th>PA91</th><th>PA89</th><th>Comparators</th></tr><tr><td>0</td><td>>0</td><td>Torque regardle of direction</td></tr><tr><td rowspan="2">1</td><td>>0</td><td>Only dete forward torque</td></tr><tr><td><0</td><td>Only the rever torque is detecte</td></tr></table></td><td>-300%-300%</td><td>100</td></tr>
<tr><td>90</td><td>Reaching torque hysteresis</td><td>1. When the motor torque exceeds this parameter, the ATRQ (torque arrival) of the digital output DO is ON, otherwise it is OFF.
2. The comparator has hysteresis function, which is set by parameter PA90.
3. With polarity setting function:<table><tr><th>PA91</th><th>PA89</th><th>Comparators</th></tr><tr><td>0</td><td>>0</td><td>Torque regardle of direction</td></tr></table></td><td>0-300%</td><td>5</td></tr>
</table>

<table>
<tr><td></td><td></td><td><table>
<tr><td rowspan="2">1</td><td>>0</td><td>Only dete
forward torque</td></tr>
<tr><td><0</td><td>Only the rever
torque is detecte</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>91</td><td>Arrival torque polarity</td><td>1. When the motor torque exceeds this parameter, the ATRQ (torque arrival) of the digital output DO is ON, otherwise it is OFF.
2. The comparator has hysteresis function, which is set by parameter PA90.
3. With polarity setting function:<table>
<tr><th>PA91</th><th>PA89</th><th>Comparators</th></tr>
<tr><td>0</td><td>>0</td><td>Torque regardle
of direction</td></tr>
<tr><td rowspan="2">1</td><td>>0</td><td>Only dete
forward torque</td></tr>
<tr><td><0</td><td>Only the rever
torque is detecte</td></tr>
</table></td><td>0-1</td><td>0</td></tr>
<tr><td>92</td><td>Zero speed detection hysteresis</td><td>1.When the motor speed is lower than this parameter, ZSP (zero speed) of digital output DO is ON, otherwise it is OFF.
2.The comparator has a hysteresis function.</td><td>0-1000 r/min</td><td>5</td></tr>
<tr><td>94</td><td>Delay time of electromagnetic brake opening</td><td>1. Set the delay time for the electromagnetic brake to open.
2. When the system changes from the disabled state to the enabled state, it defines the delay time from the opening of the motor current to the release of the electromagnetic brake (DO output terminal BRK</td><td>0-200 ms</td><td>0</td></tr>
</table>

		ON).		
95	Motor encoder Resolution	The encoder resolution, the default is 2 to the 17th power = 131072, the setting value is 17, please modify it carefully, otherwise the wrong setting will lead to speeding.	10-32	17
96	Motor pole pairs	This parameter indicates the number of motor pole pairs. Please be careful to modify, otherwise wrong settings will lead to speeding.	1-360	5
97	Motor zero position offset angle	The offset angle between the encoder zero position and the motor zero position is determined by the motor.	0-3600	216
99	Maximum duty cycle when braking	Maximum duty cycle setting when braking.	5-90	50
100	position ring Filter selection	Set as: 0: digital moving average filter; 1: Exponential smoothing filter.	0-1	0
101	position ring Feedfo	Feedforward can reduce the position tracking error during position control. When it is set to	0-100	0

	rward gain	100, the position tracking error is always 0 under the command pulse of any frequency.		
102	Position loop feedforward filter time constant	The position loop feedforward filter is used to increase the stability of the feedforward control.	20-500	100

7.2 P3 group multi-function terminal series parameters

7.2.1 List of series parameters of group P3

P series drives all have 4 input terminals and 4 output terminals. The input and output definition values of the terminals can be changed through the series parameters of the P3 group to complete various input and output definitions. (The input terminal is active low by default)

parameter	name	scope	Factory default
P3-0	Digital input DI1 function	0-99	1
P3-1	Digital input DI2 function	0-99	2
P3-2	Digital input DI3 function	0-99	3
P3-3	Digital input DI4 function	0-99	4
P3-15	Digital input DI is forced to be valid 1	00000000-11111111	00000000
P3-16	Digital input DI is forced to be valid 2	00000000-11111111	00000000
P3-17	The digital input DI is forced to be valid 3	00000000-11111111	00000000
P3-18	The digital input DI is forced to be valid 4	00000000-11111111	00000000
P3-19	The digital input DI is forced to be valid 5	00000000-11111111	00000000
P3-20	Digital output DO1 function	0-99	2
P3-21	Digital output DO2 function	0-99	3

P3-22	Digital output DO3 function	0-99	5
P3-23	Digital output DO4 function	0-99	8
P3-30	Virtual input terminal control	0-2	0
P3-31	Virtual input terminal status value	00000000-11111111	00000000
P3-32	Virtual output terminal control	0-1	0
P3-33	Virtual output terminal status value	0000-1111	0000
P3-38	Virtual IO input DI1 function	0-99	5
P3-39	Virtual IO input DI2 function	0-99	6
P3-40	Virtual IO input DI3 function	0-99	7
P3-41	Virtual IO input DI4 function	0-99	8
P3-42	Virtual IO input DI5 function	0-99	9
P3-43	Virtual IO input DI6 function	0-99	10
P3-44	Virtual IO input DI7 function	0-99	11

P3-45	Virtual IO input DI8 function	0-99	12
Notice: 1. When P3-30=0, the IO input is determined by DI1 ~ DI4, and the number of input IO is 4, corresponding to parameters P3-0~P3-3; 2. When P3-30=1, the IO input is determined by the corresponding bit of virtual IOP3-31, and the number of input IO is 8, corresponding to parameters P3-38~P3-45; 3. When P3-30=2, the IO input is determined by DI1~DI4 and P3-31, and the number of input IOs is 12, corresponding to parameters P3-0~P3-3 and P3-38~P3-45.			

7.2.2 List of DI functions

Input terminals (the parameters of the 4 terminals corresponding to the P3 group are P3-0, P3-1, P3-2, P3-3 respectively) define the value.

define value	symbol	Function	Functional Analysis
0	NULL	No function	The input state has no effect on the system.
1	SON	Servo enable	Servo enable input terminal. OFF: The servo drive cannot be used, and the motor does not pass current; ON : The servo drive is enabled, and the motor is powered.
2	ARST	Alarm clear	Alarm clear input terminal: If there is an alarm, if the alarm is allowed to be cleared, the rising edge of the input (the moment when OFF changes to ON) clears the alarm. Note: Only some alarms are allowed to clear.
3	CCWL	Forward drive prohibited	1. CCW drive prohibition input terminal: OFF: Prohibit forward rotation (CCW) rotation; ON : Enable forward (CCW) rotation. 2. Used for mechanical limit stroke protection, the function is controlled by parameter PA-20. Note that the default value of PA-20 ignores this function. If you want to enable this function, you need to modify PA-20: (1) When PA-20 is 0, the function of input prohibition is valid, and whether CCW is prohibited is controlled by PA-83; (2) When PA-20 is 1, the function of input prohibition is invalid, and whether CCW is prohibited is not controlled by PA-83. 3. When the prohibition function is valid (PA-20 is 0):

			(1) When PA-83 is 0, the forward torque is limited to 0, and the forward pulse input is not limited; (2) When PA-83 is 1, the input of forward pulse is prohibited.
4	CWL	Reverse drive prohibited	1. CW drive prohibition input terminal: OFF: Prohibit forward rotation (CW) rotation; ON : Forward (CW) rotation is allowed. 2. Used for mechanical limit stroke protection, the function is controlled by parameter PA-20. Note that the default value of PA-20 is to ignore this function. If you want to enable this function, you need to modify PA-20: (1) When PA-20 is 0, the function of input prohibition is valid, and whether CW is prohibited is controlled by PA-83; (2) When PA-20 is 1, the function of input prohibition is invalid, and whether CW is prohibited is not controlled by PA-83. 3. When the prohibition function is valid (PA-20 is 0): (1) When PA-83 is 0, the reverse torque is limited to 0, and the reverse pulse input is not limited; (2) When PA-83 is 1, the input of reverse pulse is prohibited.
5	TCCW	Forward torque limit	OFF: CCW direction torque is not limited by PA-36 parameters; ON: CCW direction torque is limited by PA-36 parameter. Note: No matter whether TCCW is valid or invalid, CCW direction torque is still limited by parameter PA-34.
6	TCW	Reverse	OFF: CW direction torque is not limited by PA-37 parameters;

		torque limit	ON : CW direction torque is limited by PA-37 parameter. Note: No matter whether TCW is valid or invalid, the torque in CW direction is still limited by parameter PA-35.
7	ZCLAMP	Zero speed clamp	When the following conditions are met, the zero-speed clamping function is enabled (the speed is forced to zero): Condition 1: Speed control mode (PA4=1), when external speed is selected (PA22=0); Condition 2: ZCLAMP ON; Condition 3: The speed command is lower than parameter PA-75. When any of the above conditions are not satisfied, normal speed control is performed.
8	CZERO	zero command	Under speed or torque control, the speed or torque commands are: OFF: normal command; ON: Zero command.
9	CINV	instruction negation	Under speed or torque control, the speed or torque commands are: OFF: normal command; ON: Invert the instruction.
10	SP1	Speed selection 1	In the speed control mode (PA4=1), when the internal speed is selected (PA22=1), the combination of SP1 and SP2 can select different internal speeds: SP2=OFF SP1=OF: Internal speed 1 (parameter PA-24) SP2=OFF SP1=ON: Internal speed 2 (parameter PA-25) SP2=ON SP1=OFF: Internal speed 3 (parameter PA-26)
11	SP2	Speed selection 2	

			SP2=ON SP1=ON: Internal speed 4 (parameter PA-27)
13	TRQ1	Torque selection 1	In torque control mode (PA4=2), when internal torque is selected (PA32=1), the combination of TRQ1 and TRQ2 selects different internal torques: TRQ2=OFF TRQ1=OFF: Internal torque 1 (parameter PA-64) TRQ2=OFF TRQ1=ON: Internal torque 2 (parameter PA-65) TRQ2=ON TRQ1=OFF: Internal torque 3 (parameter PA-66) TRQ2=ON TRQ1=ON: Internal torque 4 (parameter PA-67)
14	TRQ2	Torque selection 2	
16	CMODE	Composite mode control mode setting	When PA-4 is set to 3, 4, 5, it is in mixed control mode, and the control mode can be switched through this input terminal: (1) When PA-4 is 3, CMODE OFF means position mode; CMODE ON means speed mode; (2) When PA-4 is 4, CMODE OFF means position mode; CMODE ON means torque mode; (3) When PA-4 is 5, CMODE OFF means speed mode; CMODE ON means torque mode.
18	GEAR1	Electronic gear selection 1	When PA-11 is 0, the combination of GEAR1 and GEAR2 is used to select the numerator of different electronic gear ratios: GEAR2=OFF GEAR1=OFF: Numerator 1 (parameter PA-12) GEAR2=OFF GEAR1=ON: Numerator 2 (parameter PA-77) GEAR2=ON GEAR1= OFF: Numerator 3 (parameter PA-78) GEAR2=ON GEAR1=ON: Numerator 4 (parameter PA-79)
19	GEAR2	Electronic gear selection 2	

20	CLR	Position deviation clear	In the position control mode, the position deviation counter clears the input terminal.
twenty one	INH	Pulse input prohibited	In the position control mode, the position command pulse prohibition terminal: OFF: Command pulse input is valid; ON : Command pulse input is disabled.
twenty two	JOGP	positive inching	In speed mode, when PA22=5, this signal is turned on, the motor jogs in the forward direction, and the speed is set by PA21. Note: This signal is turned on at the same time as the reverse jog, and the jog function is invalid.
twenty three	JOGN	reverse inch	In speed mode, and when PA22=5; when this signal is turned on, the motor jogs in the opposite direction, and the speed is set by PA21. Note: This signal is turned on at the same time as the forward jog, and the jog function is invalid.
27	HOLD	Internal position control command stop	In the internal position register mode, this signal is turned on and the motor will stop running (it can only be used when the internal position mode PA-14=3).
28	CTRG	internal location command trigger	In the internal position register mode, after selecting the internal position register control command (POS0-2) , this signal is triggered, and the motor runs according to the internal position register command. When the digital output zero speed signal (ZSPD=1), it will accept the next trigger internal position command.

<table>
<tr><td>29</td><td>POS0</td><td>internal location command select 0</td><td rowspan="3">The internal position selection corresponds to the relationship:

<table>
<tr><th>Location Order</th><th>POS2</th><th>POS1</th><th>POS0</th><th>CTRG</th><th>correspond parameter</th></tr>
<tr><td rowspan="2">P1</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">↑</td><td>P4-2</td></tr>
<tr><td>P4-3</td></tr>
<tr><td rowspan="2">P2</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">↑</td><td>P4-5</td></tr>
<tr><td>P4-6</td></tr>
<tr><td rowspan="2">P3</td><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">↑</td><td>P4-8</td></tr>
<tr><td>P4-9</td></tr>
<tr><td rowspan="2">P4</td><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">↑</td><td>P4-11</td></tr>
<tr><td>P4-12</td></tr>
<tr><td rowspan="2">P5</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">↑</td><td>P4-14</td></tr>
<tr><td>P4-15</td></tr>
<tr><td rowspan="2">P6</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">1</td><td rowspan="2">↑</td><td>P4-17</td></tr>
<tr><td>P4-18</td></tr>
<tr><td rowspan="2">P7</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">↑</td><td>P4-20</td></tr>
<tr><td>P4-21</td></tr>
<tr><td rowspan="2">P8</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">↑</td><td>P4-23</td></tr>
<tr><td>P4-24</td></tr>
</table></td></tr>
<tr><td>30</td><td>POS1</td><td>internal location command selection 1</td></tr>
<tr><td>31</td><td>POS2</td><td>internal location command option 2</td></tr>
<tr><td>33</td><td>SHOM</td><td>Start return to origin</td><td>In the internal position register mode, the origin needs to be searched. After this signal is turned on, the origin search function is activated (please refer to the setting of P4-34).</td></tr>
<tr><td>34</td><td>ORGP</td><td>return to origin</td><td>In the internal position register mode, when searching for the origin, the servo will regard the position of this point as the origin after this signal is turned on (please refer to the setting of</td></tr>
</table>

			parameter P4-32).

7.2.3 List of DO functions

The definition value of output terminal (4 terminals corresponding to P3 group parameters are P3-20, P3-21, P3-22, P3-23 respectively):

define value	symbol	Function	Functional Analysis
1	ON	always valid	Force output ON.
2	RDY	Servo ready	OFF: Servo main power is not connected or there is an alarm; ON : Servo main power is normal, no alarm.
3	ALM	Call the police	OFF: there is an alarm; ON : No alarm.
4	ZSP	zero speed	During speed and torque control, OFF: Motor speed is higher than parameter PA-75 (regardless of direction); ON : Motor speed is lower than parameter PA-75 (regardless of direction).
5	COIN	Positioning completed	During position control, OFF: The position deviation is greater than the parameter PA-16; ON : The position deviation is smaller than parameter PA-16.
6	ASP	speed to reach	During speed and torque control, OFF: Motor speed is lower than parameter PA-28; ON : Motor speed is higher than parameter PA-28. With polarity setting function, please refer to the description of parameter PA-28.
7	ATRQ	Torque arrives	OFF: Motor torque is lower than parameter PA-89;

			ON : The motor torque is higher than parameter PA-89. With polarity setting function, please refer to the description of parameter PA-89.
8	BRK	Electromagnetic brake	OFF: electromagnetic brake braking; ON : The electromagnetic brake is released.
9	RUN	Servo running	OFF: The servo motor is not powered on; ON : The servo motor is running with power on.
10	NEAR	positioning approach	During position control, OFF: The position deviation is greater than the parameter PA-85; ON : Position deviation is less than parameter PA-85.
11	TRQL	torque limit	OFF: The motor torque has not reached the limit value; ON : The motor torque reaches the limit value. The torque limit method is through parameters PA-34, PA-35, PA-36, PA-37.
12	SPL	speed limit	During torque control, OFF: The motor speed has not reached the limit value; ON : The motor speed has reached the limit value. The speed limit method is set by parameter PA-50.
13	VCOIN	same speed	OFF: The absolute value of the difference between the actual speed and the command speed is greater than PA76; ON : The absolute value of the difference between the actual speed and the command speed is less than PA76.

15	HOME	Return to origin completed	OFF: When the origin return is not completed, no signal is output; ON : The signal is output when the origin return is completed.
16	CMDOK	Internal position command complete	OFF: When the internal position command is not completed or the internal position command is not stopped, no signal is output; ON : When the internal position command is completed or the internal position command is stopped, the signal will be output after the time set by P4-1.

7.2.4 DI force valid

There are five parameters in group P3 (P3-15, P3-16, P3-17, P3-18, P3-19) that can be set to force the digital input DI to be valid.

(1) The corresponding function of P3-15 is represented by 8-bit binary:

digit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	CZERO	ZCLAMP	TCW	TCCW	CWL	CCWL	ARST	SON

(2) The corresponding functions of P3-16 are represented by 8-bit binary:

digit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	CMODE	NULL	TRQ2	TRQ1	NULL	SP2	SP1	CINV

(3) The corresponding function of P3-17 is represented by 8-bit binary:

digit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	JOGN	JOGP	INH	CLR	GEAR2	GEAR1	NULL

(4) The corresponding function of P3-18 is represented by 8-bit binary:

digit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	POS2	POS1	POS0	CTRG	HOLD	NULL	NULL

(5) The corresponding function of P3-19 is represented by 8-bit binary:

digit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Function	NULL	NULL	NULL	NULL	NULL	NULL	ORGP	SHOM

Parameter meaning:

Any of the 5 parameters	Corresponding function	functional result
0	Not planned	OFF (inactive)
	planned	determined by the signal
1	unplanned or planned	ON (forced valid)

◆ 已规划是指参数已被 P3-0~P3-3 中的输入端子选中功能，未规划则相反。

7.3 P4 group internal position command series parameters

serial number	name	Function	parameter scope	Factory default
P4-0	Internal position command control mode	0: absolute position command; 1: Incremental position command.	0-1	0
P4-1	Internal Position Command Completion Digital Output Delay	1. When the internal position command is completed or the internal position command is stopped, after the delay time set by P4-1, the DO signal of the internal position command completion (CMDOK) is output. 2. When the delay time of P4-1 is set to 0, and the DO signal zero speed detection (ZSPD) is set to 1, the internal position command of the trigger signal is accepted again. 3. When the delay time of P4-1 is not set to 0, it is set to 1 when the DO signal internal position command is completed (CMDOK),	0-200 ms	0

		and then the internal position command triggered by the DI signal command trigger (CTRG) is accepted.		
P4-2	Position rotation setting of internal position command 1	Sets the number of position turns for the internal position of the first segment.	-30000-30000	0
P4-3	The number of pulses in the position circle of the internal position command 1 is set	1. Set the number of position pulses for the internal position of the first segment. 2. Internal position command 1 = the set value of the number of turns of the first stage of the internal position + the set value of the number of pulses of the first stage of the internal position. (Max is the set number of pulses per revolution of the motor, please refer to the setting of PA-11 PA-12 PA-13).	+/-max .cnt/rev	0
P4-4	The internal position command controls the movement speed of 1 set up	Set the movement speed of the internal position command control 1.	0-5000 r/min	1000

P4-5	Position rotation setting of internal position command 2	Sets the number of position turns for the second segment internal position.	-30000-30000	0
P4-6	The number of pulses in the position circle of the internal position command 2 is set	1. Set the number of position pulses for the second segment internal position. 2. Internal position command 2 = the set value of the number of turns of the second stage of the internal position + the set value of the number of pulses of the second stage of the internal position.	+/-max.cnt/rev	0
P4-7	The internal position command controls the movement speed of 2 set up	Set the movement speed of the internal position command control 2.	0-5000 r/min	1000
P4-8	Position rotation setting of internal position command	Sets the number of position turns for the inner position of the 3rd stage.	-30000-30000	0

	3			
P4-9	The number of pulses in the position circle of the internal position command 3 is set	1. Set the number of position pulses for the internal position of the third segment. 2. Internal position command 3 = the set value of the number of turns of the third stage of the internal position + the set value of the number of pulses of the third stage of the internal position.	+/-max .cnt/rev	0
P4-10	Internal position command controls the movement speed of 3 set up	Set the movement speed of the internal position command control 3.	0-5000 r/min	1000
P4-11	Position rotation setting of internal position command 4	Sets the number of position turns for the internal position of the 4th segment.	-30000-30000	0

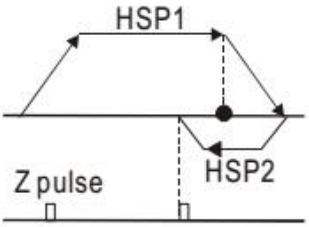
P4-12	The number of pulses in the position circle of the internal position command 4 is set	1. Set the number of position pulses for the 4th segment internal position. 2. Internal position command 4 = the set value of the 4th stage internal position circle number + the 4th stage internal position pulse number set value.	+/-max .cnt/rev	0
P4-13	The internal position command controls the movement speed of 4 set up	Set the movement speed of the internal position command control 4.	0-5000 r/min	1000
P4-14	Position rotation setting of internal position command 5	Sets the number of position turns for the internal position of the 5th segment.	-30000-30000	0
P4-15	The number of pulses in the position circle of	1. Set the number of position pulses for the 5th segment internal position. 2. Internal position command 5 = the set value of the number of turns of the fifth segment of the internal position + the set value of the number of pulses of the fifth	+/-max .cnt/rev	0

	the internal position command 5 is set	segment of the internal position.		
P4-16	The internal position command controls the movement speed of 5 set up	Set the movement speed of the internal position command control 5.	0-5000 r/min	1000
P4-17	Position rotation setting of internal position command 6	Sets the number of position turns for the 6th segment internal position.	-30000-30000	0
P4-18	The number of pulses in the position circle of the internal position command 6 is set	1. Set the number of position pulses for the 6th segment internal position. 2. Internal position command 6 = the set value of the 6th stage internal position circle number + the 6th stage internal position pulse number set value.	+/-max .cnt/rev	0

P4-19	Internal position command controls the movement speed of 6 set up	Set the movement speed of the internal position command control 6.	0-5000 r/min	1000
P4-20	Position rotation setting of internal position command 7	Sets the number of position turns for the internal position of the 7th segment.	-30000-30000	0
P4-21	The number of pulses in the position circle of the internal position command 7 is set	1. Set the number of position pulses for the 7th segment internal position. 2. Internal position command 7 = the set value of the number of revolutions of the 7th segment of the internal position + the set value of the number of pulses of the 7th segment of the internal position.	+/-max .cnt/rev	0
P4-22	The internal position command controls the movement	Set the movement speed of the internal position command control 7.	0-5000 r/min	1000

	speed of 7 set up			
P4-23	Position rotation setting of internal position command 8	Sets the number of position turns for the internal position of the 8th segment.	-30000-30000	0
P4-24	The number of pulses in the position circle of the internal position command 8 is set	1. Set the number of position pulses for the 8th segment internal position. 2. Internal position command 8 = the set value of the 8th stage internal position circle number + the 8th stage internal position pulse number set value.	+/-max .cnt/rev	0
P4-25	The internal position command controls the movement speed of 8 set up	Set the movement speed of the internal position command control 8.	0-5000 r/min	1000

P4-32	Type of origin detector and setting of search direction	0: Origin return in forward direction, CCWL is used as return origin; 1: Reverse direction origin return, CWL as return origin; 2: Return to the origin in the forward direction, ORGP is used as the return origin; 3: Return to the origin in the reverse direction, ORGP is used as the return origin; 4: Forward rotation directly finds the zero point of the absolute position of the single circle as the return origin; 5: Reverse and directly search for the zero point of the absolute position of a single circle as the return to the origin.	0-5	0
P4-33	Short-distance movement method setting to reach the origin	0: After finding the reference origin, return to look for the single-turn absolute position zero point as the mechanical origin; 1: Do not return after finding the reference origin, go forward to find the zero point of the absolute position of a single circle as the mechanical origin; 2: After finding the reference origin (ORGP rising edge or single-turn absolute position zero point) as the mechanical origin, decelerate to stop.	0-2	0
P4-34	origin trigger boot mode	0: Turn off the origin return function; 1: When the power is turned on, the origin return function is automatically executed; 2: The origin return function is triggered by the input contact of the origin search function (SHOM).	0-2	0

P4-35	origin stop Mode setting	0: After the origin detection is completed, the motor decelerates and pulls back to the origin; 1: After the origin detection is completed, the motor decelerates and stops according to the forward direction.	0-1	0
P4-36	The first stage of high-speed origin return speed setting (HSPD1)	Set the first stage high-speed origin return speed. 	1-2000 r/min	1000
P4-37	Second stage low speed origin return speed setting (HSPD2)	Set the second-stage low-speed origin return speed.	1-500 r/min	50
P4-38	Origin return offset circles (HOF1)	Set the zero return offset number of turns.	-30000-30000	0
P4-39	Origin return offset pulse number (HOF2)	1. Set the number of return-to-origin offset pulses. 2. When the parameter functions HOF1 and HOF2 are set to zero, the origin will be the single-turn absolute position zero point or ORGP according to the definition of the	+/-max .cnt/rev	0

		origin return mode. If the set value is not zero, the origin will be based on the above single-turn absolute position zero point or ORGP plus a pulse offset HOF1 x 10000+HOF2 as the new origin.		

8 . error code

Fault symbol	fault name	Fault content
--	normal	
1	speeding	Servo motor speed exceeds the set value
2	Main circuit overvoltage	Main circuit power supply voltage is too high
3	Main circuit undervoltage	Main circuit power supply voltage is too low
4	Location out of tolerance	The value of the position deviation counter exceeds the set value
5	drive overheating	Drive temperature is too high
6	Speed Amplifier Saturation Fault	Speed regulation long time saturation
7	Drive forbidden exception	Both CCW/CW drive inhibit inputs are OFF
8	Position deviation counter overflow	The absolute value of the position deviation count value exceeds 2^{30}
11	IPM module failure	IPM smart module failure
13	drive overload	Servo drive and motor overload (instantaneous overheating)
14	brake failure	Brake circuit failure
18	relay switch failure	The actual state of the relay is inconsistent with the control state
19	Brake delay error	There is pulse input when the brake is not open
20	EEPROM error	EEPROM error
twenty one	FPGA module failure	FPGA Module Function Abnormal
twenty three	Current acquisition circuit failure	Current acquisition circuit failure
29	User torque	The motor load exceeds the value and

	overload alarm	duration set by the user
42	AC input voltage too low	AC input voltage too low
47	The main circuit voltage is too high when powered on	The main circuit voltage is too high when powered on
50	Encoder communication failure	There is no communication connection between the drive and the encoder
51	Encoder communication error	After the encoder communication is established, an interruption occurs and the connection is disconnected
52	Encoder battery low voltage alarm	The encoder battery voltage is low enough to alarm, the information is not lost but needs to be replaced as soon as possible
53	Encoder battery voltage error alarm	The encoder battery voltage error alarm, the stored information has been wrong, and the encoder needs to be reset
54	Encoder error alarm	The encoder is not a battery alarm, but the encoder needs to be reset
55	CRC check error 3 times in a row	The CRC check of the data received by the encoder communication is wrong three times in a row
56	MODBUS frame too long error	The received MODBUS frame data is too long
57	MODBUS communication format is abnormal	Improper setting of communication parameters or incorrect address or value
58	Single lap position value error	The single-turn position offset value stored by the drive exceeds the encoder resolution
59	The encoder reports a CF error	The encoder continuously reports errors in the CF domain, and the encoder needs to be reset

Chapter 9 Alarm Handling Methods

alarm code	Alarm name	Operating status	reason	Approach
1	speeding	Appears when the control power is turned on	1. Control circuit board failure. 2. Encoder failure.	1. Replace the servo drive. 2. Replace the servo motor.
		Occurs when the motor is running	The input command pulse frequency is too high.	Set the input command pulse correctly.
			The acceleration/deceleration time constant is too small, and the speed overshoot is too large.	Increase the acceleration/deceleration time constant.
			The input electronic gear ratio is too large.	set correctly.
			Encoder failure.	Replace the servo motor.
			Defective encoder cable.	Replace the encoder cable.
			The servo system is unstable, causing overshoot.	1. Reset the relevant gain value. 2. If the gain cannot be set to an appropriate value, reduce the load moment of inertia ratio.
		Appears when the motor has	The load is too high.	1. Reduce load. 2. Change to a higher power drive and motor.

		just started	1. Encoder zero point error. 2. The motor UVW leads are wrongly connected. 3. Encoder cable leads are connected incorrectly.	1. Replace the servo motor. 2. Ask the manufacturer to reset the encoder zero point. 3. Correct wiring.

alarm code	Alarm name	Operating status	reason	Approach
2	The main circuit overvoltage	Appears when the control power is turned on	Circuit board failure.	Replace the servo drive.
		Appears when mains power is turned on	1. The power supply voltage is too high. 2. The power supply voltage waveform is abnormal.	Check the power supply.
		Occurs when the motor is running	Brake resistor wiring disconnected.	Rewire.
			1. Brake transistor damaged. 2. Internal braking resistor damaged.	Replace the servo drive.
			Insufficient brake circuit capacity.	1. Reduce the start-stop frequency. 2. Increase the acceleration/deceleration time constant.

				3. Decrease the torque limit value. 4. Reduce load inertia. 5. Change to a higher power drive and motor.
3	The main circuit undervoltage	main power appears when the source	1. Circuit board failure. 2. Damaged power fuse. 3. Soft-start circuit faulty. 4. The rectifier is damaged.	Replace the servo drive.
			1. Power supply voltage is low. 2. Temporary power outage for more than 20ms.	Check power.
		Occurs when the motor is running	1. The power supply capacity is not enough. 2. Instantaneous power down.	Check power.
			The radiator is overheating.	Check the load condition.

alarm code	Alarm name	Operating status	reason	Approach
4	Location out of tolerance	Turn on the control power appears when the source	Circuit board failure.	Replace the servo drive.
		Turn on the main power supply and control line, input the pulse command, the motor does not rotate or reverse	1. The encoder zero point changes. 2. Encoder failure.	1. Readjust the encoder zero point. 2. Replace the servo motor.
		Occurs when the motor is running	The detection range of the set position out-of-tolerance is small.	Increase the detection range of position out-of-tolerance.
			Position proportional gain is too small.	Increase gain value.
			Insufficient torque.	1. Check torque limit value. 2. Reduce load capacity. 3. Change to a higher

				power drive and motor.
			The command pulse frequency is too high.	Reduce frequency.
			The encoder zero point changes.	Readjust the zero point of the encoder.
5	drive overheating	drive running appear in the process	1. Circuit board failure. 2. Drive temperature is too high.	1. Reduce drive temperature. 2. Replace the servo drive.
6	Speed Amplification Saturation Fault	Occurs when the motor is running	1. The load is too high. 2. The motor is mechanically stuck.	1. Reduce load. 2. Change to a higher power drive and motor. 3. Check the mechanical part of the load.
7	Drive forbidden exception		The CCW/CW drive inhibit input terminals are both disconnected.	Check wiring.
8	Position deviation counter overflow		1. The motor is mechanically stuck. 2. The input command pulse is abnormal.	1. Check the mechanical part of the load. 2. Check command pulse. 3. Check that the motor rotates according to the command pulse.

alarm code	Alarm name	Operating status	reason	Approach
11	IPM mode block failure	Appears when the control power is turned on	Circuit board failure.	Replace the servo drive.
		motor has run appear in the process	1. Supply voltage is low. 2. overheat.	1. Check the drive. 2. Power cycle. 3. Replace the drive.
			Short circuit between driver UVW.	Check wiring.
			Poor grounding.	Properly grounded.
			Damaged motor insulation.	Replace the motor.
			disturbed.	1. Add line filter. 2. Stay away from sources of interference.
13	overload	Appears when the control power is turned on	Circuit board failure.	Replace the servo drive.
		Occurs when the motor is running	Exceed the rated torque operation.	1. Check the load. 2. Reduce start-stop frequency. 3. Decrease the torque limit value. 4. Change to a higher power drive and motor.

			Keep the brake off.	Check the holding brake.
			The motor oscillates erratically.	1. Adjust gain. 2. Increase the acceleration/deceleration time. 3. Reduce load inertia.
			1. UVW has a phase disconnection. 2. Encoder connection error.	Check wiring.
14	brake failure		Brake circuit failure.	change drive

alarm code	Alarm name	Operating status	reason	Approach
18	relay switch failure		The relay is damaged.	Return to factory for repair.
19	The brake delay is not open		The parameter value of PA94 is set too large, the control pulse is coming, and the brake has not been opened.	Decrease the value of parameter PA94.
20	EEPROM error		Damaged chip or circuit board.	1. Replace the servo drive. 2. After repairing, you

				must reset the drive model (refer to PA10), and then restore the default parameters.
twenty one	FPGA module failure		The FPGA module is not functioning properly.	Replace the drive.
twenty three	Current acquisition circuit failure		The current acquisition circuit is faulty.	Replace the servo drive.
29	User torque overload alarm		1. The parameters of PA30 and PA31 are unreasonable. 2. Unexpectedly large loads occur.	1. Change parameters. 2. Overhaul machinery.
42	AC input Voltage is too low	When powered down Runtime	1. normal. 2. External AC voltage input is too low.	Check AC220V input.
47	The main circuit voltage is too high when powered on		1. The external AC voltage input is too high. 2. Main circuit failure.	1. Check AC220V input. 2. Change the drive.
50	Encoder communication		There is no communication connection between the drive and the encoder.	Connect the encoder cable and power on again.

	failure			
51	Encoder Communication exception		After the encoder communication is established, there is an interruption and the connection is disconnected.	Connect the encoder cable and power on again.
52	Encoder battery low voltage alarm		The encoder battery voltage is low enough to alarm, the information is not lost but needs to be replaced as soon as possible.	Replace the encoder battery.
53	Encoder battery voltage error alarm		The encoder battery voltage error alarm, the stored information has been wrong, and the encoder needs to be reset.	The encoder battery is exhausted and must be replaced.
54	Encoder Error alarm		The encoder is not a battery alarm, but the encoder needs to be reset.	Reset the encoder again.

alarm code	Alarm name	Operating status	reason	Approach
55	CRC check error 3 times in a row		The CRC check of the data received by MODBUS communication is wrong three times in a row	Replace the drive.
56	MODBUS frame too long error		1. Communication protocol mismatch. 2. disturbed.	1. Confirm the frame length. 2. Add a line filter to keep away interference.
57	MODBUS communication format is abnormal		1. Improper setting of communication parameters. 2. The communication address or value is incorrect.	Replace the drive.
58	lap wrong position value		The single-turn position offset value stored by the drive exceeds the encoder resolution.	Power on again.
59	Encoder Report a CF error		The encoder continuously reports errors in the CF field, and the encoder needs to be reset.	Reset the encoder again.

8. Warranty Terms

8.1 Warranty period of 18 months

Provide a one-year warranty for its products from the date of shipment. During the warranty period, our company will provide free maintenance services for the products.

8.2 Not covered by warranty

■ Improper wiring, such as reversed power supply polarity and live plugging and unplugging of motor leads.

■ Use beyond electrical and environmental requirements.

■ Unauthorized changes to internal devices.

8.3 Repair process

If you need to repair the product, please follow the procedure below:

(1) Contact our customer service personnel to obtain permission for repair.

(2) A written description of the drive failure phenomenon and the sender's contact information and mailing method are attached with the goods.

Address: After-sales Department, 2nd Floor, No. 108, Dagang Street, Baiyun District, Guangzhou , Guangdong CHINA
Tel: +86- 15013078821 Mr. Zhong
Web: www.hanpose.com www.hanbuild.com
Email: info@hanpose.com