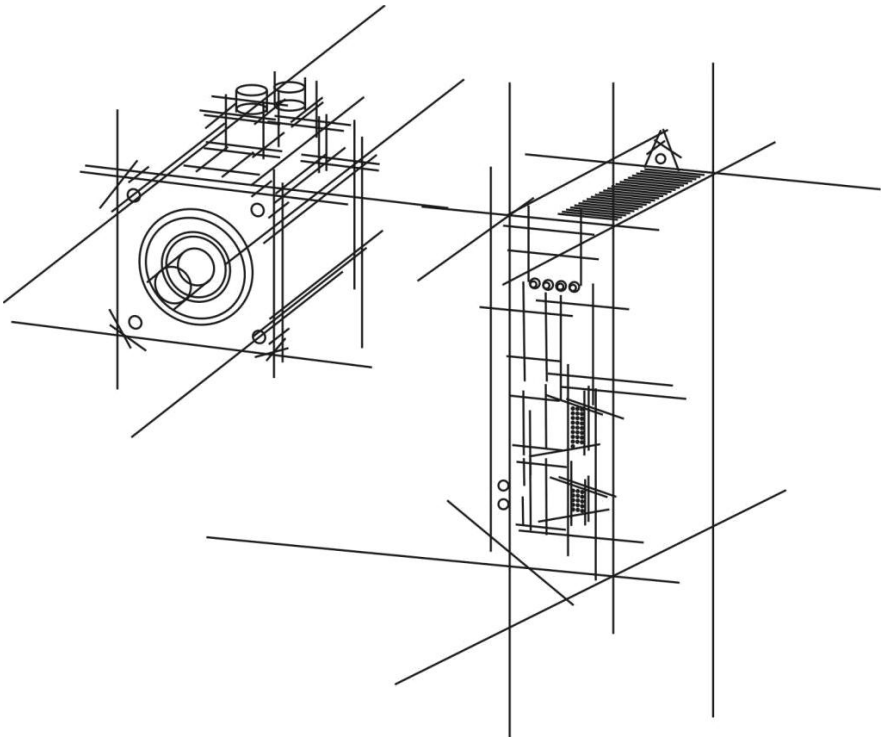
SVC600 交流伺服

使用手册

交流伺服使用手册

AC Servo Manual



Safety Precautions

Before storing, installing, wiring, operating, inspecting or servicing the product, the user must familiarize himself/herself with and observe the following important matters to ensure safe use of the product.

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

CAUTION Incorrect operation may cause danger, result in personal injury or death, and may damage the equipment. Strictly prohibited behaviors are prohibited and may result in damage to the equipment or render it inoperable.

1. Application

distr

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

2. wiring

distr

1. Reliably ground the grounding terminal; improper grounding may cause electric shock or fire.
2. Do not connect the 220V drive power supply to a 380V power source, as this may cause equipment damage and electric shock or fire.
3. The U, V, W motor output terminals and motor terminals U, V, W must be

3. manipulate

take

1. When the mechanical equipment starts to operate, it is necessary to match the appropriate parameter setting value. Failure to adjust to the appropriate setting values may result in loss of control or malfunction of the machinery and equipment.
2. Before starting operation, check that the emergency switch can be activated at any time to stop the machine.
3. Please test the servo motor for normal operation without load first, and then

4. (of a computer) run

proh

1. When the motor is running, it is forbidden to touch any of the rotating parts, as this may cause injury or death.
2. It is prohibited to touch the drive and motor while the unit is running, as this may

5. Maintenance and inspection

proh

6. Scope of use

1. It is prohibited to touch the drive and the inside of its motor as this may cause electric shock.
2. It is prohibited to remove the drive panel when the power is activated, as this may result in electric shock.

take

The products covered in this manual are for general industrial use and should not be

CONTENTS

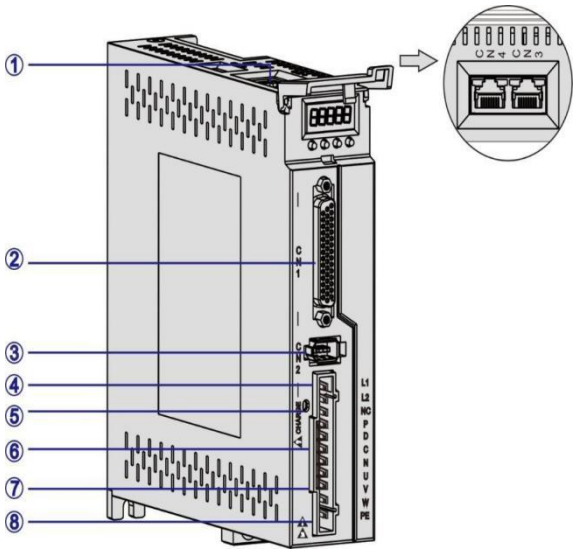
Chapter 1 Product Inspection and Installation

1.1 Product Inspection

This product has been tested for complete functionality before leaving the factory. In order to prevent the product from being shipped out of order due to negligence, please check the following items in detail after unpacking:

- Check that the servo drive and servo motor models are the same as the models you ordered.
- Check whether the servo driver and servo motor have been damaged or scratched during transportation. Do not connect the wires to the power supply if they are damaged during transportation.
- Check the servo driver and servo motor for loose components. Check if there are loose screws, or if the screws are not locked or have fallen off.
- Check that the servo motor rotor shaft can rotate smoothly by hand. Motors with brakes cannot be rotated directly.
- Check that the servo operating instructions are included.
- Check that the drive accessories are included in the box.

If there is any discrepancy in the content of the product, please contact the agency



1.2 Product front panel

This panel introduction applies to model: SVC600P S040~S075

Figure 1.1 SVC600P Servo Drive Front Panel Introduction

serial number	Terminal Name	Functional Description
①	CN3, CN4	Communication terminals.
②	CN1	Input and output control signal terminals.
(iii)	CN2	Encoder signal terminal, connected to the motor encoder.
④	L1,L2	Mains power input terminals.
⑤	CHARGE	Bus voltage indicator. Used to indicate that the bus capacitor is in a charged state. When the indicator is on, the internal capacitor of the servo unit may still be charged even if the main circuit power is turned off! Load. Therefore, do not touch the power terminals when the light is on to avoid electric shock.
(vi)	P,D,C,N	Brake resistor connection terminal.
(vii)	U,V,W	Servo motor connection terminal. Connect servo motor U,V,W phase.
⑧	PE	Grounding Terminal. Connect to the power supply and motor ground terminals for grounding.

1.3 Servo mounting method

1.3.1 Drive Installation Method

- Mounting direction

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

- mounting

When mounting, tighten the 2 M4 set screws on the rear of the servo drive.

- grounding

Be sure to ground the drive ground terminal, otherwise there may be a risk of electric shock or interference generating false action.

- Alignment requirements

When wiring the drive, route the cables downward (refer to the figure below) to avoid flowing into the drive along the cables if there is liquid attached to the cables in the field.

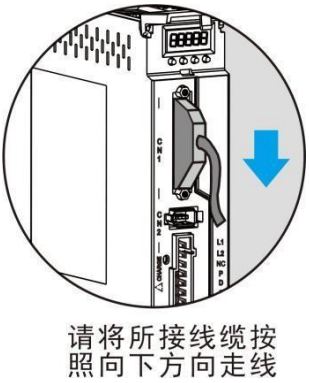


Figure 1.2 Servo Drive Cable Alignment Requirements Diagram

- mounting interval

Refer to Figure 1.3 for mounting spacing distances between drives and to other equipment, noting that the figure indicates the most

Smaller sizes, to ensure drive performance and longevity, allow as much mounting space as possible.

- radiator

The servo drive uses both natural and forced cooling methods.

- Installation Precautions

When installing the electrical control cabinet, prevent dust or iron filings from getting inside the Servo Drive.

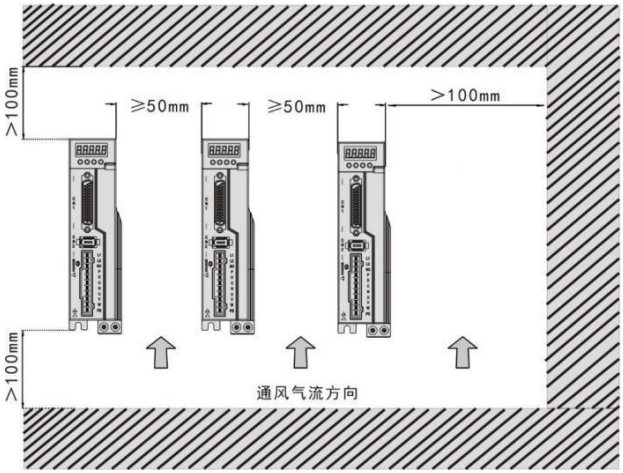


Figure 1.3 Installation interval

1.3.2 Installation environment conditions

- Operating ambient temperature: 0~40℃; operating ambient humidity: below 80% (no condensation)
- Storage ambient temperature: -40~50℃; storage ambient humidity: below 80% (no condensation)
- Vibration: 0.5G or less.
- A well-ventilated place with little moisture and dust.
- No corrosive, ignition gas, oil and gas, cutting fluid, cutting powder, iron powder and other environments.
- A place free from water vapor and direct sunlight.

1.3.3 Motor mounting method

- Horizontal mounting: To avoid liquids such as water and oil from flowing into the motor from the motor outlet end, place the cable outlet underneath.
- Vertical mounting: If the motor is mounted with the motor shaft facing upward and a gearhead is attached, be careful to prevent oil from the gearhead from seeping into the motor via the motor shaft.
- The extension of the motor shaft must be sufficient, if the extension is insufficient, it will be easy to cause vibration when the motor moves.
- When mounting and dismounting the motor, do not hit the motor with a hammer, otherwise the motor shaft and encoder will be easily damaged.

1.3.4 Definition of motor rotation direction

This manual describes the definition of the direction of rotation of the motor: facing the motor shaft, the rotation axis rotates counterclockwise (CCW) for positive rotation, and the rotation axis rotates clockwise (CW) for reverse rotation.

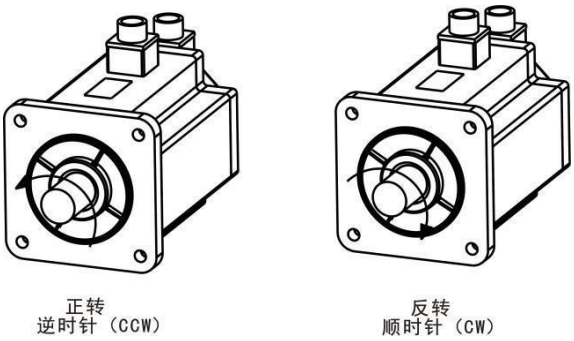


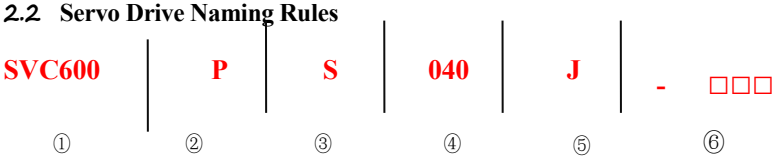
Figure 1.4 Definition of motor rotation direction

Chapter 2 Servo Specifications

2.1 Introduction to Servo Drive Specifications

model number	SVC600PS040J	SVC600PS075J
output power	0.4KW	0.75KW
Main circuit input power supply	single phase (elec.) AC220V-15%~+10% 50/60Hz	
control method	0: position control mode; 1: speed control mode; 2: torque control mode; 3: position-speed mixing Combined control mode; 4: Position torque mixing control mode; 5: Speed torque mixing control mode	
protective function	Overspeed/main power supply overvoltage/undervoltage/overcurrent/overload/encoder abnormality/control power supply abnormality/position overdifference	
monitoring function	Rotation 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 disable 4: CW drive disable 5: Deviation counter clear 6: Command pulse inhibit 7: CCW torque limit 8: CW torque limitation	
control output	Servo ready / servo alarm / positioning complete / mechanical brake	
Energy-consuming braking	Supports internal and external	
Applicable loads	Less than 3 times the motor inertia	
Display Operation	5-digit LED digital display, 4 operation keys	
communication method	RS485	
position control	input method	0: pulse + direction
		1: CCW/CW pulses
		2: A/B two-phase quadrature pulse
		3: Internal position control
	Input Electronics gear ratio	Gear ratio molecule: 1-32767
		Gear score mother: 1-32767

2.2 Servo Drive Naming Rules



serial number	hidden meaning
①	SVC600 Series Servo Drives
②	P: Pulse type
(iii)	S: 220V T: 380V
④	Power: 040 means 40*10=400W; 075 means 75*10=750W
⑤	J: Substrate mounting
(vi)	Special specifications: customized

2.3 Servo motor naming rules

serial number	hidden meaning
①	TC1 Motor Series
②	Motor Characteristics and Inertia Ratings
(iii)	Power supply S: 220V T: 380V
④	Rated power (B indicates x 10W): 75B indicates rated torque 750W.
⑤	Rated speed (C indicates x 100rpm): 30C indicates a rated speed of 3000rpm.
(vi)	Encoder type: A1: single-turn absolute 17 bits
(vii)	3: Motor shaft Solid, with key
⑧	0: no 1: oil seal 2: brake 4: brake + oil seal

1. For example, the performance parameter code 75B30C indicates a rated power of 750W and a rated speed of 3000rpm.
2. Rated torque formula: T = P / (0.1047 × N) = 750 / (0.1047 × 3000) = 2.3878

2.4 Servo Motor and Servo Drive Adaptation Table

saddle	model number	power (output) (W)	number of revolutions per	Adaptor Drive	add sth. into a group encoders
60mm	TC1H1S40B30C-A131	400	3000	SVC600P	Default: 17 bits Singleturn absolute encoders, special Request
80mm	TC1H1S75B30C-A131	750	3000		
	TC1H1S10C30C-A131	1000	2000		

Chapter 3 Driver and Motor Sizing

3.1 Drive Size

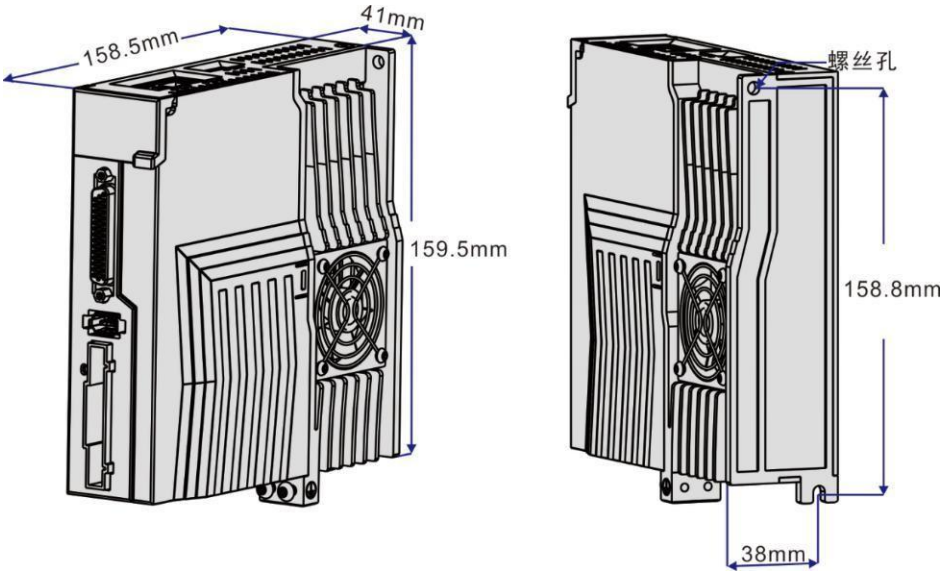


Figure 3.1 External Dimensions of SVC600P Series

3.2 Motor Size

- 60 Mounting dimensions for pedestal motors (see Figure 3.2 and Table 3-1)

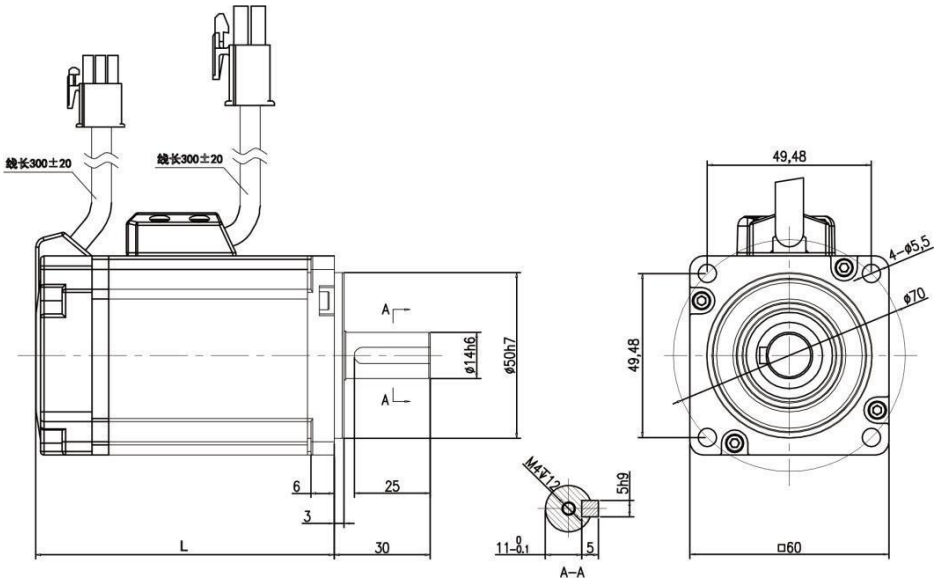


Figure 3.2 60 Motors and Table 3-1

model number	TC1H1S40B30C-A131
L (mm)	90

- 80 Mounting dimensions for pedestal motors (see Figure 3.3 and Table 3-2)

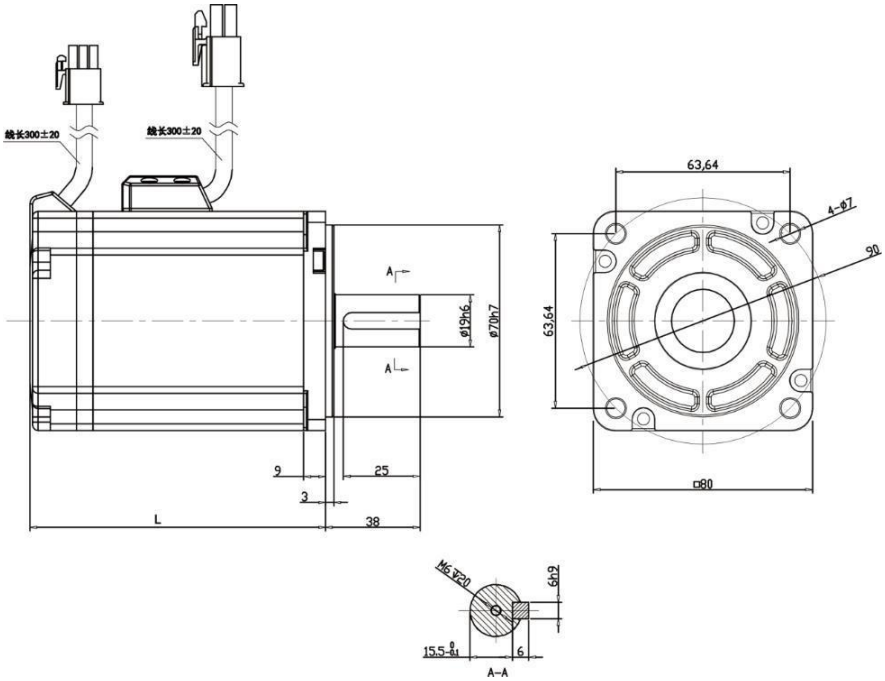


Figure 3.3 80 Motors and Table 3-2

model number	TC1H1S75B30C-A131	TC1H1S10C30C-A131
L (mm)	90	--

Chapter IV Drive System Wiring and Composition

4.1 Servo system wiring

4.1.1 Servo Drive Wiring Diagram

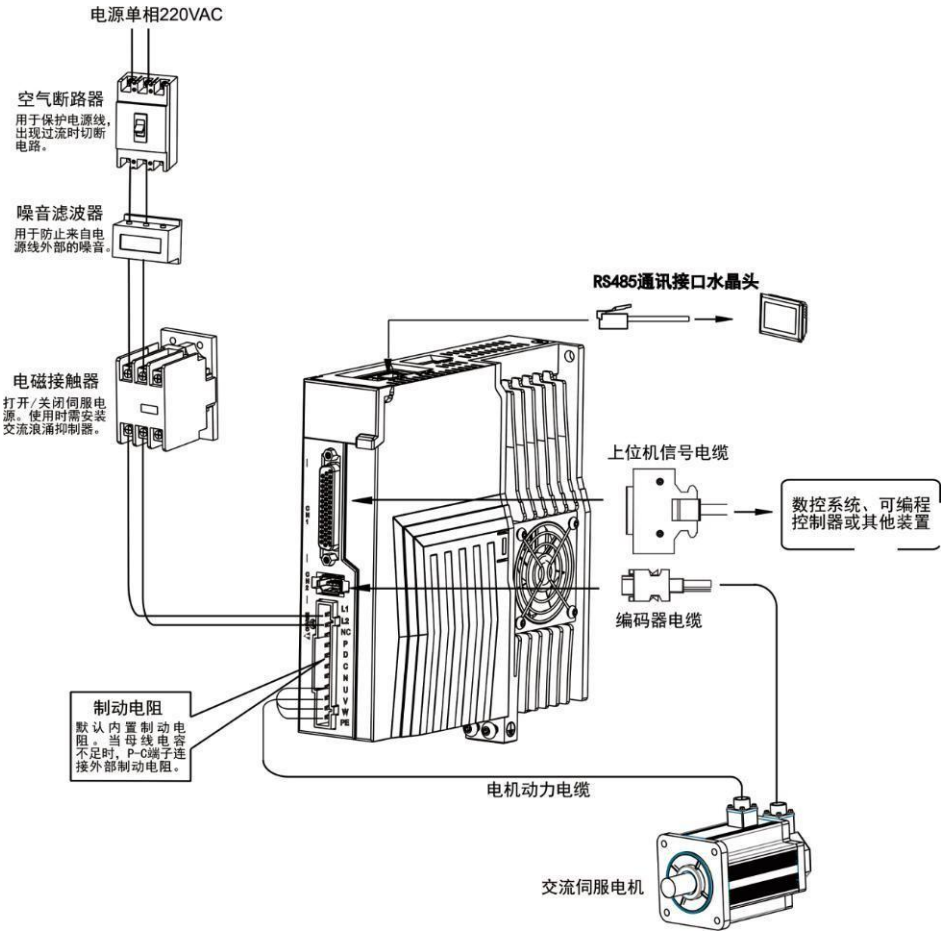


Figure 4.1 Servo System Wiring Diagram

4.1.2 Wiring Instructions

Wiring Notes:

- The cable length is within 3m for command cable and 20m for encoder.
- Check the power supply and wiring of L1,L2 for correctness. Do not connect to a 380VAC power supply if the drive supports only single-phase 220VAC.
- The phase sequence of the motor output U, V, W terminals must correspond to the corresponding terminals of the driver one by one, and the wrong motor may not rotate or fly. The motor cannot be reversed by switching the three-phase terminals, which is different from the asynchronous motor.
- Since the servo motor flows high-frequency switching current, the leakage current is relatively large, and the motor ground terminal must be connected together with the servo drive ground terminal PE and well grounded.
- Relays mounted to output signals with diodes for absorption should be connected in the correct direction, otherwise they will cause malfunctions and fail to output signals.
- To prevent false operation caused by noise, install an insulating transformer and noise filter on the power supply.
- Wiring should be done with power cables (motor cables, power cables, etc.) and signal cables more than 30cm apart, and should not be placed in the same wiring duct.
- Install a non-fused circuit breaker to disconnect the external power supply in case of drive failure.
- Because the servo driver has a large-capacity electrolytic capacitor inside, there is still a high voltage in the internal circuit even if the power is cut off, and you should wait at least 5 minutes or more after cutting off the power before touching the driver and the motor.

4.1.3 Wire specification

Connection Terminal	notation	Wire specification
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
Brake Resistor Terminal	P, D/P, C	1.5~4mm^2

◆ The encoder cable must be twisted. If the encoder cable is too long (>20m), it will result in insufficient power supply to the encoder, whose power and ground can be connected by multiple wires or by using thick wires.

4.2 Servo Driver Terminal Pinout

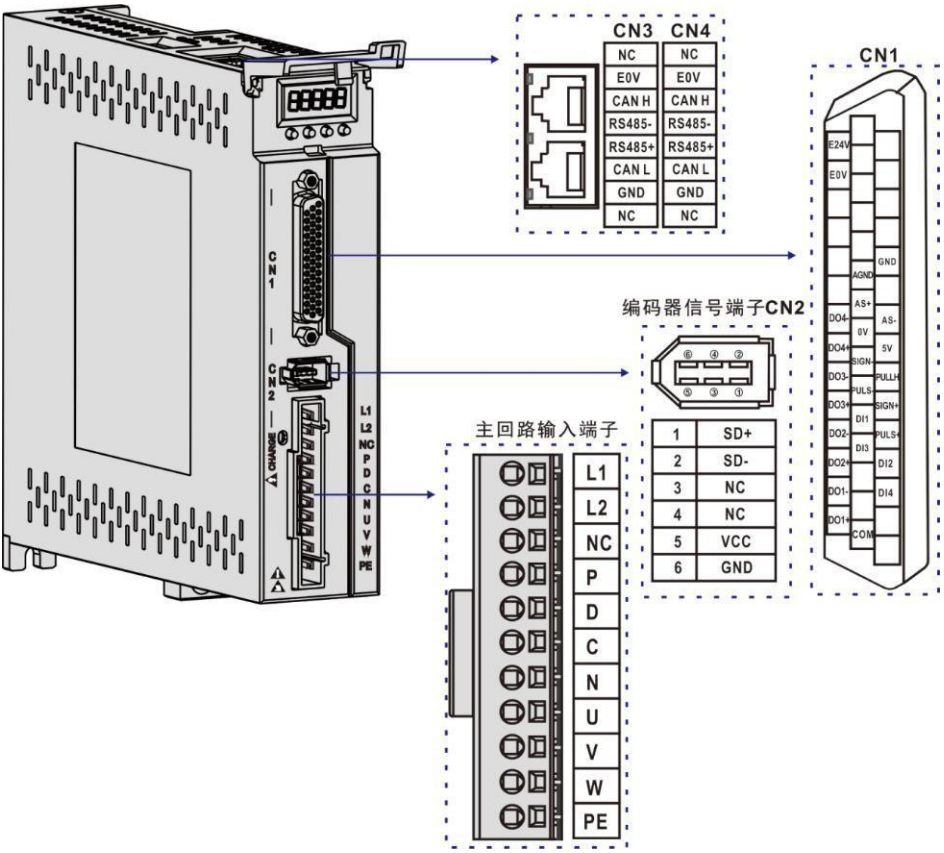


Figure 4.2 SVC600P Terminal Pinout Diagram

NOTE

◆ The above illustrations show the pinouts of the terminals that come with the driver body.

4.3 Servo Drive Main Circuit Connection

4.3.1 Main circuit terminal introduction

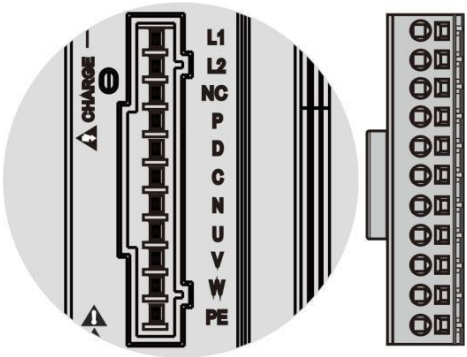


Figure 4.3 Main Circuit Terminal Pinouts

Name	Terminal Symbols	particular
Main circuit power input terminals	L1, L2	Single phase 220VAC -15%~+10%, 50/60Hz
	NC	empty end
Brake Resistor Terminal	P, D	When using the internal braking resistor, short P to D.
	P, C	When using an external braking resistor, short P to D and connect the external braking resistor wires between P and C. P and C are connected to the external braking resistor wires. N Disable connection.
Motor Connection Terminal	U, V, W	Connect to servomotor phases U, V, and W.
	⏚	Drive ground terminal, connected to the power supply and motor ground terminals.

NOTE

◆ The factory default is the internal braking resistor connection: P and D are shorted.

4.3.2 Braking Resistor Wiring Instructions

If the internal braking resistor is used, the driver should be shorted between P and D, i.e., it can be used normally according to the factory status, as shown in Fig. A. If external braking resistor is used, the short connection between P and D must be removed first, and then the external braking resistor will be connected across P and C, as shown in Figure B:

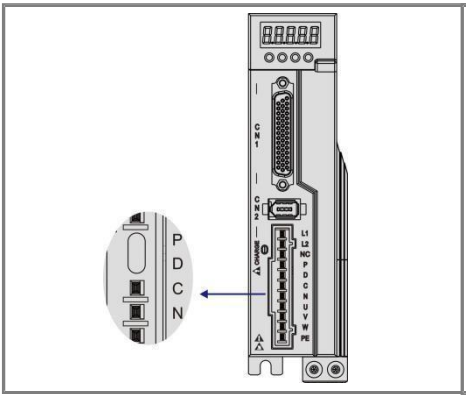


Figure A

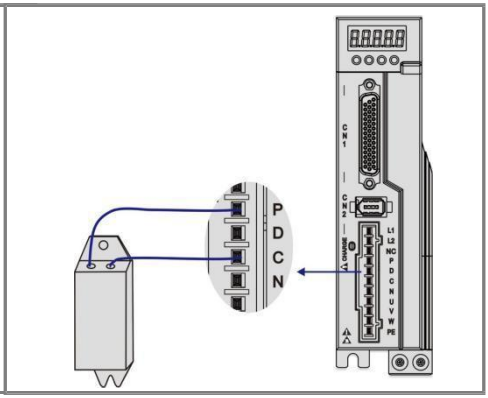


Figure B

Brake resistor wiring precautions:

- Do not connect the external braking resistor to the positive and negative terminals P and N of the busbar, as this will cause the machine to blow up and cause a fire;
- Do not go below the minimum allowable resistance value of 25Ω, as

4.4 CN1 Control signal terminal

4.4.1 CN1 Control Signal Terminal Description

The CN1 control signal terminal provides the signals required for connection to the host controller, using a DB44 socket, and the signals are included:

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

4.4.2 CN1 Terminal Connector Pinout

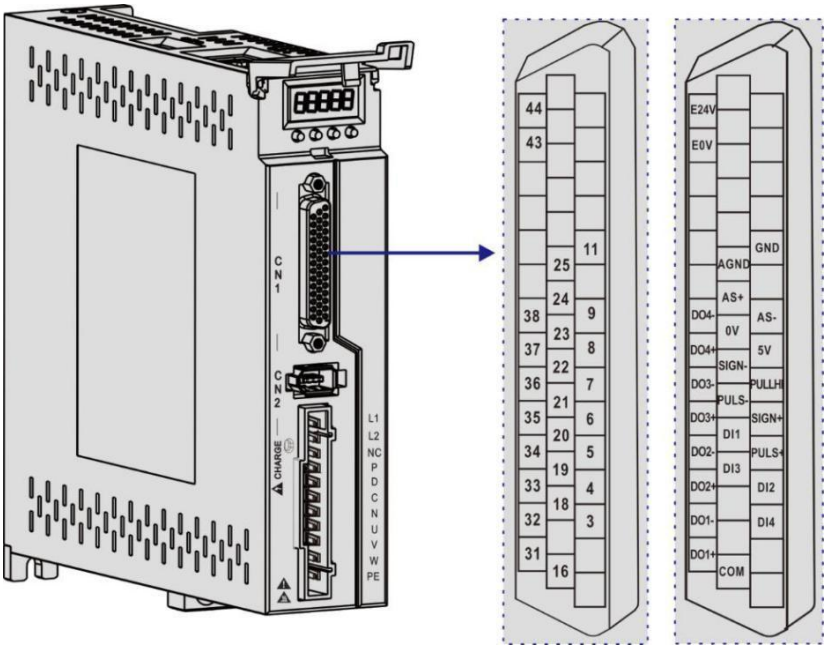


Figure 4.4 Driver CN1 Terminal Connection Pinouts

NOTE

◆ 24-26AWG gauge cable is recommended.

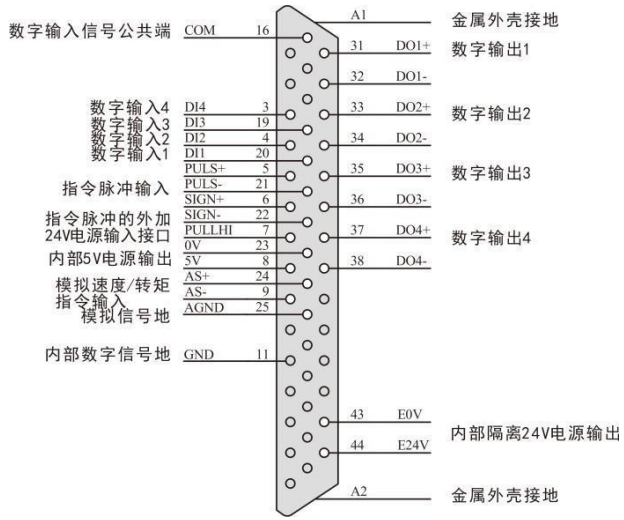


Figure 4.5 Driver CN1 Terminal Pinouts

4.4.3 Position command input signal description

Signal Name		pin number	functionality
Position pulse command	PULS+	5	High-speed opto-isolated input, parameter PA14 sets the operating mode: ● Pulse + Direction ● CCW/CW Pulse ● A, B two-phase quadrature pulse input ● Internal position control input
	PULS-	21	
	SIGN+	6	
	SIGN-	22	
	PULLHI	7	External 24V power input connector for command pulses
	GND	11	Internal digital signal ground

The command pulse output circuit on the upper unit side can be selected from two types: 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)
increment	500k	1
Open collector	200k	2.5

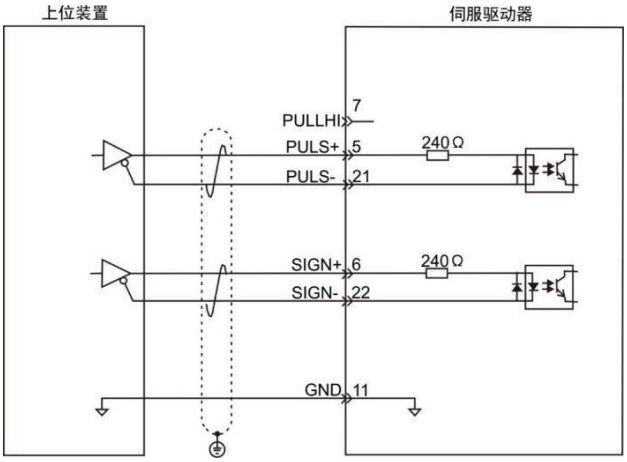
NOTE

◆ An output pulse width of the upper unit that is less than the minimum pulse width value will cause the driver to receive pulses incorrectly.

◆ The ports between PULS+ and PULS- and between SIGN+ and SIGN- only support signal level inputs up to 5V, signals above 5V must be connected to an external resistor in series, otherwise the driver will be damaged.

Pulse Command Input Circuit Schematic

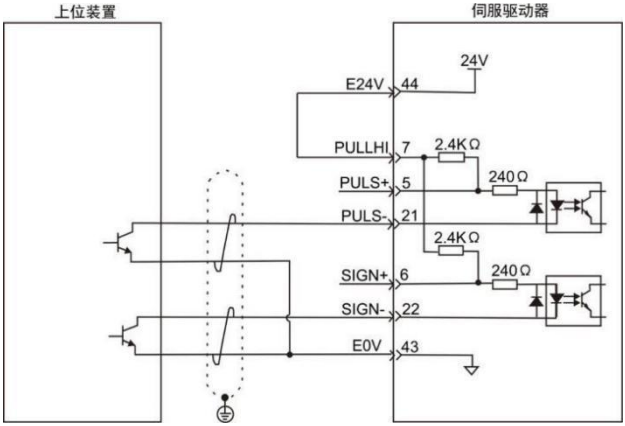
1） When differential



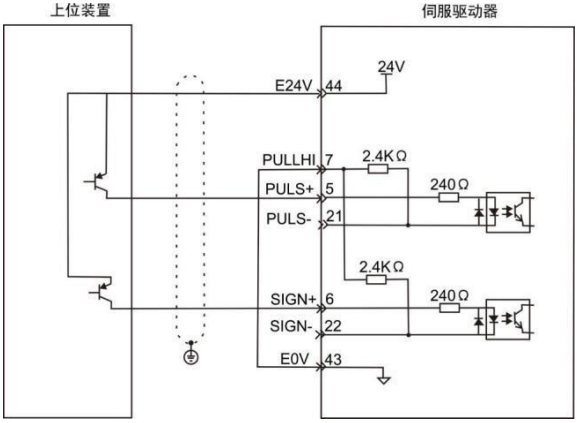
2） When open collector mode

A） When using the servo driver's internal 24V power supply:

- Common positive connection, e.g. Mitsubishi PLC.



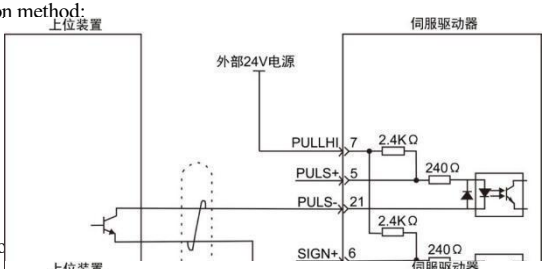
- Common negative connection: e.g. Siemens PLC.



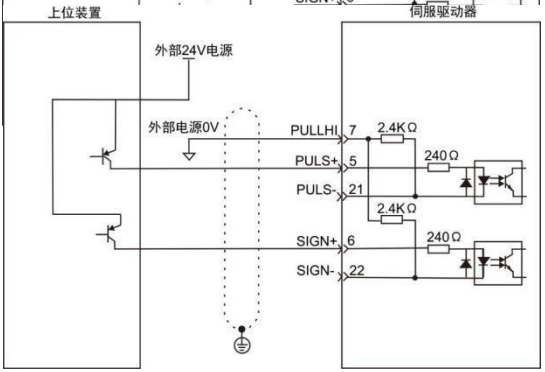
B） When using an external power supply:

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

- Co-positive connection method:

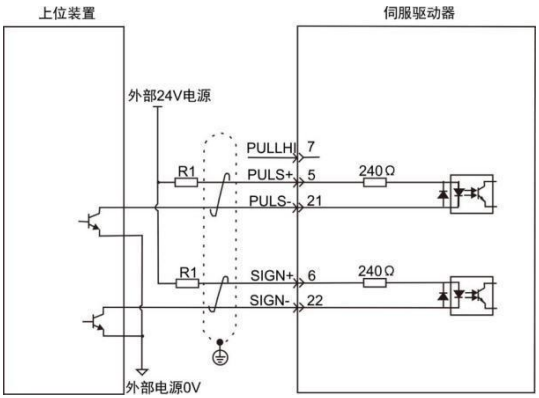


- Common Negative Co

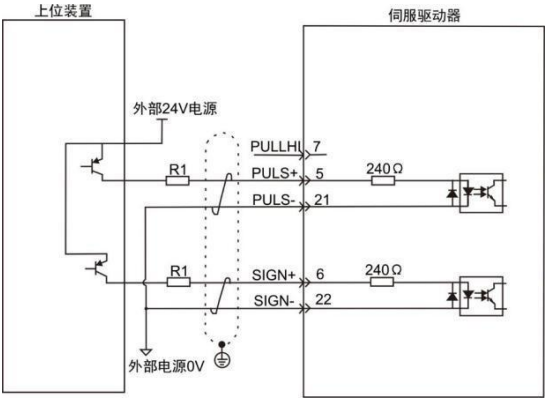


Option 2: Use an external resistor for the driver.

- Co-positive connection method:



- Common Negative Connection:



NOTE

◆ The formula for selecting resistor R1:

◆

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

Table 4-1 Recommended R1 Resistance Values

VCC Voltage	R1 Resistance	R1 Power
24V	2.4KΩ	0.5W
12V	1.5KΩ	0.5W

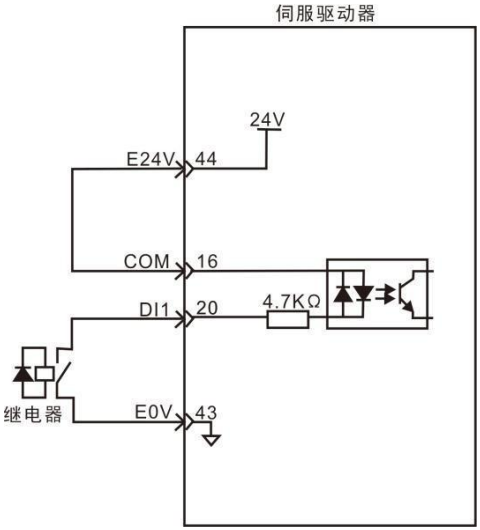
4.4.4 Description of digital input and output signals

Signal Name		pin number	default function	clarification
digital input	DI1	20	Servo Enable	Opto-isolated inputs, functionally programmable, defined by P3 group parameters P3-0 to P3-17. Note: COM terminal is common positive or common negative connector, input level is 12V-24V.
	DI2	4	Alarm Clearance	
	DI3	19	Positive Rotation Drive prohibited	
	DI4	3	inverted drive prohibited	
	COM	16	digital input signal public address	
digital output	DO1+	31	Servo ready.	Opto-isolated output, functionally programmable, defined by P3 group parameters P3-20 to P3-23.
	DO1-	32		
	DO2+	33	Alarm output	
	DO2-	34		
	DO3+	35	Positioning complete.	
	DO3-	36		
	DO4+	37	electromagnetic brake	
	DO4-	38		
internal isolation power output (other electrical devices etc)	E0V	43	Internal 0V	Internal isolated 24V power output, voltage range 20V~28V, Maximum output current 100mA.
	E24V	44	Internal 24V	

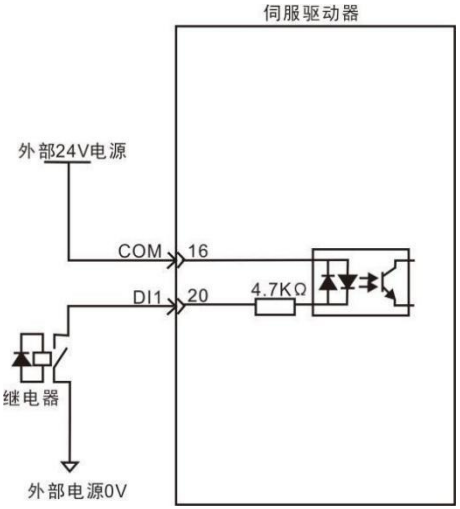
- **Digital Input Circuit Schematic**

Take DI1 as an example to illustrate, DI1~DI4 interface circuits are the same. 1) When the upper unit is a relay output

A) When using the servo driver's internal 24V power supply:

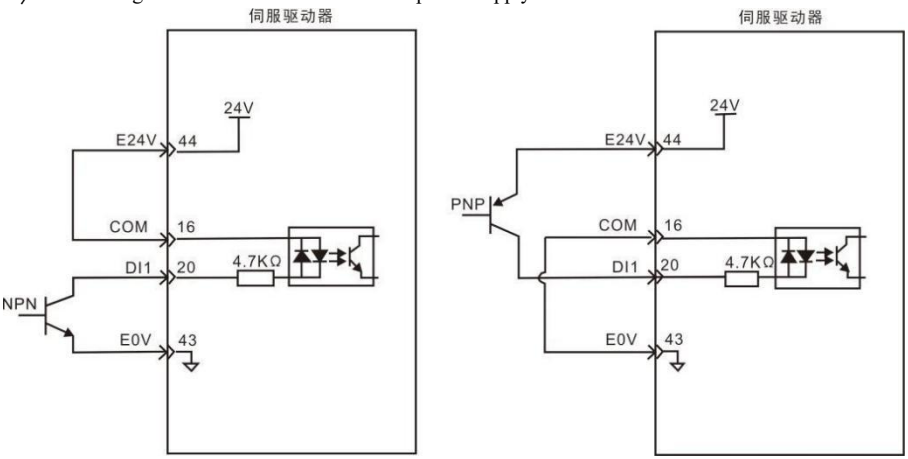


B) When using an external 24V power supply:

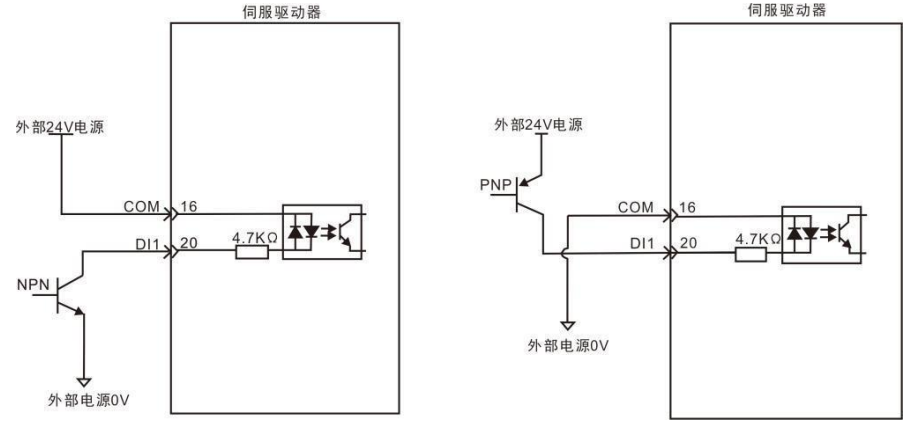


2) When the upper unit is an open collector output

A) When using the servo driver's internal 24V power supply:



B) When using an external 24V power supply:



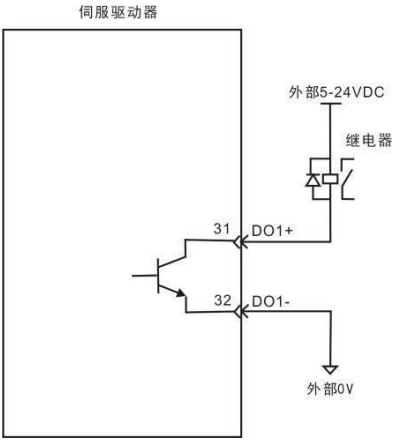
Attention:

- Mixing of PNP and NPN inputs is not supported.

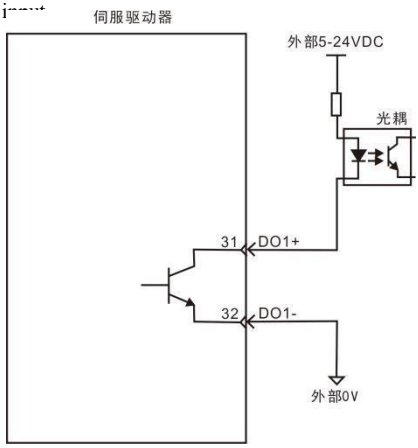
- **Digital Output Circuit Schematic**

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

1) When the upper unit is a relay input.



2) When the upper unit is an optocoupler input.



- ◆ When the upper unit is a relay, be sure to connect a continuity diode, otherwise the DO port may be damaged or strong signal interference may result.
- ◆ The maximum allowable voltage and current capacity of the servo driver's internal optocoupler output circuit is as follows:
- ■ Voltage: DC30V
- ■ Current: DC50mA

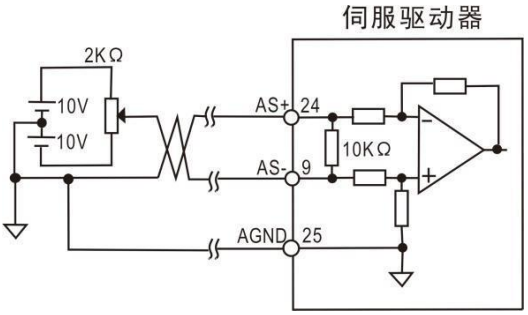
4.4.5 Analog Command Signal Description

Signal Name		pin number	functionality
Analog command input	AS+, AT+	24	Analog input for speed/rotation, range: -10V~+10V.
	AS-, AT-	9	
	AGND	25	

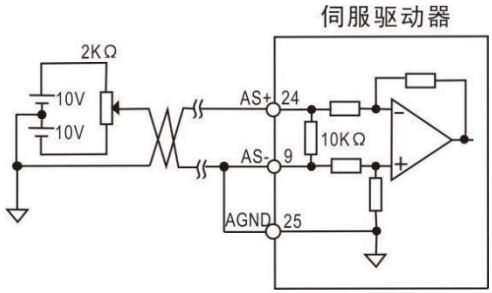
Pulse command input interface schematic

There are two types of connection methods: differential input and single-ended input, and it is recommended to use the differential input connection method. The speed and torque share a common analog input, input range: -10V~+10V, input impedance is about 10KΩ. zero bias of the analog input is normal, and can be compensated by the parameter.

1） When analog differential input



2） When analog single-ended input



4.4.6 Wiring instructions for holding brake

A holding brake is a mechanism that prevents the servo motor shaft from moving when the servo drive is in a non-operational state, keeping the motor locked in position so that the moving parts of the machinery do not move due to self-weight or external forces.

Schematic diagram of holding brake signal circuit

Brake Wiring Brake input signal connections are not polarized and require the user to have a 24V power supply. An example of a standard connection between the brake signal BK and the brake power supply is shown below:

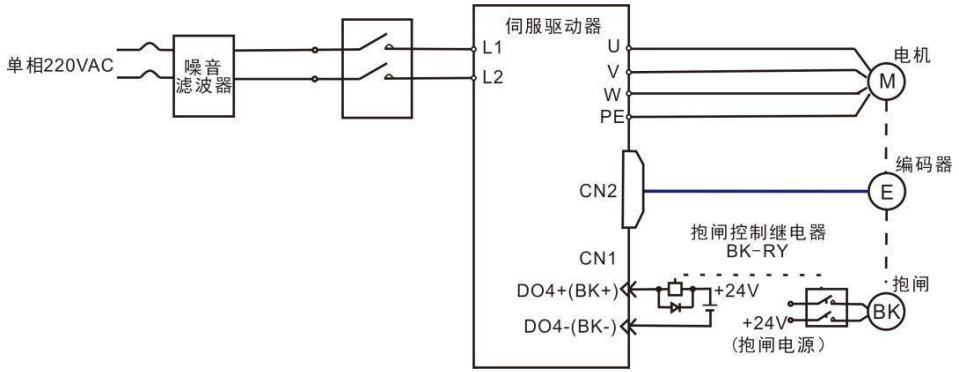


Fig. 4.6 Wiring diagram for holding brake signal

Attention:

◆ The holding brake mechanism built into the servomotor is a non-electrically actuated fixed special mechanism that cannot be used for braking purposes, and is used only to keep the servomotor in a stopped state.

◆ The holding coil has no polarity.

◆ The servo on signal (Servo On) should be cut off after the servo motor stops.

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

◆ When the holding brake coil is energized (holding brake open state), magnetic flux leakage may occur at the shaft end and other parts. Be careful when using instruments such as magnetic sensors for motor attachments.

◆ The holding brake is prohibited 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 holding brake to malfunction.

◆ Recommended for cables of 0.5mm² or more.

4.5 CN2 Encoder signal terminal

4.5.1 CN2 Terminal Plug Schematic

CN2 Diagram of the encoder signal terminal connected to the motor encoder.

The terminals for the encoder use 6PIN sockets with the following shape and pinout:

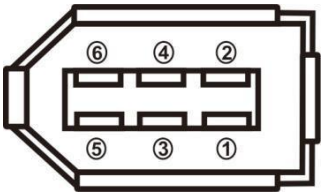


Figure 4.7 CN2 encoder signal terminals

4.5.2 Encoder terminal signal description

Signal Name		pin number	functionality
Encoder Signal Power Supply	5V	5	5V power supply for the encoder (supplied by the driver), cables on the
	0V	6	When 20m or more, the power and ground wires can be connected with multiple wires or use thick wires in order to prevent the voltage of the encoder from decreasing.
Positive absolute encoder communication	SD+	1	Positive absolute encoder communication
Absolute encoder communication negative terminal	SD-	2	Absolute encoder communication negative terminal
empty end	NC	3	reservations
empty end	NC	4	reservations
Shielded Wire Protective Ground	Plugs Metal Shell		Connecting the encoder cable shield

4.6 CN3 and CN4 Communication Interface

4.6.1 Communication port wiring diagram

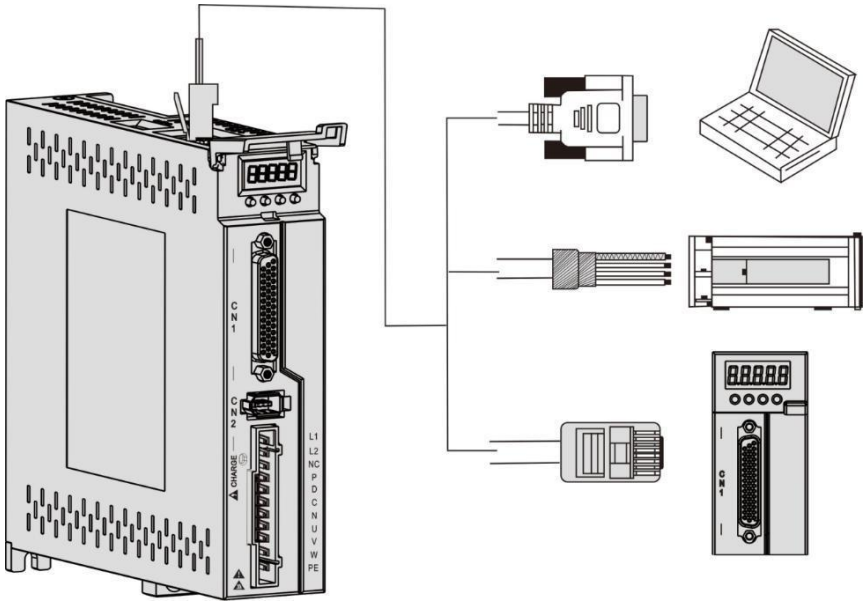
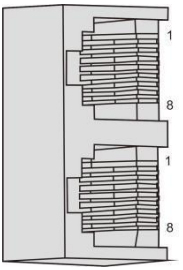


Figure 4.8 Wiring Diagram of Communication Port

4.6.2 Communication Port Pin Definition Description

The communication connection between the drive and PC, PLC and the drive can be realized through the CN3 and CN4 ports on the drive, in which the pins of CN3 and CN4 are defined as follows:

pin number	CN3	name (of a thing)	CN4	name (of a thing)	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 connector	RS485 -	RS485 communication connector	
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	

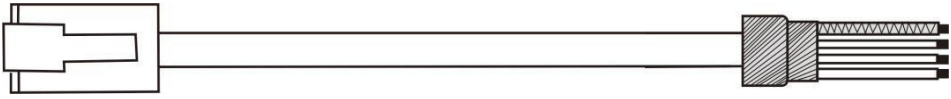
Attention:

- It can be connected to a PC or host computer controller through a special serial cable, and is not allowed to be plugged or unplugged with electricity.
- It is recommended to use a twisted pair or shielded cable with a length of less than 2 meters.
- When multiple machines are connected in series, CN3 connects to CN4 of the previous drive and CN4 connects 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), connect the PE terminal of the host computer to the terminal of the driver with a reasonable grounding; in this case, it is prohibited to connect the 485 signal ground of the host computer to the 485 signal ground (GND) of the driver, otherwise the driver may be damaged.

4.6.3 485 Communication Network Connection Description

1. 485 communication connection with PLC

When 485 communication networking is used, the connection cables between the driver and PLC are as follows:



A B

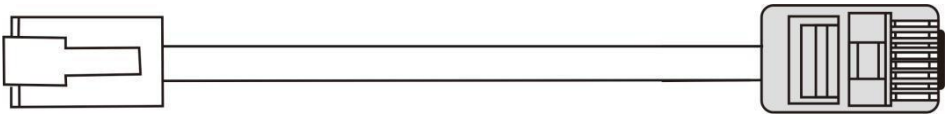
Figure 4.9 Schematic diagram of servo drive and PLC communication cable

Table 4-2 Pin Connection Relationship of Servo Driver and PLC Communication Cable

Drive Side RJ45 (Side A)		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)	clamshell	PE (shielded mesh layer)	clamshell

2. 485 communication connection for parallel connection of multiple machines

When 485 communication networking is used, the connection cables for multiple parallel connections of servo



drives are as follows:

A B

Fig. 4.10 Schematic diagram of servo drives with multiple parallel cables

Table 4-3 Servo Drive Multi-Computer Parallel Communication Cable Pin Connection Relationships

Drive Side RJ45 (Side A)		Drive Side RJ45 (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)	clamshell	PE (shielded mesh layer)	clamshell

3. 485 Communication Grounding Precautions

When RS485 communication is used, an example of connecting the GND terminal of the upper unit to the GND terminal of the servo driver is shown below:

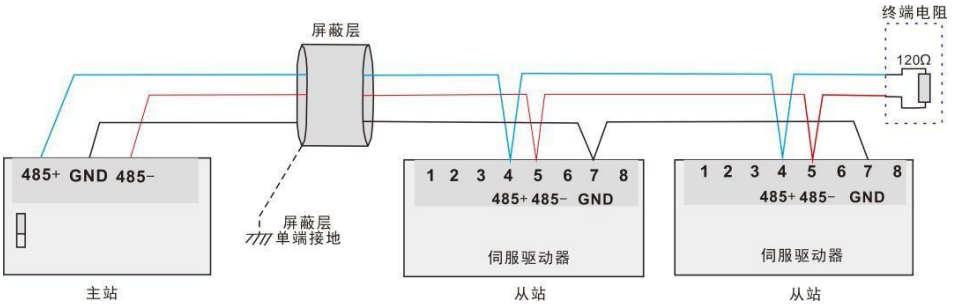
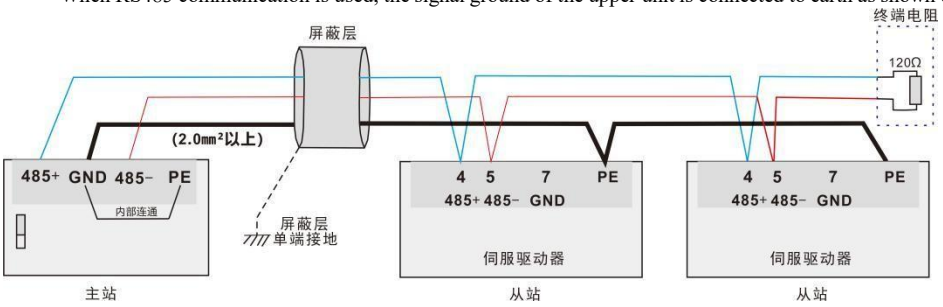


Figure 4.11 Schematic diagram of 485 communication connection

When RS485 communication is used, the signal ground of the upper unit is connected to earth as shown below:



Attention:

- The PLC has a built-in 485 communication terminal resistor.
- It is recommended that the shield be grounded at one end.
- Do not connect the GND terminal of the upper unit to the E0V terminal of the servo drive as this will damage the machine.

4.7 Anti-jamming countermeasures for power wiring

To suppress interference, take the following measures:

- The length of the command input cable should be 3m or less, and the length of the encoder cable should be 20m or less.
- Use thick wires for grounding wiring whenever possible. (2.0mm² or more)
- Please use a noise filter to prevent RF interference. When used in a residential environment or in an environment with high power supply interference, install a noise filter on the input side of the power cord.
- To prevent incorrect operation caused by electromagnetic interference, the following treatment can be used: 1) Install the upper unit 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） Separate strong power lines from weak power lines when wiring and keep a distance of 30cm or more. Do not put them into the same pipe or bundle them together.

4） Do not share the power supply with welding machines, electric discharge processors, etc. When a high-frequency generator is 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

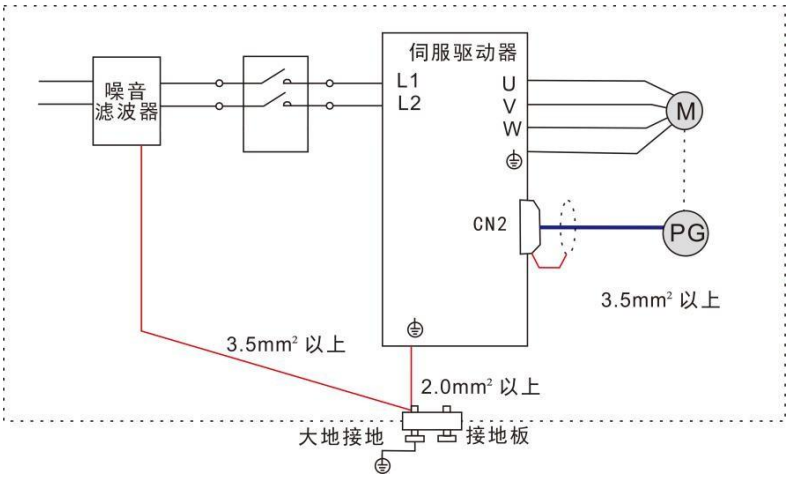


Figure 4.12 Example of anti-interference wiring

NOTE

◆ Use a thick wire of 3.5 mm² or more if possible, braided copper wire is recommended, for the connection cable of the outer box for grounding.

2. Grounding

To avoid possible EMI problems, ground as follows.

1) Grounding of servo motor housing

Please connect the ground terminal of the servo motor to the ground terminal PE of the servo driver and ground the PE terminal reliably to reduce potential EMI problems.

2) Encoder Cable Shield Grounding

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

4.7.2 How to use the noise filter

To prevent interference from the power supply line and weaken the servo driver's influence on other sensitive equipment, select the appropriate noise filter at the power supply input depending on the amount of input current. Also, install noise filters at the power supply lines of peripheral devices as necessary. Please observe the following precautions when installing and wiring noise filters to prevent the filter from being ineffective.

- Separate the noise filter input and output wiring; do not route them into the same conduit or bundle them together.

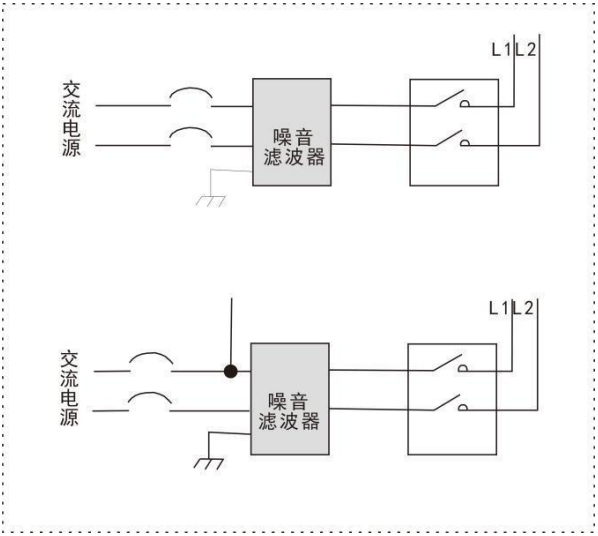


Figure 4.13 Example of noise filter input and output wiring split alignment

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

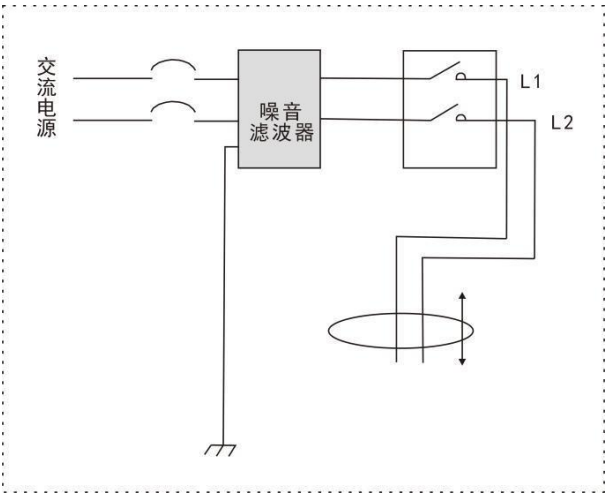


Figure 4.14 Noise Filter Ground and Output Wiring Separation Schematic

- The noise filter needs to be grounded separately using the shortest possible thick wire; do not share a ground wire with other grounding equipment.

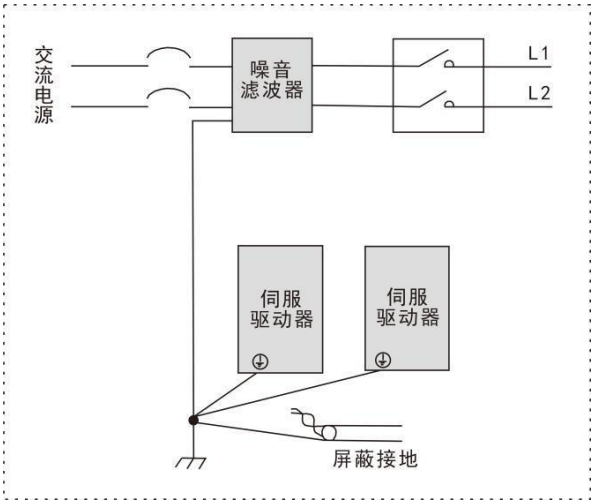


Figure 4.15 Schematic diagram of single point grounding

- Ground handling for noise filters installed in the control cabinet.

When the noise filter is installed in the same control cabinet as the servo drive, it is recommended that the filter and the servo drive be fixed to the same metal plate to ensure that the contact parts are conductive and well lapped, and that the metal plate is grounded.

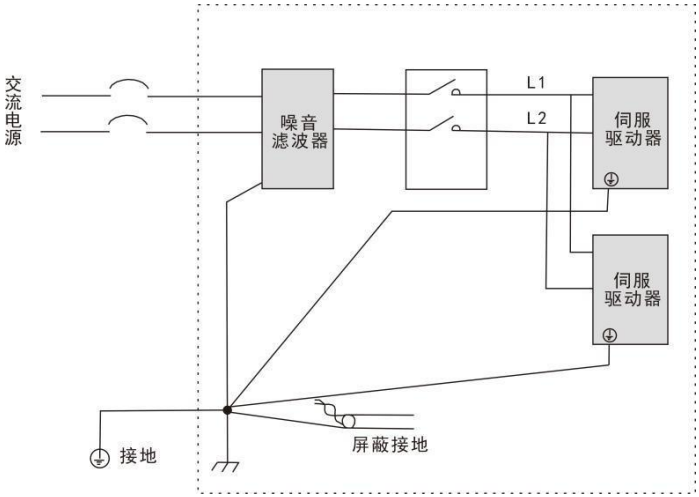


Figure 4.16 Schematic diagram of noise filter ground handling

Chapter 5 Operation Mode and Control Wiring Diagram

According to the command mode and operation characteristics of servo drives, they can be categorized into three operation modes: position control operation mode, speed control operation mode, torque control operation mode, and so on.

- The position control mode generally determines the displacement of movement by the number of pulses, and the frequency of externally input pulses determines the amount of rotation speed. Because the position mode allows strict control of position and speed, it is generally applied to positioning devices. It is the control mode with the most servo applications and is mainly used in robotics, mounter, engraving, milling and carving, CNC machine tools and so on.
- Speed control mode is to control the rotation speed through the analog give and take, digital give and take, communication give and take, mainly used in some constant speed occasions. Such as the application of engraving and milling machine, the upper computer adopts the position control mode, the servo drive adopts the speed control mode.
- The torque control mode is to control the size of the torque through analog giving, digital giving and communication giving. It is mainly used in the winding and unwinding devices which have strict requirements on the force of the material, such as the winding device or the fiber pulling equipment and other tension control occasions. The torque setting should be changed at any time according to the change of the winding radius to ensure that the force of the material will not be changed with the change of the winding radius.

5.1 Position Control Mode

5.1.1 Position Mode Description

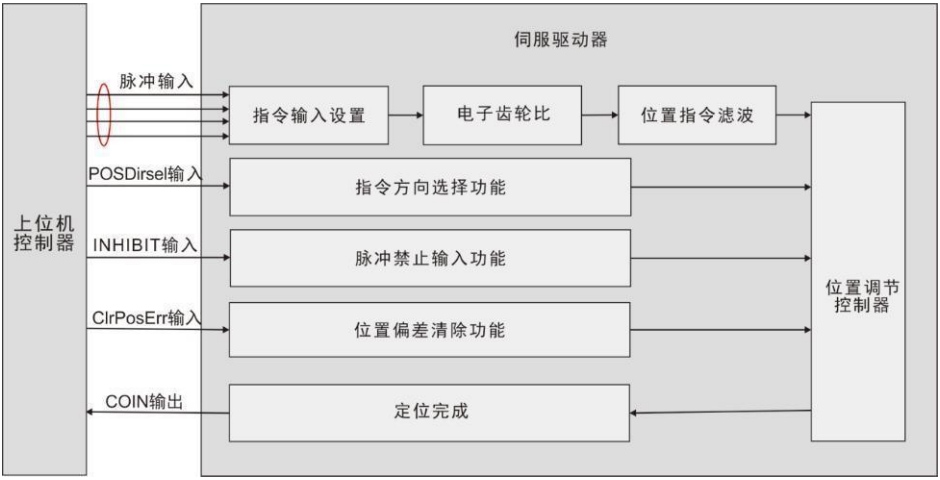


Figure 5.1 Block diagram of position control mode

Position mode is a common operating mode for servo drives, and the main steps for its use are shown below:

1） Correctly connect the servo main circuit and control circuit power supply, as well as motor power line and encoder line, after power on the servo panel display "r O" means that the servo power supply and encoder wiring is correct.

2） Perform a servo JOG test run by pressing the button to confirm that the motor can operate normally.

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

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

5） Servo enable to control the servo motor rotation by sending position commands from the upper computer. First, make the motor rotate at low speed and confirm whether the rotation direction and electronic gear ratio are normal, and then make gain adjustment.

5.1.2 Position Mode Wiring

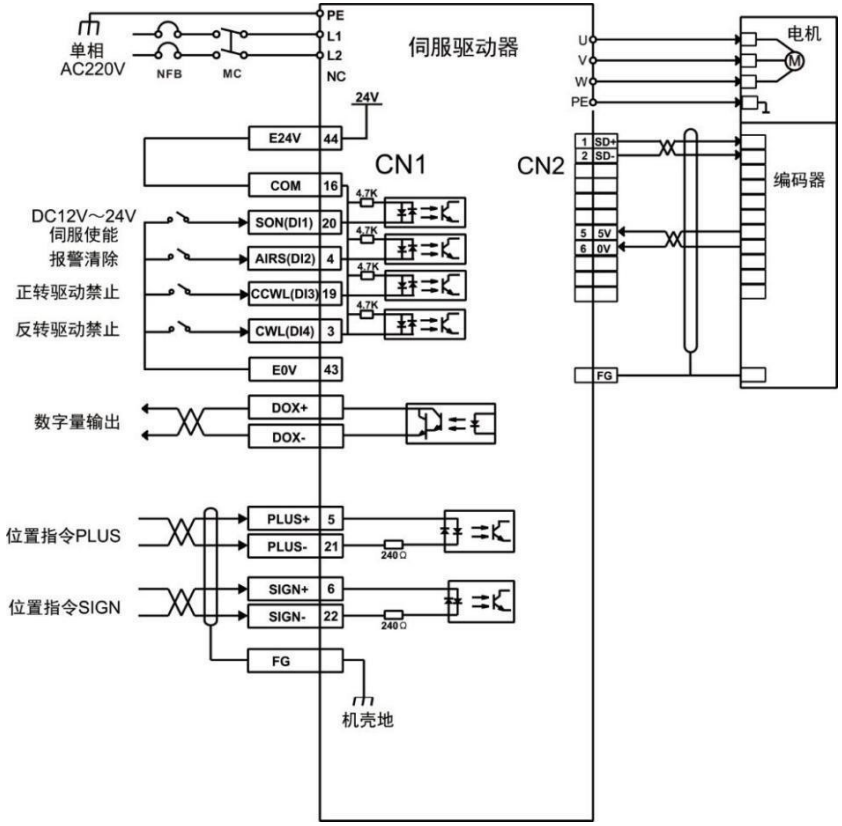


Figure 5.2 Position Mode Wiring Diagram

◆ The internal +24V supply voltage range is 20V~28V and the maximum operating current is 100mA. If an external 24V supply is used, connect the external +24V supply to pin 16 (COM) and the external 0V supply to pin 43 (E0V).
◆ DO output power supply should be provided by the user, power supply range 5V~24V. Maximum allowable voltage of DO port is DC30V, maximum allowable current is 50mA.

5.1.3 Parameters to be adjusted in position control mode

- **Gain and smoothing filter parameter adjustment**

required parameter	Parameter description	parameter value	Factory Default
PA4	Control mode 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 parameter	Parameter description	parameter value	Factory Default
PA11	Number of command pulses for 1 motor revolution	0-30000	10000
PA12	Position Command Pulse Electronic Gear First Molecule	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 reversal	0-1	0
PA59	Command pulse active edge	0-1	0
PA77	Position command pulse electronic gear ratio second molecule	1-32767	0
PA78	Position command pulse electronic gear ratio third molecule	1-32767	0
PA79	Position Command Pulse Electronic Gear Ratio Fourth Molecule	1-32767	0
PA80	Command direction signal active 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 parameter	Parameter description	parameter value	Factory Default
PA16	Locate the scope of completion	0-3000 pulses	130
PA17	Position out-of-range detection	0-30000 x 100 pulses	6000
PA18	Position overrun error invalid	0-1	0
PA83	CWL,CCWL Directionally Prohibited Mode	0-1	0
PA84	Positioning Completion Return Difference	0-32767	65
PA85	Positioning proximity range	0-32767	6500
PA86	Positioning Approach Difference	0-32767	650

- **Adjustment of Input/Output Terminal Related Parameters**

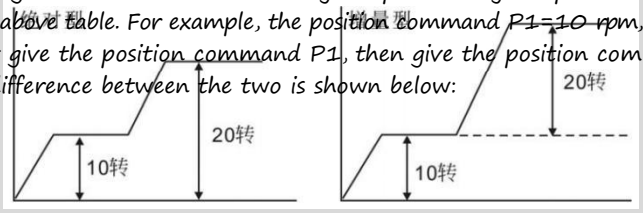
required parameter	Parameter description	parameter value	Factory Default
PA55	Input terminal effective level control word	0000-1111	0000
PA57	Output Terminal Effective Level Control Word	0000-1111	0000
PA58	IO input terminal de-jitter time constant	1-20ms	2
P3-0	Digital Input DI1 Function	0-99	1
P3-1	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 Forced 1	00000000-11111111	00000000
P3-16	Digital Input DI Forced 2	00000000-11111111	00000000
P3-17	Digital Input DI Forced 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

◆ Status of POS0-2: 0 for contact break (open), 1 for contact path (close). CTRG

↑ represents the moment when the connection changes from a break (0) to a path (1). max represents the command pulse for one motor revolution.

Absolute position registers are widely used and are equivalent to a simple program control. Users can easily complete the cyclic operation by using the above table. For example, the position command P1=10 rpm, P2=20 rpm, first give the position command P1, then give the position command P2. the difference between the two is shown below:



- **Internal Position Pr Mode Position Command Description and Related Parameters**

The Pr position command source is the built-in position command registers using the parameters (P4-2, P4-3)-(P4-23, P4-24) in groups of eight, and together with the external I/Os (CN1, POS0-POS 2, and CTRG) you can select one of the groups of eight to be used as the position command:

placement command	POS2	POS1	POS0	CTRG	homologous parameters	clarification	travel speed processor 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)	

5.2 Speed control mode

5.2.1 Speed Mode Description

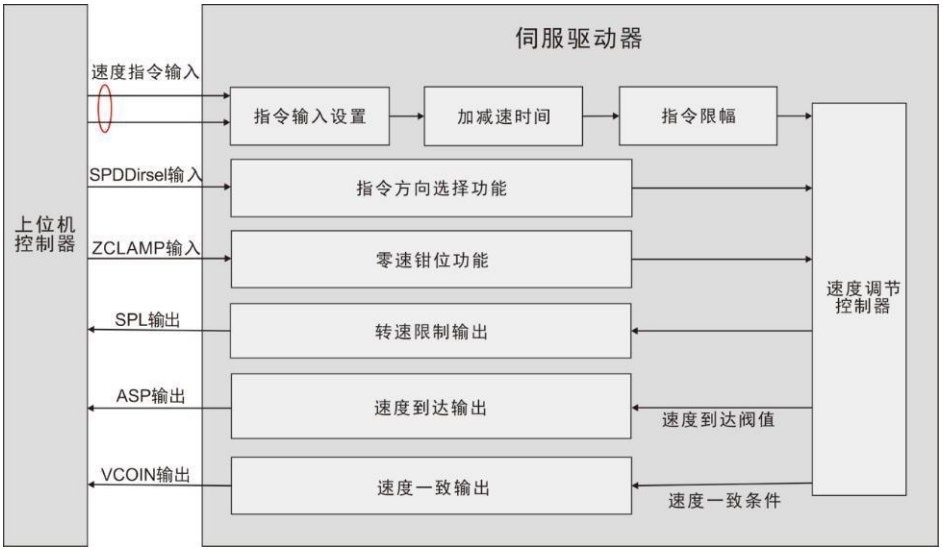


Figure 5.3 Speed Control Mode Block Diagram

The main steps for using the speed mode are shown below:

1） Correctly connect the servo main circuit and control circuit power supply, as well as the motor power line and encoder line, after power on the servo panel display "r 0" means that the servo power supply and encoder wiring is correct.

2） Perform a servo JOG test run by pressing the key to confirm that the motor can operate normally.

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

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

5） Servo enable to control the servo motor rotation by sending position commands from the upper computer. First, make the motor rotate at low speed and confirm whether the rotation direction and electronic gear ratio are normal, and then make gain adjustment.

5.2.2 Speed Mode Wiring

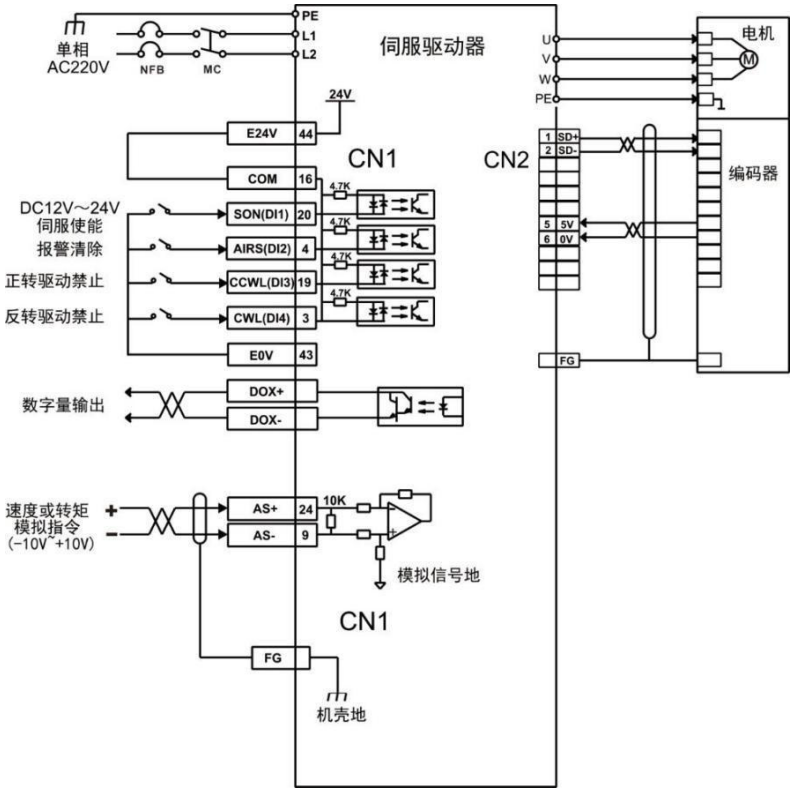


Figure 5.4 Speed Mode Wiring Diagram

5.2.3 Parameters to be adjusted in speed control mode

- **Parameters to be adjusted for the speed control method**

required parameter	Parameter description	parameter value	Factory Default
PA4	Control mode selection	1	0
PA5	Speed proportional gain	5-2000Hz	150
PA6	Velocity constant of integration	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	speed of arrival	0-3000r/min	3000
PA40	Acceleration time constant	1-10000ms	100
PA41	Deceleration time constant	1-10000ms	100
PA42	S-type acceleration and deceleration time constants	0-1000ms	0
PA43	Analog speed command input gain	10-3000r/min/v	300
PA44	Reverse direction of analog speed command	0-1	0
PA45	Zero offset compensation for analog speed commands	-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 velocity return difference	0-5000r/min	30
PA88	Arrival velocity polarity	0-1	0
PA92	Zero Speed Detection Return	0-1000r/min	5

5.3 Torque control mode

5.3.1 Torque Mode Description

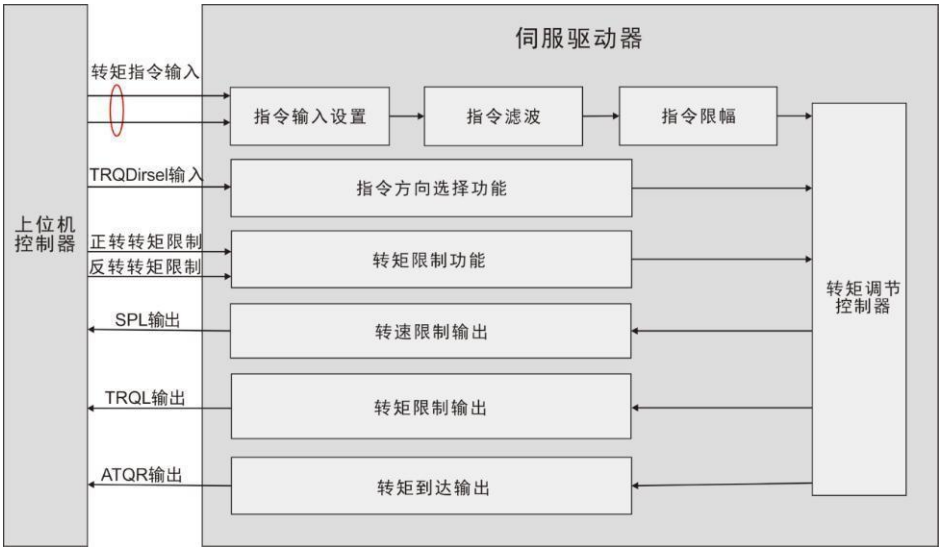


Figure 5.5 Block diagram of torque control mode

The main steps for using the torque mode are shown below:

1） Correctly connect the servo main circuit and control circuit power supply, as well as the motor power line and encoder line, after power on the servo panel display "r O" means that the servo power supply and encoder wiring is correct.

2） Perform a servo JOG test run by pressing the key to confirm that the motor can operate normally.

3） Refer to Figure 5.6 Wiring Instructions to connect the required DI/DO signals in the CN1 terminals, such as servo enable, alarm clear, positioning completion signal, etc.

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

5） Servo enable to control the servo motor rotation by sending position commands from the upper computer. First, make the motor rotate at low speed and confirm whether the rotation direction and electronic gear ratio are normal, then make gain adjustment.

5.3.2 Torque Mode Wiring

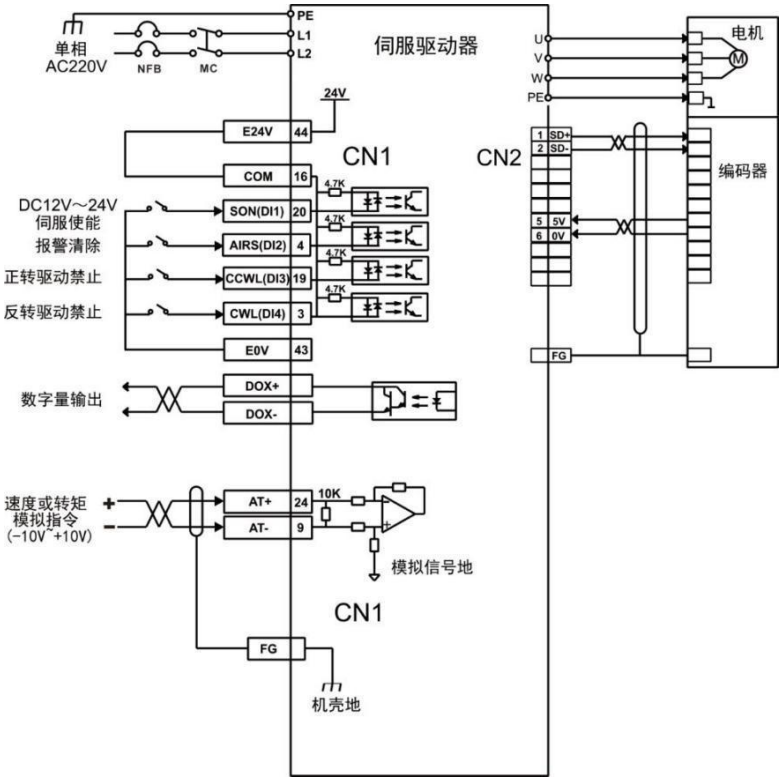


Figure 5.6 Torque Mode Wiring Diagram

5.3.3 Parameters to be adjusted in speed control mode

- **Torque control method requires parameter adjustment**

required parameter	Parameter description	parameter value	Factory Default
PA4	Control mode selection	2	0
PA29	Analog torque command input gain	Setup on demand	30
PA32	Internal and external torque command selection	0-2	0
PA33	Reverse direction of analog torque command input	0	0
PA39	Analog Torque Command Zero Offset Compensation	0	0
PA50	Speed limitation during torque control	Setup on demand	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 methods	0-1	0
PA89	Arrival torque	-300%-300%	100
PA90	Arrival torque return	0%-300%	5
PA91	Arrival torque polarity	0-1	0

5.4 Description of origin regression function and related parameters

5.4.1 Related Setting Parameters

required parameter	Parameter description	parameter value	Factory Default
P4-32	Home Detector Types and Finding Direction Settings	0-5	0
P4-33	Setting of the short distance travel method to the home position	0-2	0
P4-34	Home Trigger Activation Mode	0-2	0
P4-35	Home stop mode setting	0-1	0
P4-36	First high speed home return speed setting	1-2000 r/min	1000
P4-37	Second low-speed home return speed setting	1-500 r/min	50
P4-38	Number of home return offset revolutions	+/-30000	0
P4-39	Number of home return offset pulses	+/-max cnt	0

5.4.2 Description of Home Return Mode (must be used in Internal Position Mode)

A. Home Trigger Initiation Mode (P4-34)

The origin-triggered startup mode is divided into two categories: automatic execution of the origin return function

and contact-triggered origin return function:

P4-34=0: Disables the home return function. When P4-34 is set to 0, the home return function cannot be activated regardless of other settings.

P4-34=1: The home return function is automatically executed when the power supply is turned on. This function is effective only once when the power supply and servo are turned on, i.e., it is used under operating conditions where the home return is not to be performed repeatedly during servo operation. This function allows you to omit one of the input contacts used to perform home return.

P4-34=2: Home return function triggered by SHOM input contact. To set this function, one of the input pin function planning registers (P3-0 to P3-3) must be set to the SHOM trigger home return function. The SHOM contact can be triggered at any time during servo operation and the home return function can be executed.

B. Home detector type and search direction setting (P4-32)

The home position detector can use a left or right limit switch as the home position reference point, or an additional detector (e.g., proximity type or photogate type switch) can be used as the home position reference point. The Z pulse can also be set as the home position reference point when the servomotor moves in only one revolution.

P4-32=0: Positive direction to find the origin and use the CCWL limit input point as a rough reference point for the origin. When home positioning is complete, CCWL switches to the limit input function. Subsequent re-triggering will generate a limit warning. When using the limit input point as a rough reference point for the home position, it is recommended to set the return to search for the Z pulse (P4-33=0) as the exact mechanical home position. P4-32=1: Reverse direction to find the home position and use the CWL limit input point as a rough reference point for the home position. When finished After the home positioning, the CWL turns into a limit input function. Subsequent re-triggering will generate a limit warning. When using the limit input point as a rough reference point for the home position, it is recommended to set the return to find the Z pulse (P4-33=0) as the exact mechanical home position.

P4-32=2: Positive direction search for the home position and use ORGP (external detector input point) as the reference point for the home position, in this case, the exact mechanical home position can be set as the Z-phase pulse with return search (P4-33=0) or without return search (P4-33=1). When the Z-phase pulse is not used as the mechanical home position, the positive edge of ORGP can also be set as the mechanical home position (P4-33=2).

P4-32=3: Reverses direction to find the origin and uses the ORGP(external detector input point)as the reference point for the origin. In this case, the exact mechanical home position can be set as the Z-phase pulse with return search (P4-33=0) or without return search (P4-33=1). When the Z-phase pulse is not used as the mechanical home position, the positive edge of ORGP can also be set as the mechanical home position (P4-33=2).

P4-32=4: Positive direction directly find the absolute position zero point of one turn, this function is usually used for servo motor only in a rotary range of motion control, at this time can not be connected to any external detection switch.

P4-32=5: Reverse the direction of direct search for the absolute position of the zero point of a single turn, this function is usually used for servo motors only in a rotary range of motion control, at this time without any external detection switch.

C. Setting of short-distance travel method to reach the home position (P4-33)

P4-33=0: After finding the reference home position, the motor returns to the second speed to find the nearest zero point of the absolute position of the single revolution as the mechanical home position.

P4-33=1: After finding the reference home position, 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 home position.

P4-33=2: Find the rising edge of detector ORGP as the mechanical home position and stop by deceleration, applicable to the setting of P4-32 value as 2 and 3; or find the zero point of single-turn absolute position and stop by deceleration, applicable to thesetting of P4-32 value as 4 and 5.

D. Home stop mode setting (P4-35)

P4-35=0: After the home position detection is completed, the motor decelerates and pulls back to the home position. The motor decelerates and stops after the home position detection signal is obtained in the second stage of operation. After stopping, the motor moves to the mechanical home position at two speeds.

P4-35=1: After the home position detection is completed, the motor decelerates and stops in the forward direction. The motor decelerates and stops after the home position detection signal is obtained in the second speed stage. The position overrun after stopping is not corrected, and the mechanical home position does not change depending on the position overrun.

5.5 Pre-operation check

Please first disengage the load connected to the servomotor, the coupling connected to the servomotor shaft and its related accessories. Ensure that the servomotor can work normally without a load before connecting the load to avoid unnecessary danger.

- Check and make sure before running:

1） There is no visible damage to the servo drive cosmetically;

2） Wiring terminals are insulated;

3） There are no conductive or flammable objects such as screws or metal sheets inside the drive, and there are no conductive foreign objects at the wiring ports;

4） Servo drive or external braking resistor not placed on combustible objects;

5） Wiring is complete and properly wired.

- The drive power supply, auxiliary power supply and ground terminal are wired correctly; each control signal cable is wired correctly; each limit switch and protection signal have been wired correctly.

1） The Enable switch is turned OFF;

2） Cut off the power circuit and emergency stop alarm circuit to maintain access;

3） The servo drive applied voltage reference is correct.

- Power up the servo drive without the controller sending a run command signal. Check and ensure that: 1) The servo motor can rotate normally without vibration or excessive running sound;

2） Each parameter is set correctly, unintended action may occur depending on mechanical characteristics, do not over set extreme parameters;

3） The bus voltage indicator and digital tube display are not abnormal.

Chapter 5 Operation and Display Interface

6.1 Drive 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 system statuses, setup parameters and so on. The operation is hierarchical, unfolding layer by layer from the main menu.

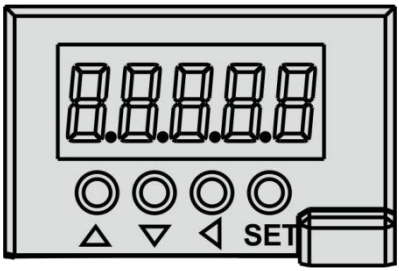


Figure 6.1 Driver Panel Display Interface

6.1.2 Key Description

notation	name (of a thing)	functionality
▲	Add key	Add serial number or value; long press has repeat effect
▼	minus key	Decrease serial number or value; long press has repeat effect
◀	exit button	Menu exit; operation cancel
SET	confirmation key	Operation Confirmation

6.2 main menu

Level 1 is the main menu, there are 8 operation modes, ▲, ▼ key to change the mode, press SET key to enter level 2 to perform specific operation, press ◄ key to return to the main menu from level 2.

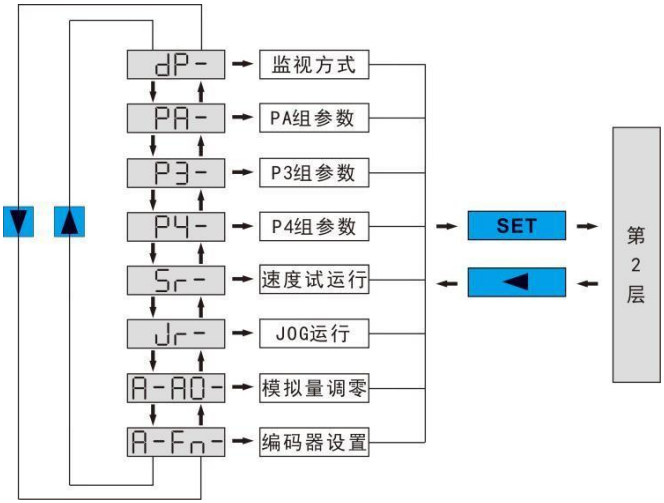


Figure 6.2 Main Menu Operation Block Diagram

6.3 Parameter setting process

Parameters are represented by parameter segment + parameter number, the hundredth digit is the segment number, and the tenth and individual digits are the parameter number. For example, the parameter PA53, the segment number is "PA" ,the parameter number is "53", the display shows "PA-53".

Select parameter setting "P-**" under the main menu and press SET key to enter the parameter setting mode. Firstly, use ▲、▼ to select the parameter segment, after selecting, press SET key to enter the segment parameter number selection. Secondly, use ▲、▼ key to select the parameter number again, after selecting, press SET key to display the parameter value.

Use ▲ and ▼ to modify the parameter value. Press ▲ or ▼ key once, the parameter will be increased or decreased by 1. Press and hold ▲ or ▼, the parameter can be increased or decreased continuously. When the parameter value is modified, press the SET key, the decimal point of the rightmost LED digital tube will light up and flash 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 re-powered up before they can work).

6.4 Monitoring status contents

The first level is used to select the operation mode, there are 7 modes, use ▲, ▼ to change the mode, press SET to enter into the 2nd level of the selected mode, and press ◄ to return to the first level from the 2nd level.

Select "dp-- " in the first level and press SET key to enter the monitoring mode. There are 25 kinds of display status, user can use ▲ and ▼ keys to select the desired display mode, and then press SET key to enter the specific display status.

monitoring method	manipulate	monitoring example	clarification
P-SPd	SET ⇄	r 1000	Motor speed 1000r / min
P-PoS		04580	Current Position 124580
P-PoS.		P. 12	
P-CPo		C4581	Position 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-CnE		CnE 0	Current control mode 0: Position control mode
P- CS		r. 500	Speed corresponding to analog input in speed mode 500 r/min.
P- Ct		t 0.50	The analog input in torque mode corresponds to 50 % of the torque.
P-APo		A3265	Absolute rotor 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 4.

monitoring method	manipulate	monitoring example	clarification
P- rL		rL-on	Relay open status
		rL.-oF	Relay off state
		rL-Er	Relay Alarm Status
P- rn		rn - on	Normal operation of the main circuit
		rn.-oF	Main circuit not charged
		rn-CH	Main circuit charging but servo not enabled
		rn-Er	Main circuit alarm
P- US		U-on	Bus voltage normal
		U-.LoU	Bus voltage too low
		U-Err	Presence Alarm
P- AS		43210	Motor absolute position 876543210
P- AS.		A.8765	

6.5 Analog Zeroing

With this operation, the drive automatically detects the analog zero bias and writes the zero bias value to parameter PA39 (or PA45). This operation already saves the zero bias parameter to the EEPROM, so there is no need to perform the parameter write operation again.

First, select analog zeroing **"A-AO"** and press **SET** key to enter. Then select analog speed zeroing **"A-SPd"** or analog torque zeroing **"A-Trq"** via ▲ and ▼, press and hold the **SET** key for more than 3 seconds after selecting the operation, and wait until **"donE"** is displayed to activate the operation. When "donE " is displayed, the operation will be activated. When finished, press ◀ to return to the menu selection status.

6.6 Encoder Selection

Select **"F-res"** to reset the encoder, set the multi-turn information of the encoder to zero, and through the parameter value setting of 1, the single-turn information can be cleared to zero, so as to achieve the purpose of setting the home position; select **"F-clr"** to clear the alarm operation of the encoder, the alarm No. 53 caused by battery dropout can be cleared by this operation. Select "F-clr" to clear the alarm operation of the encoder. Alarm No. 53 caused by battery power failure can be cleared by this operation. After selecting the operation, press and hold the SET key for more than 3 seconds and wait **until "donE"** is displayed to activate the operation. When finished, press the ◀ key to return to the menu selection status.

6.7 Parameter default value recovery

Use the Restore Default Parameters (Factory Parameters) function in the following cases:

- Parameters are tuned out of order and the system does not work properly.

To restore the default parameters, proceed as follows:

1. Check that the motor code (parameter PA1) is correct.
2. Change the password (PA0) to 385.
3. Go to Parameter Management and perform the following actions:

All parameters are restored to default values, and user-modified parameters are also restored to factory default values. Press ◄ to return to the main menu, use ▲, ▼ to select "PA-" mode, press SET to enter the second level of operation interface, then press ▲ to make PA=0, then press **SET** to enter the third level of interface, and set PA0 as the value of 385, press **SET** to save. Next, press ◄ to return to "PA-" interface, and set PA1 to DEF-, press and hold **SET** key for 5 seconds, and wait for the LED to flash several times to finish saving the default parameters. Finally, re-power on the device.

Chapter VI. Description of parameter functions

7.1 PA Group Parameters

serial number	name (of a thing)	functionality	Parameter range	factory value
0	cryptographic	1. The user password is 315. 2. The model code is 385.	0-9999	315
1	model number coding	This parameter is read-only and cannot be modified. The drive automatically recognizes the motor type No. No need to choose.	40-80	see table 7-1
2	hardware releases	You can view the software version number, but you cannot modify it.		

Table 7-1

drives	SVC600P
electrical machinery	--
	60 Flange, TC1H1S40B30C-A131
	80 Flange, TC1H1S75B30C-A131
	80 Flange, TC1H1S10C30C-A131
	--
	--

serial number	name (of a thing)	functionality	Parameter range	factory value
3	starting (point) Display Status	0: Displays the motor speed; 1: Displays the current position 5 digits lower; 2: Displays the current position 5 digits higher; 3: Displays the lower 5 bits of the position command (command pulse accumulation amount); 4: Displays the high 5 bits of the position command (command pulse accumulation); 5: Display position deviation is 5 digits lower; 6: Display position deviation is 5 digits higher; 7: Displays motor torque; 8: Displays the motor current; 9: Current control mode; 10: Displays the current temperature; 11: Display speed command; 12: Displays the torque command; 13: Displays the absolute rotor position 5 digits lower in one revolution; 14: Displays the absolute rotor position 5 digits higher in one revolution; 15: Displays the input terminal status; 16: Displays the status of the output terminals; 17: Displays the encoder input signal; 18: Displays the main circuit bus voltage value; 19: Displays the alarm code; 20: Displays the logic chip version number; 21: Displays the status of relay engagement; 22: Displays the operating status; 23: Display of the external voltage status. 24: Displays the absolute value position 5 digits lower;	0-25	0

		25: Displays the absolute value position 5 digits higher.		

serial number	name (of a thing)	functionality	Parameter range	factory value
4	Control mode selection	This parameter allows you to set the control mode of the drive: 0: Position control mode; 1: Speed control method; 2: Torque control method; 3: Mixed position-velocity control mode; 4: Position-torque hybrid control mode; 5: Speed-torque hybrid control mode; 6: Encoder zeroing mode.	0-6	0
5	Speed Proportional Gain	1. Sets the proportional gain of the speed loop regulator. 2. The higher the setting value, the higher the gain and the higher the stiffness. The parameter values are determined according to the specific servo drive system model and load. In general, the larger the load inertia, the larger the setting value. 3. Under the condition that the system does not generate oscillation, try to set a larger.	5-2000 Hz	150
6	Speed Integral Constant	1. Sets the integration time constant of the speed loop regulator. 2. The smaller the setting, the faster the integration speed and the more the system resists deviation Stronger, i.e., the greater the stiffness, but too small is prone to overshooting.	1-1000 ms	75
7	Torque filters	1. Sets the torque command filter characteristics. 2. Used to suppress resonance generated by torque. 3. The smaller the value, the lower the cut-off frequency, the less vibration and noise generated by the motor. If the load inertia is large, the setting value can be reduced appropriately. Too small a value results in a slower response and may cause oscillation. 4. The higher the value, the higher the cutoff frequency and the faster the response. If the	20-500%	100

		For a higher torque response, the setting can be increased appropriately.		
8	Speed Detection Filter	1. Sets the speed detection filter characteristics. 2. The smaller the value, the lower the cut-off frequency and the less noise the motor produces. If the load inertia is large, the setting value can be reduced appropriately. Too small a value results in a slower response and may cause oscillation. 3. The higher 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 increased appropriately.	20-500%	100

<table>
<tr><th>serial number</th><th>name (of a thing)</th><th>functionality</th><th>Parameter range</th><th>factory value</th></tr>
<tr><td>9</td><td>Position Proportional Gain</td><td>1. Sets the proportional gain of the position loop regulator.
2. The higher the setting value, the higher the gain, the higher the stiffness, and the smaller the positional hysteresis for the same frequency command pulse. However, too large a value may cause oscillation.
3. Parameter values are based on the specific servo drive system model and load.
Situation Determination.</td><td>1-1000</td><td>80</td></tr>
<tr><td>11</td><td>Command for every 1 revolution of the motor pulse number (math.)</td><td>1. Sets the number of command pulses equivalent to each 1 revolution of the motor.
2. When this setting value is 0, the PA-12 (position command pulse frequency division) is set to "0".
Sub), PA-13 (Position Command Pulse Crossover Denominator) are valid.</td><td>0-30000</td><td>10000</td></tr>
<tr><td>12</td><td>Position Command Pulse Electronic Gear First Molecule</td><td>1. Sets the fractional octave frequency of the position command pulse (electronic gear).
2. In the position control mode, by setting the PA12, PA13 parameters, it can be easily matched with various pulse sources to achieve the user's desired control resolution (i.e. angle/pulse).
3. P x G = N x C x 4.
P: number of pulses of the input command; G: electronic gear ratio; G = crossover numerator / crossover denominator N: number of motor rotations; C: number of photoelectric encoder lines/revolution, C=2500 in this system.
4. For example, if the input command pulse is 6000, the servo motor rotates one revolution 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 Gear1 and Gear2. The denominator is set by parameter PA13. The combination is as follows:
<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>First molecule (parameter PA12)</td></tr>
<tr><td>0</td><td>1</td><td>Second molecule (parameter PA 77)</td></tr>
<tr><td>1</td><td>0</td><td>Third molecule (parameter PA 78)</td></tr>
<tr><td>1</td><td>1</td><td>Fourth molecule (parameter PA</td></tr>
</table>
</td><td>0-32767</td><td>0</td></tr>
</table>

				79)		
		Note: 0 means OFF, 1 means ON.				
13	Position Command Pulse Electronics gear denominator	See parameter PA12.			1-32767	10000

serial number	name (of a thing)	functionality	Parameter range	factory value
14	Position command pulse input method	1. Sets the input form of the position command pulse. 2. Set to one of the 3 input methods by parameterization: 0: Pulse + direction; 1: CCW pulse/CW pulse; 2: A, B two-phase quadrature pulse input; 3: Internal position input. Note: CCW is the axial view from the servomotor, rotating counterclockwise, defined as positive; CW is the axial view from the servomotor's Axial observation, rotated clockwise, is defined as reverse.	0-3	0
15	Command pulse direction reversal	Set to: 0: Normal; 1: The position command pulse direction is reversed.	0-1	0
16	Locate the scope of completion	1. Sets the range of positioning completion pulses under position control. 2. This parameter provides the basis for the driver to judge whether positioning is completed in the position control mode. When the number of pulses remaining in the position deviation counter is less than or equal to the value set in this parameter, COIN (positioning completion) of the digital output DO is ON, otherwise OFF. 3. The comparator has a return differential function. Set by parameter PA84.	0-30000 impulse	130
17	Position out-of-range detection	1. Set the range of position out-of-position alarm detection. 2. In the position control mode, when the position deviation counter of the The drive gives a position alarm when the value exceeds this parameter value.	0-30000 ×100 impulse	6000
18	Position overrun error invalid	Set to: 0: Position overrun alarm detection is valid; 1: Position overrun alarm detection is invalid, stop detecting position overruns Differential error.	0-1	0

<table>
<tr><th>serial number</th><th>name (of a thing)</th><th>functionality</th><th>Parameter range</th><th>factory value</th></tr>
<tr><td>19</td><td>Position command smoothing filter</td><td>1. Smooth filtering of command pulses with an exponential form of acceleration and deceleration, with values indicating time constants.
2. The filter does not lose the input pulse, but there is a command delay.
3. This filter is used for:
(1) The upper controller has no acceleration or deceleration function;
(2) The electronic gear split multiplier is large (>10);
(3) The instruction frequency is low.
4. Stepping jumps and unevenness in motor operation.
5. When set to 0, the filter does not work.</td><td>0-1000×
0.1ms</td><td>100</td></tr>
<tr><td>20</td><td>Invalid driver disable input</td><td>Set to:
0: CCW and CW input inhibit valid. When CCW drive prohibition switch (FSTP) is ON, CCW drive is allowed; when CCW drive prohibition switch (FSTP) is OFF, CCW directional torque remains 0; CW is the same. If both CCW and CW drive prohibition are OFF, a drive prohibition input error alarm is generated;
1: Cancel CCW, CW input prohibition. CCW, CW drive is allowed regardless of the CCW, CW drive inhibit switch state. At the same time, if both CCW and CW drive prohibition are OFF, it does not produce the
The raw driver prohibits input error alarms.</td><td>0-1</td><td>1</td></tr>
<tr><td>21</td><td>JOG Transport travel speed</td><td>Sets the running speed of the JOG operation.</td><td>0-6000
r/min</td><td>100</td></tr>
<tr><td>22</td><td>Speed command source</td><td>For speed control, set the source of speed command, parameter meaning: 0: Analog speed command is input from analog port AS+, AS-;
1: Internal speed command, determined by SP1, 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>
</table></td><td>0-5</td><td>0</td></tr>
</table>

		1	0	Internal speed 3 (parameter PA26)			
		1	1	Internal speed 4 (parameter PA27)			

		2: Analog speed command + internal speed command: DI signal {note} / speed command SP2 / SP1 0 / 0 / Analog Speed Command 0 / 1 / Internal speed 2 (parameter PA25) Note: 0 means OFF, 1 means ON. 3: JOG speed command, which needs to be set when performing a pointing (JOG) operation. 4: Keyboard speed command, which needs to be set when performing keyboard speed (SF) operation. 5: IO terminal control for pointing operation.		
23	Maximum speed limit	Set the maximum speed limit of the servo motor. 1. Independent of the direction of rotation. 2. If the set value exceeds the rated speed, the actual maximum speed limit is Rated RPM.	0-6000r/ min	5000
24	Internal speed 1	1. Setting the internal speed 1. 2. Speed control mode (PA22=0), when SP1 OFF, the When SP2 OFF, internal speed 1 is selected as the speed command.	-6000-6000 r/min	100
25	Internal speed 2	1. Setting the internal speed 2. 2. In the speed control mode (PA22=0), when SP1 ON, SP2 When OFF, internal speed 2 is selected as the speed indicator.	-6000-6000 r/min	500
26	Internal speed 3	1. Setting the internal speed 3. 2. In the speed control mode (PA22=0), when SP1 OFF, SP2 When ON, internal speed 3 is selected as the speed command.	-6000-6000 r/min	1000
27	Internal speed 4	1. Set internal speed 4. 2. In the speed control mode (PA22=0), when SC1 ON, SC2 When ON, internal speed 4 is selected as the speed command.	-6000-6000 r/min	2000

28	speed of arrival	1. ASP for digital output DO when motor speed exceeds this parameter (Speed reached) ON, otherwise OFF. 2. The comparator has a return difference function, set by parameter PA87. 3. Polarity setting function is available:	0-3000 r/min	3000

<table>
<tr><td></td><td></td><td>
<table>
<tr><th>PA88</th><th>PA28</th><th>comparator</th></tr>
<tr><td>0</td><td>>0</td><td>velocity regardless of direction</td></tr>
<tr><td rowspan="2">1</td><td>>0</td><td>Only forward speed is detected</td></tr>
<tr><td><0</td><td>Detects only reversal speed</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>29</td><td>Analog torque command input gain</td><td>1. Sets the proportionality between the analog torque input voltage and the actual operating torque of the motor.
2. The unit of the setting value is 0.1v/100%.
3. The default value is 30, which corresponds to 3v/100%, i.e., input 3v voltage production
Generate 100% of the rated torque.</td><td>10-100 (0.1v/ 100%)</td><td>30</td></tr>
<tr><td>30</td><td>User torque overload alarm value</td><td>1. Set the user torque overload value, which is a percentage of the rated torque, and the torque limit value is protected in both positive and negative directions regardless of direction.
2. If PA31 > 9, the drive generates an alarm with the number Err-29 and the motor stops when the motor torque is > PA30 and the duration is > PA31. After the alarm is generated, the drive must re
Power-up clears the alarm.</td><td>1-300</td><td>300</td></tr>
<tr><td>31</td><td>User torque overload alarm detection time</td><td>1. User torque overload detection time in milliseconds.
2. When set to zero, the user torque overload alarm does not function.</td><td>0-32767</td><td>0</td></tr>
<tr><td>32</td><td>Torque command source</td><td>For torque control, set the source of the torque command:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">Torque command</th></tr>
<tr><th>TRQ2</th><th>TRQ1</th></tr>
<tr><td>input:0</td><td>0</td><td>Internal torque 1 (parameter PA64)</td></tr>
<tr><td>0</td><td>1</td><td>Internal torque 2</td></tr>
</table>
2: Analog torque command + internal torque command:
<table>
<tr><th colspan="2">DI signal {note}</th><th rowspan="2">Torque command</th></tr>
<tr><th>TRQ2</th><th>TRQ1</th></tr>
<tr><td>0</td><td>0</td><td>Analog torque command</td></tr>
</table></td><td>0-1</td><td>0</td></tr>
</table>

		0	1	Internal torque 2 (parameter PA65)				

		<table><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.		
33	Analog torque command input direction retrieve the opposite of what one intended	Reverse polarity for analog torque input.	0-1	0
34	Internal CCW to torque limit	1. The setting value is a percentage of the rated torque, e.g. if the setting is 2 times the rated torque, the setting value is 200. 2. At all times, this restriction is in effect. 3. If the set value exceeds the maximum allowable overload capacity of the system, the 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 a percentage of the rated torque, e.g. if the setting is 2 times the rated torque, the setting value is -200. 2. At all times, this restriction is in effect. 3. If the set value exceeds the maximum allowable overload capacity of the system, the The actual torque is limited to the maximum allowable overload capacity of the system.	-300-0%	-300
36	External CCW to torque limit	1. The setting value is a percentage of the rated torque, e.g. if the setting is 1 times the rated torque, the setting value is 100. 2. This limitation is effective only when the CCW torque limit input terminal (CCWL) is ON. 3. When the limit is active, the actual torque limit is the maximum allowable overload capacity of the system, the internal CCW torque limit, the external CCW torque Limit the minimum of the three.	0-300%	100

37	External CW Moment Limit	Set the external torque limit value for the CW direction of the servomotor. 1. The setting value is a percentage of the rated torque, e.g. if the setting is 1x the rated torque, the setting value is -100. 2. This limitation is effective only when the CW torque limit input terminal (CWL) is ON. 3. When the limit is active, the actual torque limit is the maximum allowable overload capacity of the system, the internal CW torque limit, the external CW torque limit, and the actual torque limit is the maximum allowable overload capacity of the system. The minimum of the absolute values of the three systems.	-300-0%	-100

serial number	name (of a thing)	functionality	Parameter range	factory value
38	temp warning value	Sets the drive temperature to the upper limit alarm value.	200-1350	
39	Analog torque command zero bias compensation	The amount of zero-bias compensation for analog torque input.	-2000-2000	0
40	Acceleration time constant	The setting value is to indicate the acceleration time of the motor from 0-1000r/min. 1. The acceleration and deceleration characteristics are linear. 2. Only for speed control and internal position control mode, other The control method is invalid.	1-10000ms	100
41	Deceleration time constant	The set value is to indicate the deceleration time of the motor from 1000-0r/min. 1. The acceleration and deceleration characteristics are linear. 2. Only for speed control and internal position control mode, other The control method is invalid.	1-10000ms	100
42	S-type acceleration and deceleration time a constant (math.)	To make the motor start and stop smoothly, set the time for the S-type acceleration and deceleration curve section.	0-1000ms	0
43	Analog speed command input gain	Sets the proportionality between the analog speed input voltage and the actual motor running speed.	10-3000 r/min/v	300

44	Reverse direction of analog speed command	Polarity reversal for analog speed inputs. 1. When set to 0, the speed direction is CCW when the analog speed command is positive. 2. When set to 1, when the analog speed command is positive, the speed square toward for CW.	0-1	0
45	Zero offset compensation for analog speed commands	The amount of zero bias compensation for the analog speed input.	-5000-5000	0

serial number	name (of a thing)	functionality	Parameter range	factory value
46	Analog Speed Command Filter	1. Low-pass filter for analog speed inputs. 2. The larger the setting, the faster the response to the speed input analog, the greater the effect of signal noise, and the smaller the setting, the slower the response. The less the signal noise affects.	1-1000 Hz	300
47	Mechanical brake operation setting when the motor stops	1. Defines the delay time between the actuation of the mechanical brake (change of output BRK from ON to OFF) and the cut-off of the motor current during a motor stall. 2. This parameter should not be less than the delay time (Tb) of the mechanical brake to Avoid small displacements of the motor or work drops.	0-200× 10ms	0
48	Mechanical brake operation setting during motor operation	1. Defines the delay time from motor current cutoff to mechanical braking action (output BRK changes from ON to OFF) during motor stall. 2. This parameter is used to decelerate the motor from a telltale rotational state to a low speed and then actuate the mechanical brake to avoid damage to the brake. 3. The actual action time is PA48 or the motor decelerates to PA49. The time required for the value is taken as the minimum of the two.	0-200× 10ms	50
49	Mechanical brake operation during motor operation tempo	1. Defines the speed value from motor current cutoff to mechanical brake operation (output terminal BRK changes from ON to OFF) during motor operation. 2. The actual action time is the number of PA48 or motor deceleration to PA49 The time required for the value, taking the smallest of the two.	0-3000 r/min	100
50	Speed at torque control limitation	1. For torque control, the motor operating speed is limited to this parameter. 2. It prevents over speeding with light loads.	0-5000 r/min	3000
53	Servo force enable	Set to: 0: The enable signal is controlled by the SON of DI input; 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.	0-30000ms	0

<table>
<tr><th>serial number</th><th>name (of a thing)</th><th>functionality</th><th>Parameter range</th><th>factory value</th></tr>
<tr><td>55</td><td>Input terminal effective level control word</td><td>1. Sets the input terminals to be inverted. Terminals that are not inverted are valid when the switch is closed and invalid when the switch is disconnected; terminals that are inverted are invalid when the switch is closed and valid when the switch is disconnected.
2. Represented by a 4-bit binary number, the bit is 0 to indicate that the represented output terminals are not inverted, and 1 to indicate that the represented output terminals are inverted. The input terminals represented by the binary number 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: High level active;
1: Active low.</td><td>0000-1111</td><td>0000</td></tr>
<tr><td>57</td><td>Output Terminal Effective Level Control Word</td><td>1. Setting the output terminals inverted. For inverted terminals, the definitions of on and off are exactly the opposite of the standard definitions.
2. Expressed as a 4-bit binary number, the output terminal represented by a 0 is not inverted, and the output terminal represented by a 1 is inverted.
The input terminals represented by binary numbers are as
<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: High level active;
1: Active low.</td><td>0000-1111</td><td>0000</td></tr>
<tr><td>58</td><td>IO input terminal de-jitter time constant</td><td>1. De-jitter filtering time for the input terminals.
2. The smaller the value, the faster the terminal input response.
3. The larger the value, the better the terminal input anti-interference performance, but the
Response slows down.</td><td>1-20ms</td><td>2</td></tr>
<tr><td>59</td><td>Command pulse active edge</td><td>Set to:
0: Pulse rising edge valid;
1: Pulse falling edge valid.</td><td>0-1</td><td>0</td></tr>
<tr><td>60</td><td>soft reset (electronics)</td><td>0: Soft reset is invalid;
1: Soft reset is valid and the system will reboot.</td><td>0-1</td><td>0</td></tr>
</table>

61	System Alarm Clearing	Set to: 0: System alarm clearing is invalid; 1: System alarm clearing is effective.	0-1	0

serial number	name (of a thing)	functionality	Parameter range	factory value
62	Encoder Selection	4: Single-turn absolute encoder; 5: Multi-turn absolute encoder.	4-5	by motor decide (to do somethin g)
63	Load Inertia Ratio	1. Set the load inertia ratio for the corresponding motor rotational inertia. 2. The set value is: = ((load inertia + rotational inertia) / rotational inertia) × 100.	1-500	100
64	Internal torque 1	In the torque control mode (PA4=2), when TRQ1 OFF When TRQ2 OFF, internal torque 1 is selected for the torque command.	-300-300	0
65	Internal torque 2	In the torque control mode (PA4=2), when TRQ1 ON When TRQ2 OFF, internal torque 2 is selected for the torque command.	-300-300	0
66	Internal torque 3	In the torque control mode (PA4=2), when TRQ1 OFF When TRQ2 ON, internal torque 3 is selected as the torque command.	-300-300	0
67	Internal torque 4	In the torque control mode (PA4=2), when TRQ1 ON When TRQ2 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	MODBUS communication baud rate.	48-1152 ×100	96

73	MODBUS pass Protocol Selection	Set to: 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 data bits transmitted are 8 bits; the letters N, E, and O stand for parity: N: indicates that this bit is not used; E: indicates 1 even bit; O: indicates 1 odd bit. The number 1 or 2 indicates that the communication bit is 1 or 2 bits.	0-3	0
74	Communication error handling	When the communication signal is incorrect, select: 0: Continue operation; 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 the digital output DO is ON, otherwise OFF. 2. When ZCLAMP ON for digital input DI, the speed indicator If the command value is lower than this value, the speed command value is forced to zero.	0-1000 r/min	10
76	Speed Consisten t Setting Value	When the difference between the actual speed and the commanded speed is less than this setting, the digital output DO's UCO2N (speed consistency) ON, No Then OFF.	0-1000 r/min	10
77	Position command pulse electronic gear ratio second molecule	See parameter PA12 for details.	0-32767	0
78	Position command pulse electronic gear ratio tertiary molecule	See parameter PA12 for details.	0-32767	0
79	Position command pulse electronic gear ratio fourth element	See parameter PA12 for details.	0-32767	0
80	Command direction signal active level	Set to: 0: High level positive direction; 1: Low level positive direction.	0-1	0
81	Command pulse PULS signal filtering radio waves (i.e. pick out one frequency)	1. Digital filtering of the pulse input PULS signal, the larger the value, the larger the filtering time constant. 2. Maximum pulse input frequency by default 500kHz (kpps), larger values reduce the maximum pulse input frequency accordingly. 3. It is used to filter out the noise on the signal line to avoid counting error. If the phenomenon of inaccurate walking due to inaccurate counting occurs, the value of the parameter can be increased appropriately. 4. After parameter modification, it must be saved and re-powered to be valid.	0-15	4

82	Command pulse SIGN signal filtering	1. Digital filtering of the pulse input SIGN signal, the larger the value, the larger the filtering time constant. 2. Maximum pulse input frequency by default 500kHz (kpps), higher values Maximum pulse input frequency will be reduced accordingly.	0-15	4

		3. Used to filter out the noise on the signal line to avoid counting error. If the phenomenon of inaccurate walking due to inaccurate counting occurs, the value of the parameter can be increased appropriately. 4. After parameter modification, it must be saved and re-powered to be effective.		
83	CWL, CCWL party Towards a Prohibited Approach	1. This parameter is used to select the way to prohibit when the machine touches the mechanical limit switch and triggers the CWL, CCWL limit. Parameter Meaning: 0: Limits the torque in that direction to 0; 1: Disables pulse input in that direction.	0-1	0
84	Positioning Completion Return Difference	1. Sets the range of positioning completion pulses under position control. 2. When the number of pulses remaining in the position deviation counter is less than or equal to the setting value of this parameter, COIN (positioning completion) of the digital output DO is ON, otherwise OFF. 3. The comparator has a return difference function, set by parameter PA85.	0-32767 pulse	65
85	Positioning proximity range	1. Sets the range of positioning proximity pulses under position control. 2. When the number of pulses remaining in the position deviation counter is less than or equal to the setting value of this parameter, NEAR of the digital output DO is ON, otherwise OFF. 3. The comparator has a return difference function, set by parameter PA86. 4. It is used to prepare the host computer for the next step by receiving the NEAR signal when the positioning is about to be completed. General Parameters The value should be greater than the positioning completion range.	0-32767 pulse	6500
86	Positioning Approach Difference	See the description of parameter PA85 for details.	0-32767 pulse	650
87	Arrival velocity return difference	1. When the motor speed exceeds this parameter, ASP (Speed Arrival) of the digital output DO is ON, otherwise OFF. 2. The comparator has a return differential function. 3. Polarity setting function is available: PA88 | PA28 | comparator	0-5000 r/min	30

		0	>0	velocity regardless of direction		
		1	>0	Only forward speed is detected		
			<0	Detects only reversal speed		
88	Reach velocity polarity	Refer to the description of parameter PA87.			0-1	0

<table>
<tr><td>89</td><td>Arrival torque</td><td>1. When the motor torque exceeds this parameter, ATRQ (torque reached) of the digital output DO is ON, otherwise OFF.
2. The comparator has a return difference function, set by parameter PA90.
3. Polarity setting function is available:<table><tr><th>PA91</th><th>PA89</th><th>comparator</th></tr><tr><td>0</td><td>>0</td><td>Torque regardless of direction</td></tr><tr><td rowspan="2">1</td><td>>0</td><td>Positive torque detection only</td></tr><tr><td><0</td><td>Reverse torque detection only</td></tr></table></td><td>-300%-300%</td><td>100</td></tr>
<tr><td>90</td><td>Arrival torque return</td><td>1. When the motor torque exceeds this parameter, ATRQ (torque reached) of the digital output DO is ON, otherwise OFF.
2. The comparator has a return difference function, set by parameter PA90.
3. Polarity setting function is available:<table><tr><th>PA91</th><th>PA89</th><th>comparator</th></tr><tr><td>0</td><td>>0</td><td>Torque regardless of direction</td></tr><tr><td rowspan="2">1</td><td>>0</td><td>Positive torque detection only</td></tr><tr><td><0</td><td>Reverse torque detection only</td></tr></table></td><td>0-300%</td><td>5</td></tr>
<tr><td>91</td><td>Arrival torque polarity</td><td>1. When the motor torque exceeds this parameter, ATRQ (torque reached) of the digital output DO is ON, otherwise OFF.
2. The comparator has a return difference function, set by parameter PA90.
3. Polarity setting function is available:<table><tr><th>PA91</th><th>PA89</th><th>comparator</th></tr><tr><td>0</td><td>>0</td><td>Torque regardless of direction</td></tr><tr><td rowspan="2">1</td><td>>0</td><td>Positive torque detection only</td></tr><tr><td><0</td><td>Reverse torque detection only</td></tr></table></td><td>0-1</td><td>0</td></tr>
</table>

92	Zero Speed Detection Return	1. When the motor speed is lower than this parameter, ZSP (zero speed) of the digital output DO is ON, otherwise OFF. 2. The comparator has a return differential function.	0-1000 r/min	5
94	Delay time for opening the electromagnetic brake	1. Set the delay time for the electromagnetic brake to open. 2. Defines the delay time from motor current turn-on to electromagnetic brake release (DO output terminal BRK ON) when the system goes from an inactive state to an enabled state.	0-200 ms	0

95	Motor encoder resolution	Encoder resolution, the default is 2 to the 17th power = 131072, set the value of 17, please be careful to change, otherwise the wrong setting will be Causes flying cars.	10-32	17
96	Motor pole pair number	This parameter indicates the number of motor pole pairs. Please modify it carefully, otherwise Incorrect settings can result in flying cars.	1-360	5
97	Motor zero position offset angle	Encoder zero position and motor zero position offset angle, determined by motor Definition.	0-3600	216
99	Maximum percentage when braking null ratio	Maximum duty cycle setting for braking.	5-90	50
100	Position loop filter selection	Set to: 0: Digital moving average filter; 1: Exponential smoothing filter.	0-1	0
101	Position loop feed-forward gain	Feedforward reduces the position tracking error during position control, and with a setting of 100, with a command pulse of any frequency, position The tracking error is always 0.	0-100	0
102	Position loop feed-forward filtering wave time constant (math.)	Position loop feedforward quantity filtering to increase the stability of the feedforward control quantity.	20-500	100

7.2 P3 Multifunction Terminal Series Parameters

7.2.1 P3 Group Series Parameter List

All P series drivers have 4 input terminals and 4 output terminals, and the input and output definition values of the terminals can be changed through the P3 group series parameter to complete various input and output definitions. (Input terminals are active low by default)

parameters	name (of a thing)	realm	factory value
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 Forced 1	00000000-11111111	00000000
P3-16	Digital Input DI Forced 2	00000000-11111111	00000000
P3-17	Digital Input DI Forced 3	00000000-11111111	00000000
P3-18	Digital Input DI Forced 4	00000000-11111111	00000000
P3-19	Digital Input DI Forced 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 Values	00000000-11111111	00000000
P3-32	Virtual Output Terminal Control	0-1	0
P3-33	Virtual Output Terminal Status Values	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

Attention:

1. When P3-30=0, the IO inputs are determined by DI1 ~ DI4, and the number of input IOs is 4, corresponding to parameters P3-0~P3-3;

2. When P3-30=1, the IO input is determined by the bit corresponding to virtual IOP3-31, and the number of input IOs is 8, corresponding to parameter P3-38~P3-45;

3. When P3-30=2, IO inputs are determined by DI1~DI4 and P3-31, and the number of input IOs is 12, corresponding to the parameter

P3-0~P3-3 and P3-38~P3-45.

7.2.2 DI Function List

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

defined value	notation	functionality	Functional Analysis
0	NULL	functionless	The input state has no effect on the system.
1	SON	Servo Enable	Servo enable input terminal. OFF: servo driver can not be used, the motor does not pass current; ON: servo driver is enabled, the motor passes current.
2	ARST	Alarm Clearance	Alarm clear input terminal: If there is an alarm, the rising edge of the input (OFF t o ON moment) clears the alarm if the alarm is allowed to be cleared. Note: Only some alarms are allowed to be cleared.
3	CCWL	Positive Rotation Drive Disable	1. CCW Driver disable input terminals: OFF: Forward (CCW) rotation is prohibited; ON: Forward (CCW) rotation is allowed. 2. For mechanical limit travel protection, function controlled by parameter PA-20. Note that the default value of PA-20 ignores this function, if you need to enable this function, you need to modify PA-20: （1） When PA-20 is 0, the function of input inhibit is effective, and whether CCW is inhibited or not is controlled by PA-83; （2） When PA-20 is 1, the function of input prohibition is invalid, and whether CCW is prohibited or not is not controlled by PA-83. 3. When the disable function is active (PA-20 is 0): ① When PA-83 is 0, forward torque limitation is 0, and forward pulse input is not limited; ② When PA-83 is 1, the input of forward pulse is disabled.

4	CWL	Reverse drive prohibition	1. CW drive disable input terminal: OFF: Forward (CW) rotation is prohibited; ON: Forward (CW) rotation is allowed. 2. For mechanical limit travel protection, the function is controlled by parameter PA-20. Note that the default value of PA-20 is to ignore this function, if you need to enable this function, you need to modify PA-20: (1) When PA-20 is 0, the function of input prohibition is effective, and whether CW is

			Prohibited by PA-83 control; (2) When PA-20 is 1, the function of input prohibition is invalid, and whether CW is prohibited or not is not controlled by PA-83. 3. When the disable function is active (PA-20 is 0): ① If PA-83 is 0, reverse torque limitation is 0 and reverse pulse input is not limited; ② When PA-83 is 1, the input of reverse pulse is disabled.
5	TCCW	Positive torque limit	OFF: CCW direction torque is not limited by PA-36 parameters; ON: CCW direction torque is limited by PA-36 parameters. Note: Regardless of whether TCCW is active or inactive, the CCW directional torque is still affected by the Parameter PA-34 Limitations.
6	TCW	Reverse torque limit	OFF: CW direction torque is not limited by PA-37 parameters; ON: CW direction torque is limited by PA-37 parameters. Note: Regardless of whether TCW is valid or invalid, the CW directional torque is still affected by the Parameter PA-35 Limitations.
7	ZCLAMP	Zero-speed clamping	The zero speed clamping function turns on (speed is forced to zero) when the following conditions are met Condition 1: Speed control mode (PA4=1), when external speed is selected (PA22=0); Condition 2: ZCLAMP ON; Condition 3: The speed command is below parameter PA-75. If either of the above conditions is not satisfied, normal speed control is executed.
8	CZERO	zero instruction	Under speed or torque control, the speed or torque commands are respectively: OFF: Normal command; ON: Zero command.
9	CINV	command inversion	Under speed or torque control, the speed or torque commands are respectively: OFF: Normal command; ON: Command reversal.
10	SP1	Speed selection 1	In speed control mode (PA4=1), when internal speed is selected (PA22=1), SP1 and SP2 are combined to 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) SP2=ON SP1=OFF: internal speed 3 (parameter PA-25) SP2=ON SP1=OFF: internal speed 3 (parameter PA-25) SP2=ON SP1=OFF: internal speed 3 (parameter PA-25) SP2=ON SP1=OFF: internal speed 3 (parameter PA-26) 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), TRQ1 and TRQ2 are combined to select 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 : 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, or 5, it is in mixed control mode, and the control mode can be switched via this input terminal: (1) When PA-4 is 3, CMODE OFF, position mode; CMODE ON, then speed mode; (2) When PA-4 is 4, CMODE OFF, position mode; CMODE ON, then torque mode; (3) When PA-4 is 5, CMODE OFF, speed mode; CMODE ON, then torque mode.
18	GEAR1	Electronic gear selection 1	When PA-11 is 0, the combination of GEAR1 and GEAR2 is used to select molecules with different electronic gear ratios: GEAR2=OFF GEAR1=OFF : molecule 1 (parameter PA-12) GEAR2=OFF GEAR1=ON : molecule 2 (parameter PA-77) GEAR2=ON GEAR1= OFF : molecule 3 (parameter PA-78) GEAR2=ON GEAR1=ON : molecule 4 (parameter PA-79)
19	GEAR2	Electronic gear selection 2	
20	CLR	Position deviation removal	Position deviation counter clear input terminal in position control mode.
21	INH	Pulse Input Inhibit	Position command pulse inhibit terminals in position control mode: OFF: Command pulse input is valid; ON : Command pulse input is disabled.
22	JOGP	positive inching	In speed mode, when PA22=5, this signal is turned on, the motor is inching in the positive direction and the speed is set by PA21. Note: This signal is turned on at the same time as the reverse inching, and the inching function is invalid.
23	JOGN	invert the motion (physics)	In speed mode and PA22=5; this signal is turned on, the motor inching in the opposite direction and the speed is set by PA21. Note: This signal is turned on at the same time as the positive inching, and the inching function is invalid.

27	HOLD	Internal position control command stop	In internal position register mode, this signal is turned on and the motor will stop operation (only available in internal position mode PA-14=3).

<table>
<tr><td>28</td><td>CTRG</td><td>Internal position command trigger</td><td>In the internal position register mode, this signal is triggered when the internal position register control command (POS0-2) is selected, and the motor runs according to the internal position register command. When the zero speed signal is digitally output (ZSPD=1) before accepting the next trigger internal position command.</td></tr>
<tr><td>29</td><td>POS0</td><td>Internal position command selection 0</td><td rowspan="3">The internal location selects the correspondence:
<table>
<tr><th>placement</th><th>POS2</th><th>POS1</th><th>POS0</th><th>CTRG</th><th>homologous</th></tr>
<tr><td>P1</td><td>0</td><td>0</td><td>0</td><td>↑</td><td>P4-2
P4-3</td></tr>
<tr><td>P2</td><td>0</td><td>0</td><td>1</td><td>↑</td><td>P4-5
P4-6</td></tr>
<tr><td>P3</td><td>0</td><td>1</td><td>0</td><td>↑</td><td>P4-8
P4-9</td></tr>
<tr><td>P4</td><td>0</td><td>1</td><td>1</td><td>↑</td><td>P4-11
P4-12</td></tr>
<tr><td>P5</td><td>1</td><td>0</td><td>0</td><td>↑</td><td>P4-14
P4-15</td></tr>
<tr><td>P6</td><td>1</td><td>0</td><td>1</td><td>↑</td><td>P4-17
P4-18</td></tr>
<tr><td>P7</td><td>1</td><td>1</td><td>0</td><td>↑</td><td>P4-20
P4-21</td></tr>
<tr><td>P8</td><td>1</td><td>1</td><td>1</td><td>↑</td><td>P4-23
P4-24</td></tr>
</table></td></tr>
<tr><td>30</td><td>POS1</td><td>Internal position command selection 1</td></tr>
<tr><td>31</td><td>POS2</td><td>Internal Position Command Selection 2</td></tr>
<tr><td>33</td><td>SHOM</td><td>primordial regression (i.e. initiating a return to the origin)</td><td>In the internal position register mode, the home position is searched and this signal is turned on.</td></tr>
<tr><td>34</td><td>ORGP</td><td>The origin of the return</td><td>In the internal position register mode, when searching for the home position, the servo treats the position of this point as the home position when this signal is turned on (refer to parameter P4-32). (the setting).</td></tr>
</table>

7.2.3 DO Function List

Defined value of the output terminals (4 terminals correspond to P3 group parameters P3-20, P3-21, P3-22, P3-23 respectively):

defined value	notation	functionality	Functional Analysis
1	ON	Always works.	Forces the output ON.
2	RDY	Servo ready.	OFF : The servo main power is not turned on or there is an alarm; ON : Servo main power is normal, no alarm.
3	ALM	give a warning	OFF : There is an alarm; ON : No alarm.
4	ZSP	zero speed	For speed and torque control, the 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 complete.	For position control, the OFF: Position deviation greater than parameter PA-16; ON: Position deviation less than parameter PA-16.
6	ASP	speed	For speed and torque control, the OFF : Motor speed is lower than parameter PA-28; ON : Motor speed is higher than parameter PA-28. A polarity setting function is available, refer to the description of parameter PA-28.
7	ATRQ	Torque Arrival	OFF : Motor torque is lower than parameter PA-89; ON : Motor torque is higher than parameter PA-89. A polarity setting function is available, refer to the description of parameter PA-89.
8	BRK	electromagnetic brake	OFF : Electromagnetic brake is applied; ON : The electromagnetic brake is released.
9	RUN	Servo in operation	OFF : The servo motor is not energized; ON : The servo motor is in power-on operation.
10	NEAR	localization	For position control, the OFF: Position deviation greater than parameter PA-85; ON: Position deviation less than parameter PA-85.

11	TRQL	In torque limitation	OFF : Motor torque has not reached the limit value; ON : Motor torque reaches the limit value. The torque limiting method is via parameters PA-34, PA-35, PA-36, PA-37.

12	SPL	Speed limit in progress	For torque control, the OFF : Motor speed has not reached the limit value; ON : Motor speed has reached the limit value. The speed limit method is set via parameter PA-50.
13	VCOIN	speed	OFF : The absolute value of the difference between the actual speed and the commanded speed is greater than PA76; ON : The absolute value of the difference between the actual speed and the commanded speed is less than PA76.
15	HOME	Return of origin complete	OFF : No signal is output when home return is not completed; ON : Signal output when home return is completed.
16	CMDOK	Internal position command completed	OFF : No signal is output when the internal position command is not completed or the internal position command is not stopped; ON : When the internal position command is completed or the internal position command is stopped The signal is output after the time set by P4-1.

7.2.4 DI Mandatory Effective

Five of the P3 group parameters (P3-15, P3-16, P3-17, P3-18, P3-19) set the digital input DI to be forced active.

(1) P3-15 The corresponding function is expressed in 8-bit binary:

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

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

digitally	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
functionality	CMODE	NULL	TRQ2	TRQ1	NULL	SP2	SP1	CINV

(3) P3-17 The corresponding function is expressed in 8-bit binary:

digitally	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
functionality	NULL	JOGN	JOGP	INH	CLR	GEAR2	GEAR1	NULL

(4) P3-18 The corresponding function is expressed in 8-bit binary:

digitally	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
functionality	NULL	POS2	POS1	POS0	CTRG	HOLD	NULL	NULL

(5) P3-19 The corresponding function is expressed in 8-digit binary:

digitally	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
functionality	NULL	NULL	NULL	NULL	NULL	NULL	ORGP	SHOM

Parameter Meaning:

Any one of the 5 parameters	corresponding function	Functional results
0	unplanned	OFF (not valid)
	planned	Determined by the signal
1	Not planned or planned	ON (mandatory validity)

◆ Planned means that the parameter has been selected as a function by the input terminals in P3-0 to P3-3, and the opposite is true for unplanned.

7.3 P4 Group Internal Position Command Series Parameters

serial number	name (of a thing)	functionality	parameters realm	factory value
P4-0	Internal position refers to command-and-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, the internal position command completion (CMDOK) DO signal is output after the delay time set by P4-1. 2. When the P4-1 delay time is set to 0, the internal position command of the trigger signal is not accepted again until the DO signal zero speed detection (ZSPD) is set to 1. 3. If the P4-1 delay time is not set to 0, set it to 1 at the completion of the internal position command (CMDOK) of the DO signal to accept the DI. Internal position commands triggered by signal command trigger (CTRG).	0-200 ms	0
P4-2	Setting of the number of turns for internal position command 1	Sets the number of position turns for the 1st internal position.	-30000-30000	0

P4-4	Movement speed of internal position command control 1 Setting	Sets the travel speed of internal position command control 1.	0-5000 r/min	1000
P4-5	Internal position command 2 position circle setting	Sets the number of position turns for the 2nd internal position.	-30000-30000	0
P4-6	Setting of the number of pulses in the position circle for internal position command 2	1. Sets the number of position pulses for the 2nd internal position. 2. Internal Position Command 2 = Setting value for 2nd internal position revolution + Setting value for the number of internal position pulses in paragraph 2.	+/-max .cnt/rev	0
P4-7	Internal position command control 2 travel speed Setting	Sets the travel speed of internal position command control 2.	0-5000 r/min	1000
P4-8	Internal position command 3 position circle setting	Sets the number of position turns for the 3rd internal position.	-30000-30000	0
P4-9	Setting of the number of pulses in the position circle for internal position command 3	1. Sets the number of position pulses for the 3rd internal position. 2. Internal Position Command 3 = Setting value of the 3rd internal position revolution + Setting value for the number of internal position pulses in paragraph 3.	+/-max .cnt/rev	0

P4-10	Internal position command control 3 travel speed Setting	Set the internal position command to control the travel speed of 3.	0-5000 r/min	1000

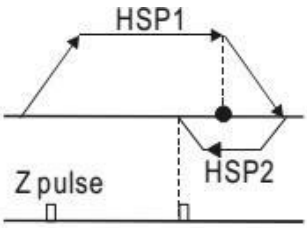
P4-11	Internal position command 4 position circle setting	Sets the number of position turns for the 4th internal position.	-30000-30000	0
P4-12	Setting of the number of pulses in the position circle for internal position command 4	1. Sets the number of position pulses for the 4th internal position. 2. Internal Position Command 4 = Setting value of the 4th internal position revolution +4 Setting value for the number of internal position pulses.	+/-max .cnt/rev	0
P4-13	The internal position command controls the travel speed of 4.	Setting the internal position command controls the travel speed of 4.	0-5000 r/min	1000
P4-14	Internal position command 5 position circle setting	Sets the number of position turns for the 5th internal position.	-30000-30000	0
P4-15	Setting of the number of pulses in the position circle for internal position command 5	1. Sets the number of position pulses for the 5th internal position. 2. Internal Position Command 5 = Setting value of the 5th internal position revolution + Setting value for the number of internal position pulses in paragraph 5.	+/-max .cnt/rev	0
P4-16	The internal position command controls the travel speed of 5.	Setting the internal position command controls the travel speed of 5.	0-5000 r/min	1000

P4-17	Internal position command 6 position circle setting	Sets the number of position turns for the internal position of segment 6.	-30000-30000	0

P4-18	Setting of the number of pulses in the position circle for internal position command 6	1. Sets the number of position pulses for the 6th internal position. 2. Internal Position Command 6 = Setting value of the 6th internal position revolution +6 Setting value for the number of internal position pulses.	+/-max .cnt/rev	0
P4-19	The internal position command controls the travel speed of 6.	Setting the internal position command controls the travel speed of 6.	0-5000 r/min	1000
P4-20	Internal position command 7 position circle setting	Sets the number of position turns for the 7th internal position.	-30000-30000	0
P4-21	Setting of the number of pulses in the position circle for internal position command 7	1. Sets the number of position pulses for the 7th internal position. 2. Internal Position Command 7 = Setting value for 7th internal position revolution +7 Setting value for the number of internal position pulses.	+/-max .cnt/rev	0
P4-22	The internal position command controls the travel speed of 7.	Sets the travel speed of internal position command control 7.	0-5000 r/min	1000
P4-23	Internal position command 8 position circle setting	Sets the number of position turns for the internal position of segment 8.	-30000-30000	0
P4-24	Setting of the number of pulses in the position circle for internal position command 8	1. Sets the number of position pulses for the 8th internal position. 2. Internal Position Command 8 = Setting value for the 8th internal position revolution	+/-max .cnt/rev	0

		+ Setting value for the number of internal position pulses in paragraph 8.		

P4-25	Internal position command controls the travel speed of 8 Setting	Setting the internal position command controls the travel speed of 8.	0-5000 r/min	1000
P4-32	Home Detector Types and Finding Direction Settings	0: Return to the origin in the forward direction, CCWL is used as the return origin; 1: Reverse direction origin return, CWL as the return origin ; 2: Return to the origin in the forward direction, ORGP as the return to the origin; 3: Reverse direction origin return, ORGP as the return origin ; 4: Positive rotation directly looking for a single turn absolute position zero point for the return to the origin; 5: Reverse the direct search for a single turn absolute position zero for the return to the origin.	0-5	0
P4-33	Setting of the short distance travel method to the home position	0: After finding the reference origin, return to find the zero point of the absolute position of a single revolution as the mechanical origin; 1: After finding the reference origin, do not return, go forward to find the zero point of the absolute position of the single circle as the mechanical origin; 2: Finding the reference origin (ORGP rising edge or absolute position of a single turn) (Zero point) is used as the mechanical home position, and then deceleration stops.	0-2	0
P4-34	Home Trigger Activation Mode	0: Turn off the origin regression function; 1: When the power is turned on, the home return function is executed automatically ; 2: The home return function is triggered by the home search function (SHOM) input contact.	0-2	0
P4-35	Home stop mode setting	0: When home detection is complete, the motor decelerates and pulls back to the home position; 1：After the home position detection is completed, the motor decelerates and stops in the forward direction.	0-1	0

P4-36	First high speed home return speed setting (HSPD1)	Sets the first high speed home return speed.  	1-2000 r/min	1000

P4-37	Second low-speed home return speed setting (HSPD2)	Sets the second low home return speed.	1-500 r/min	50
P4-38	Number of home return offset revolutions (HOF1)	Sets the number of home return offset turns.	-30000-30000	0
P4-39	Number of home return offset pulses (HOF2)	1. Sets the number of home return offset pulses. 2. Parameter Function When HOF1 and HOF2 are set to zero, the home position will be defined as the one-turn absolute position zero or ORGP according to the home return mode; if the setting value is not zero, the home position will be based on the above one-turn absolute position zero or ORGP plus a pulse offset. HOF1 x 10000 + HOF2 as the new origin.	+/-max .cnt/rev	0

Chapter 7 Fault Codes

malfunctions notation	Fault name	Fault content
--	normalcy	
1	speeding	Servo motor speed exceeds the set value
2	Main circuit overvoltage	Main circuit power supply voltage too high
3	Main circuit undervoltage	Main circuit power supply voltage too low
4	The location is terrible.	Position deviation counter value exceeds the set value
5	Drive overheating	Drive temperature too high
6	Speed amplifier saturation fault	Speed regulation long time saturation
7	Driver Disable Exception	CCW/CW Driver disable inputs are OFF
8	Position deviation counter overflow	Absolute value of the position deviation meter value exceeds 2^{30}
11	IPM module failure	IPM Smart Module Failure
13	Drive Overload	Servo driver and motor overload (transient overheating)
14	brake failure	Brake circuit failure
18	Relay switch failure	The actual state of the relay does not match the control state
19	Holding brake delay error	Pulse input when holding brake is not open
20	EEPROM error	EEPROM error
21	FPGA Module Failure	FPGA Module Function Abnormal
23	Current Acquisition Circuit Failure	Current Acquisition Circuit Failure
29	User torque overload alarm	Motor load exceeds user-set value and duration
42	AC input voltage too low	AC input voltage too low
47	Main circuit voltage too high at power-up	Main circuit voltage too high at power-up
50	Encoder communication failure	The drive has not established communication with the encoder
51	Encoder communication abnormality	Encoder communication establishes communication, then there is an interruption and the connection is disconnected
52	Encoder low battery voltage alarm	Encoder battery low voltage alarm, message not lost but need to be replaced as soon as possible

53	Encoder battery voltage error alarm	Encoder battery voltage error alarm, an error has occurred in the stored information, the Need to reset the encoder
54	Encoder error alarm	Encoder non-battery alarm, but need to reset the encoder
55	CRC calibration error 3 times in a row	The CRC check of the data received by the encoder communication is incorrect three times in a row.

56	MODBUS frame too long error	Received MODBUS frame data is too long.
57	MODBUS communication format abnormality	Improperly set communication parameters or incorrect address or value
58	Incorrect lap position value	Drive stored singleturn position offset value exceeds encoder resolution
59	Encoder reports CF error	The encoder continuously reports a CF field error, requiring a reset of the encoder

Chapter IX Alarm Handling Methods

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
1	speeding	Access Control Appears when power is supplied	1. Control board malfunction. 2. Encoder malfunction.	1. Change the servo drive. 2. Change the servo motor.
		Appears during motor operation	Input command pulse frequency is too high.	Set the input command pulse correctly.
			Acceleration/deceleration time constants are too small to make the speed The amount of degree overshoot is too large.	Increase the acceleration/deceleration time constant.
			The input electronic gear ratio is too large.	Correct setup.
			Encoder malfunction.	Change the servo motor.
			Bad encoder cable.	Change the encoder cable.
			The servo system is unstable, causing overshoot.	1. Reset the relevant gain value. 2. If the gain cannot be set to the combined If the value is appropriate, the ratio of loaded inertia is reduced.
		Appears when the motor is first started	Excessive load.	1. Reduce the amount of load. 2. Switching to higher power drives and Motor.
			1. Encoder zero error. 2. Motor UVW lead is incorrectly connected.	1. Change the servo motor. 2. Ask the factory to reset the encoder zero point.

			3. The encoder cable leads are connected incorrectly.	3. Correct wiring.

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
2	Main circuit overvoltage	Access Control Appears when power is supplied	Circuit board failure.	Change the servo drive.
		Turn on the main power source	1. Power supply voltage is too high. 2. The power supply voltage waveform is not normal.	Check the power supply.
		Appears during motor operation	Brake resistor wiring disconnected.	Rewiring.
			1. Damaged brake transistor. 2. The internal braking resistor is damaged.	Change the servo drive.
			Insufficient brake circuit capacity.	1. Reduce the frequency of start-stop. 2. Increase the acceleration and deceleration time constants. 3. Reduce the torque limit value. 4. Reduced load inertia. 5. Change to a higher power driver and motors.
3	Main circuit undervoltage	Appears when the main power is turned on	1. Circuit board failure. 2. The power supply fuse is damaged. 3. Soft start circuit failure. 4. The rectifier is damaged.	Change the servo drive.
			1. Low supply voltage. 2. Temporary power outage 20ms or more.	Check the power supply.

		Appears during motor operation	1. Insufficient power supply capacity. 2. Instantaneous power down.	Check the power supply.
			Radiator overheating.	Check the load.

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
4	The location is terrible.	Turn on the control power source	Circuit board failure.	Change the servo drive.
		Turn on the main power supply and control line, input the pulse command, the motor does not Turning or reversing	1. Encoder zero change. 2. Encoder failure .	1. Readjust the encoder zero point. 2. Replace the servo motor.
		Appears during motor operation	Small detection range of set position overshoot.	Increase the range of positional overshoot detection.
			Position proportional gain is too small.	Increase the gain value.
			Insufficient torque.	1. Check the torque limit value. 2. Reduced load capacity. 3. Switching to higher power drives and Motor.
			The command pulse frequency is too high.	Reduce the frequency.
			Encoder zero change.	Readjust the changeover encoder zero point.
5	drives overheat (e.g. an economy)	Drive operation in-process	1. Circuit board failure. 2. Drive temperature is too high.	1. Reduces drive temperature. 2. Change the servo drive.

6	Speed amplification saturation fault	Appears during motor operation	1. Overloaded. 2. The motor is mechanically seized.	1. Reduce the load. 2. Switch to higher power drives and motors. 3. Check the load mechanical parts.
7	drive a ban stop abnormality		CCW / CW drive inhibit inputs The subs are disconnected.	Check the wiring.
8	Position Deviation Counter Overflow		1. The motor is mechanically seized. 2. Input command pulse is abnormal.	1. Check the load mechanical parts. 2. Check the command pulse. 3. Check that the motor is pulsing as commanded Punch rotation.

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
11	IPM mode block fault	Turn on the control power source	Circuit board failure.	Change the servo drive.
		Appears during motor operation	1. The supply voltage is low. 2. Overheating.	1. Check the drive. 2. Re-power up. 3. Replace the drive.
			Short circuit between drive UVWs.	Check the wiring.
			Poor grounding.	Proper grounding.
			Damaged motor insulation.	Replace the motor.
			Interfered with.	1. Add line filters. 2. Keep away from sources of interference.
13	overloaded	Turn on the control power source	Circuit board failure.	Change the servo drive.
		Appears during motor operation	Run over rated torque.	1. Check the load. 2. Reduce the frequency of starting and stopping. 3. Reduce the torque limit value. 4. Switching to higher power drives and Motor.
			Keep the brake from opening.	Check the holding brake.
			The motor oscillates erratically.	1. Adjust the gain. 2. Increase the acceleration/deceleration time. 3. Reduced load inertia.

			1. UVW has one phase disconnected. 2. Encoder connection error.	Check the wiring.
14	brake failure		Brake circuit failure.	Change drive

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
18	relay (electronics) switching mode		The relay is damaged.	Return to factory for repair.
19	Holding brake delay unopened		PA94 parameter value is set too large, control The pulse is coming and the holding brake is still open.	Decrease the value of parameter PA94.
20	EEPROM error		Chip or circuit board damage.	1. Change the servo drive. 2. After repair, the drive model must be reset (refer to PA10). The default parameters are then restored.
21	FPGA Module Failure		The FPGA module functions abnormally.	Replace the drive.
23	Current Acquisition Circuit malfunctions		Current acquisition circuit failure.	Change the servo drive.
29	User torque Overload Alarm		1. PA30, PA31 Parameters are not reasonable. 2. Unexpected big loads happen.	1. Modify the parameters. 2. Overhauling machinery.
42	AC Input undervoltage	power down runtime	1. Normal. 2. External AC voltage input too low.	Check AC220V input.
47	Main circuit at power-up overvoltage		1. External AC voltage input too high. 2. Main circuit failure.	1. Check AC220V input. 2. Change the drive.
50	encoders communications failure		The drive has not established communication with the encoder. Connections.	Connect the encoder wires and reapply power.

51	encoders communications anomaly		After the encoder communication establishes communication, the Interrupt, disconnect.	Connect the encoder wires and reapply power.
52	Encoder Battery Power Insufficient pressure alarm		Encoder low battery voltage alarm, letter The message has not been lost but needs to be replaced as soon as possible.	Replace the encoder battery.
53	Encoder battery voltage error alarm		Encoder battery voltage error alarm, the stored information has been incorrect and needs to be reset. Bit Encoder.	The encoder battery is exhausted and must be replaced.
54	encoders false alarm		The encoder is not a battery type alarm, but requires Reset the encoder.	Reset the encoder.

give a warning coding	give a warning name (of a thing)	(of a computer) run state of affairs	Reason	Treatment
55	CRC Checksum Continuous 3 suboptimal		Data received by MODBUS communication CRC validation error 3 times in a row	Replace the drive.
56	MODBUS Frame Over long error		1. Communication protocol mismatch. 2. Interfered with.	1. Confirm the frame length. 2. Add line filters away from Interference.
57	MODBUS communication formatting exception		1. Communication parameters are not set properly. 2. Incorrect mailing address or value.	Replace the drive.
58	laps Position value error		Drive-stored singleturn position offset The value exceeds the encoder resolution.	Re-power up and start.
59	encoders Reporting CF Errors		The encoder continuously reports a CF field error that The encoder needs to be reset.	Reset the encoder.

Sma II S ize, H ig h Pre ci s ion

2. ÆD ÆŒWÆÑH-TRWĞBÆÆÜ.ÆN%ÜKÆŁŠ.
3. mBBWØSWWNm,f0H NON.wümTaHÆ B2Jãc.
4. f4ÆØBDЄ.HÆÆt-ÆlÆ.WÜÆWÆ#AÆ.

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