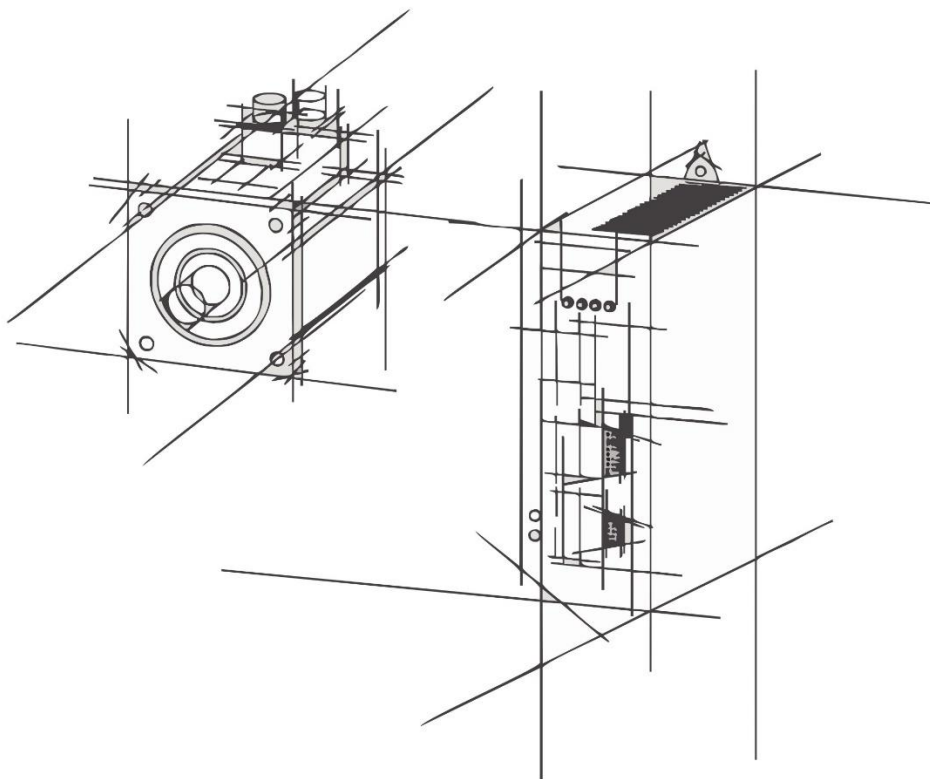




GS10 series AC servo driver user's manual



GS10 series AC servo driver
user's manual



Safety Precautions

Before storing, installing, wiring, operating, inspecting or repairing the product, users must be familiar with and comply with the following important matters to ensure safe use of this product.



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



Note: Improper operation may cause danger, result in personal injury or death, and may damage the equipment.



Prohibit: Prohibited behavior is prohibited, otherwise it will cause damage to the equipment or make it unusable.

1. Use occasions



Danger

1. It is prohibited to expose the product to places with moisture, corrosive gases, and flammable gases. Otherwise it may cause electric shock or fire.
2. It is forbidden to use the product in places exposed to direct sunlight, dust, salt and metal powder.
3. It is prohibited to use the product in places where water, oil and pharmaceuticals are dripping.

2. Wiring



Danger

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

3. Operation



Notice

1. Before the mechanical equipment starts to operate, it must be matched with appropriate parameter settings. If the appropriate setting value is not adjusted, the mechanical equipment may lose control or malfunction.
2. Before starting operation, please confirm whether the emergency switch can be activated at any time to stop the machine.
3. Please test whether the servo motor is running normally without load first, and then connect the load to avoid unnecessary losses.
4. Do not turn the power on and off frequently, otherwise it will cause overheating inside the driver.

4. Run



Prohibit

1. When the motor is running, it is prohibited to touch any rotating parts, otherwise it may cause personal injury or death.
2. When the equipment is running, it is forbidden to touch the driver and

motor, otherwise it may cause electric shock or burns.

3. When the equipment is running, it is prohibited to move the connecting cable, otherwise it may cause personal injury or equipment damage.

5. Maintenance and inspection



Prohibit

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

6. Scope of use



Notice

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

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Charter I Inspection and installation

1.1 Inspection

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

- Check whether the servo drive and servo motor models are the same as the ones you ordered.
- Check whether the servo driver and servo motor are damaged or scratched during transportation. If the product is damaged during transportation, do not connect the wiring to send power.
- Check the servo driver and servo motor for loose components. Are there any loose screws? Are the screws not locked or falling off?
- Check whether the servo motor rotor shaft can rotate smoothly by hand. Motors with brakes cannot rotate directly.
- Check whether the servo operation manual is included.
- Check whether the drive accessories are included in the box.

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

1.2 Front panel

This panel introduces applicable models: GS10-40, GS10-75

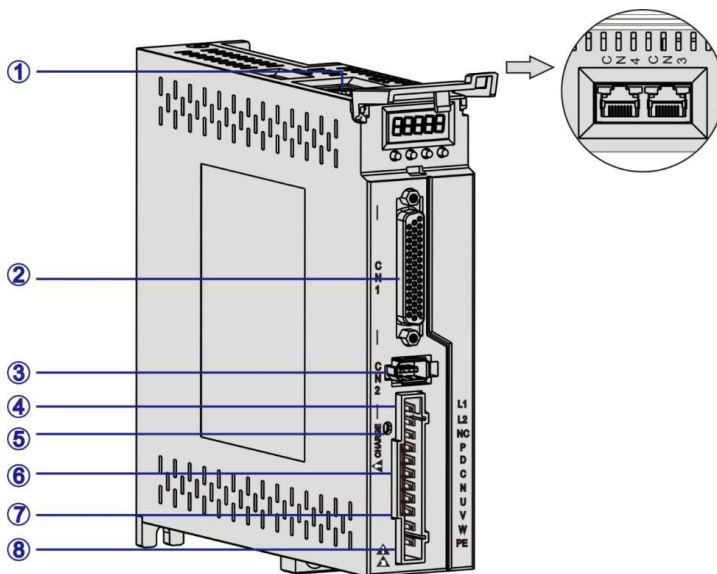


Figure 1.1 GS10 servo driver front panel introduction

Serial number	Terminal name	Function Description
①	CN3, CN4	Communication terminal.
②	CN1	Input and output control signal terminals.
③	CN2	Encoder signal terminal, connected to the motor encoder.
④	L 1, L 2	Main power input terminal.
⑤	CHARGE	Bus voltage indicator light. Used to indicate that the bus capacitor is charged. When the indicator light is on, even if the main circuit power supply is turned off, the capacitor inside the servo unit may still be charged. Therefore, do not touch the power terminals when the light is on to avoid electric shock.
⑥	P,D ,C,N	Braking resistor connection terminal.

Serial number	Terminal name	Function Description
⑦	U,V,W	Servo motor connection terminals. Connect the U, V, W phases of the servo motor.
⑧	PE	Ground terminal. Connect to the power supply and motor ground terminals for grounding processing.

1.3 Installation method

1.3.1 Driver installation method

- Installation direction

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

- Installation and fixation

When installing, tighten the two M4 fixing screws at the rear of the servo drive.

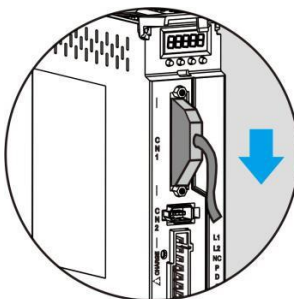
- Ground

Please be sure to connect the ground terminal of the driver to the ground, otherwise there may be a risk of electric shock or interference causing malfunction.

- Catering requirements

When wiring the driver, please route the cable downwards (refer to the figure below) to avoid liquids attached to the cables on site.

When flowing into the driver along the cable.



Please route the connected cables in a downward direction

Schematic diagram of servo drive cable routing requirements

- Installation interval

Please refer to Figure 1.3 for the installation distance between drives and other devices. Note that the minimum distance marked on the figure is

Small size. To ensure the performance and life of the driver, please leave sufficient installation intervals as much as possible.

- Heat dissipation

The servo drive adopts natural cooling method and forced heat dissipation method .

- Installation precautions

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

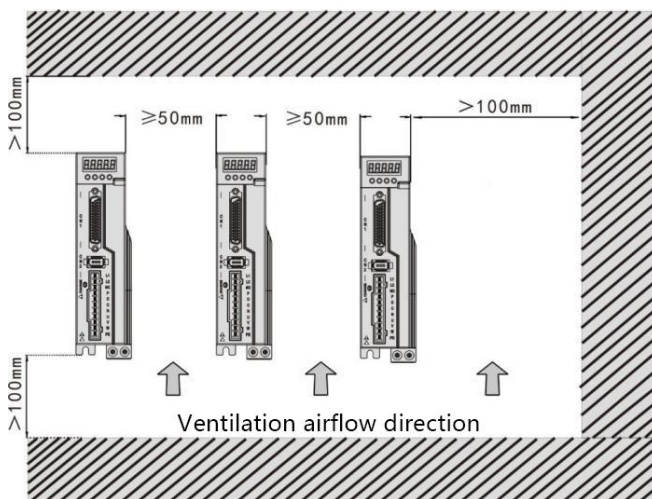


Figure 1.3 Installation intervals

1.3.2 Installation environment conditions

- Working environment temperature: 0~40°C; working environment humidity: below 80% (no condensation)
- Storage environment temperature: -40~50°C; Storage environment humidity: below 80% (no condensation)
- Vibration: below 0.5G.
- A well-ventilated place with little moisture and dust.
- No corrosive, flammable gas, oil, gas, cutting fluid, cutting powder, iron powder and other environments.
- A place free from moisture and direct sunlight.

1.3.3 Motor installation method

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

1.3.4 Definition of motor rotation direction

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

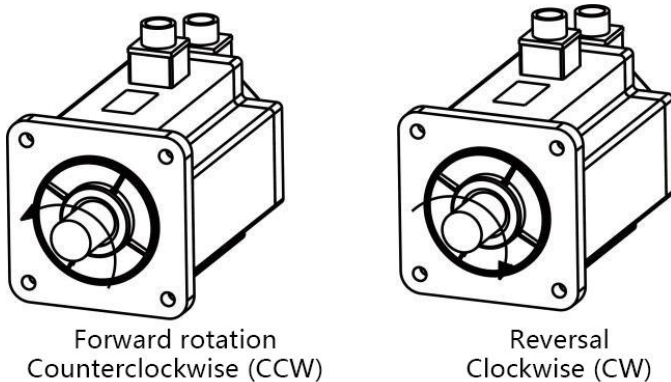


Figure 1.4 Definition of motor rotation direction

Charter II Specifications

2.1 Specifications

Model	GS10-40	GS10-75
Output Power	0.05KW~0.4KW	0.75KW~1KW
Main circuit input power	Single phase AC220V-15%~+10% 50 /60Hz	
control method	0: Position control mode 1: Speed control mode 2: Torque control mode 3: Position-speed hybrid control mode 4: Position-torque hybrid control mode 5: Speed-torque hybrid control mode	
Protective function	Overspeed/main power overvoltage and undervoltage/ overcurrent/overload/encoder abnormality/control power supply abnormality/position out of tolerance	
Monitoring function	Speed/current position/command pulse accumulation/position deviation/motor torque/motor current/running status, etc.	
control input	1: Servo enabled 2: Alarm cleared 3: CCW drive disabled 4: CW drive disabled 5: Deviation counter cleared 6: Command pulse disabled 7: CCW torque limit 8: CW torque limit	
control output	Servo ready/servo alarm/positioning completed/mechanical brake	
Energy	Supports built-in and external	

Model	GS10-40	GS10-75
consumption braking		
Applicable load	Less than 3 times the motor inertia	
show operations	5-digit LED digital tube display, 4 operation buttons	
communication method	RS485	
position control	Input	0: Pulse + direction
		1: CCW/CW pulse
		2: A/B two-phase orthogonal pulse
		3: Internal position control
	input electrons gear ratio	Gear ratio numerator: 1-32767
		Gear ratio denominator: 1-32767

2.2 Servo drive naming rules

GS10 | **P** | **-2S** | **-040** | **-A**
 ① ② ③ ④ ⑤

Serial number	Name	Meaning
①	Servo series	GS10 series servo driver
②	Control type	P: Pulse type; E: Bus type;
③	Voltage	2S: Single phase 220V; 2T: Three-phase 220V; 4T: Three-phase 380V;
④	Power	040: 400 W; 075 : 750W; 100: 1KW; 150: 1.5KW ...
⑤	Version number	A : Version A ;

2.3 Servo motor naming rules

GT10M | **- 04** | **01** | **A** | **013** | **N**
 ① ② ③ ④ ⑤ ⑥

Serial number	Name	Meaning
①	click series	GT10M series
②	Base type	Frame number: 0 4: 40mm; 0 6: 60mm; 0 8: 80mm 10: 100mm; 13: 130 mm;
③	Motor length	0 1 : 1 Stacks ; 0 2 : 2 Stacks ; 0 3 : 3 Stacks ; 0 4 : 4 Stacks ;
④	Encoder	A : Single-turn absolute value 17 digits;
⑤	Rated torque (X0.1Nm)	013: 1.27Nm; 024: 2.4Nm;
⑥	brake	N: Without brake ; B : With brake ;



1. For example, the rated torque parameter code 024 means the rated torque is 2.4Nm and the rated speed is 3000rpm.
2. Rated power calculation formula: $P=0.1047 \times N \times T=0.1047 \times 2.4 \times 3000=753.84W \approx 0.75KW$, T is the rated torque, and N is the rated speed.

2.4 Servo motor and servo driver adaptation table

Base	Motor model	Power (W)	Rotating speed (rpm)	Adapter drive	Match Encoder
60 mm	GT10M-0601A013N	400	3000	GS10P-2S040-A	17-bit single-turn absolute encoder
	GT10M-0601A013B	400	3000		
80 mm	GT10M-0801A024N	750	3000	GS10P-2S075-A	
	GT10M-0801A024B	750	2000		

Chapter III Driver and motor dimensions

3.1 Drive size

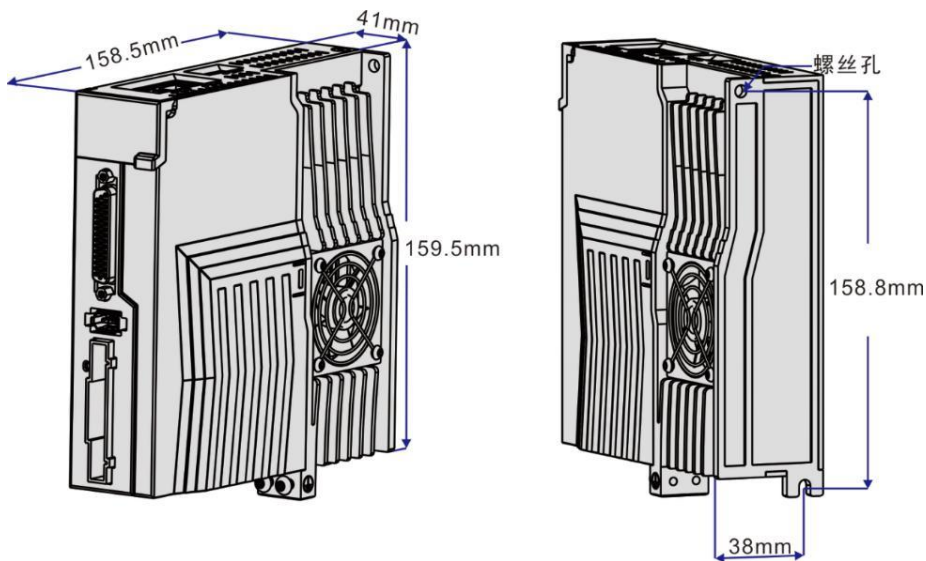


Figure 3.1 GS10 series overall dimensions

3.2 Motor size

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

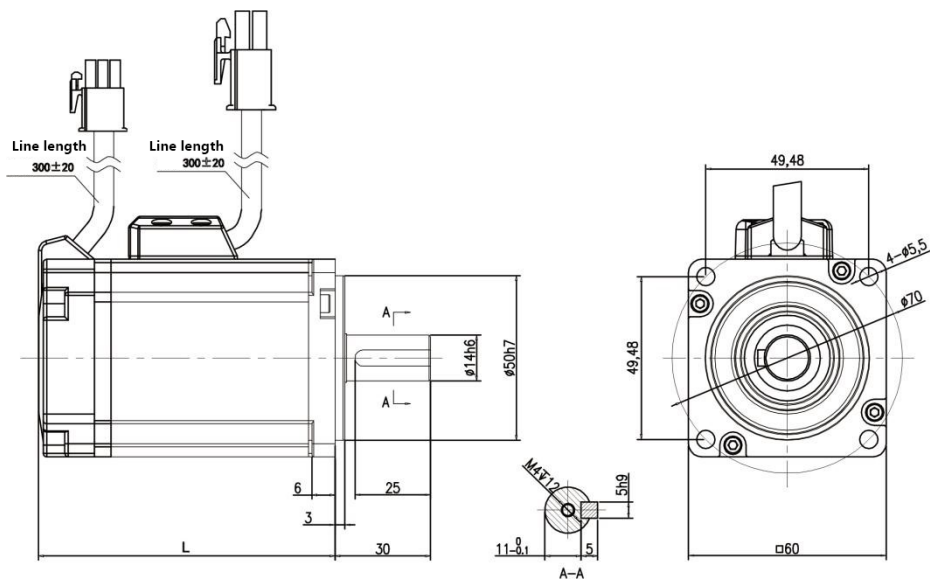


Figure 3.2 60 motor and Table 3-1

Model	GT10M-0601A013N	GT10M-0601A013B
L(mm)	--	90

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

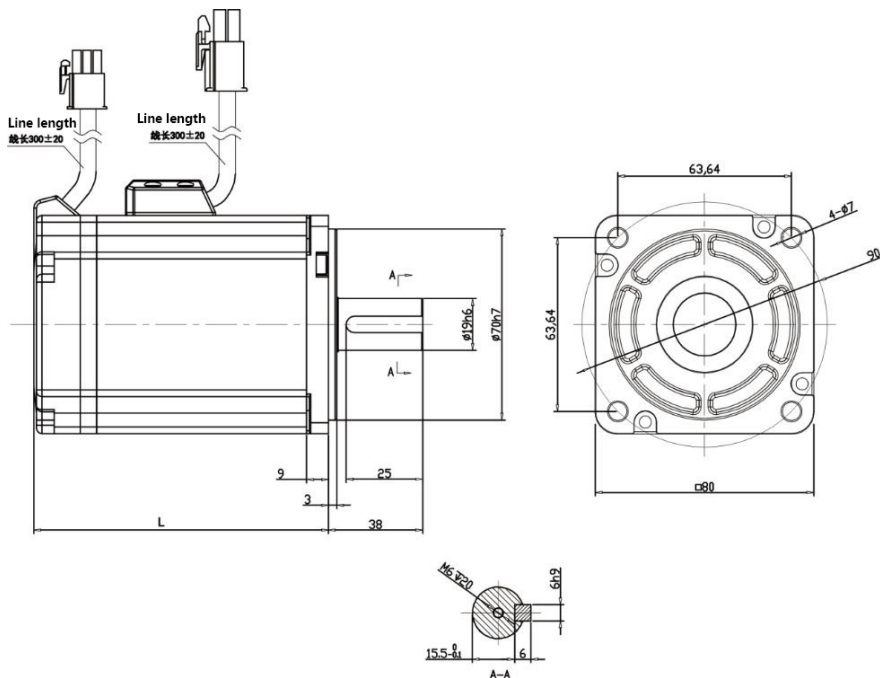


Figure 3.3 80 motor and Table 3-2

Model	GT10M-0801A024N	GT10M-0801A024B
L(mm)	--	90

Charter IV Driver system wiring and composition

4.1 Servo system wiring

4.1.1 Servo drive wiring diagram

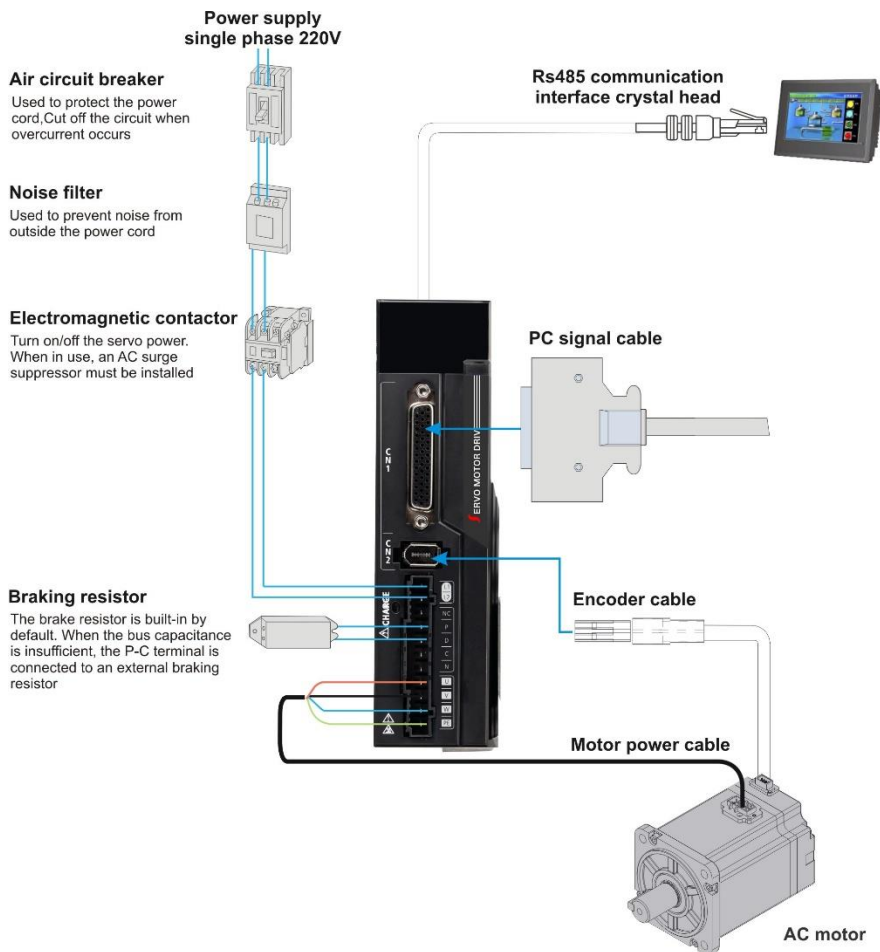


Figure 4.1 Servo system wiring diagram

4.1.2 Wiring instructions

Wiring precautions:

- Cable length: command cable within 3m, encoder length within 20m.
- Check whether the power supply and wiring of L1 and L2 are correct. If the driver only supports single-phase 220VAC, please do not connect it to the 380VAC power supply.
- The phase sequence of the motor output U, V, and W terminals must correspond one-to-one with the corresponding terminals of the driver. If connected incorrectly, the motor may not rotate or may run over. The motor cannot be reversed by exchanging the three-phase terminals, which is different from the asynchronous motor.
- Since the servo motor flows through high-frequency switching current, the leakage current is relatively large. The motor ground terminal must be connected to the servo drive ground terminal PE and well grounded.
- For the relay installed in the output signal, the diode used for absorption must be connected in the correct direction, otherwise it will cause malfunction and fail to output the signal.
- To prevent erroneous operation caused by noise, please add an isolation transformer, noise filter and other devices to the power supply.
- Please route power lines (strong current circuits such as motor lines, power lines, etc.) and signal lines at least 30cm apart, and do not place them in the same wiring duct.
- Please install a non-fuse circuit breaker so that the external power supply can be cut off in time when the driver fails.
- Because there are large-capacity electrolytic capacitors inside the servo drive, even if the power is cut off, there is still high voltage in the internal circuit. After cutting off the power, wait at least 5 minutes before touching the drive and motor.

4.1.3 Wire specifications

Connection terminal	Symbol	Wire specifications
Main circuit power supply	L1, L2	1.5~4mm ²
Motor connection terminal	U, V, W	1.5~4mm ²
Ground terminal		1.5~4mm ²
Control signal terminal	CN1	≥0.14mm ² (AWG26), including shielded wire
Encoder signal terminal	CN2	≥0.14mm ² (AWG26), including shielded wire
Braking resistor terminals	P, D/P, C	1.5~4mm ²



The encoder cable must use twisted pair. If the encoder cable is too long (>20m), it will cause insufficient power supply to the encoder. Its power and ground wires can be connected in multiple wires or use thick wires.

4.2 Servo drive terminal pin distribution

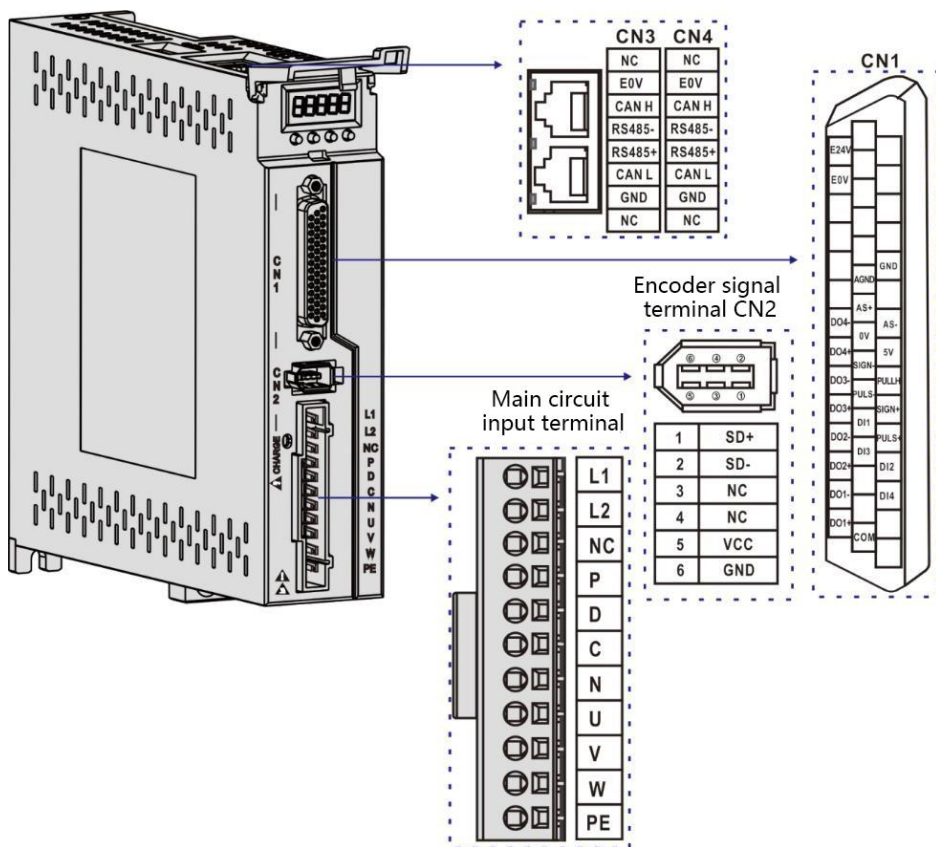


Figure 4.2 Schematic diagram of GS10 terminal pin distribution



The above pictures are all the pinout of the terminals on the driver body.

4.3 Servo drive main circuit connection

4.3.1 Introduction to main circuit terminals

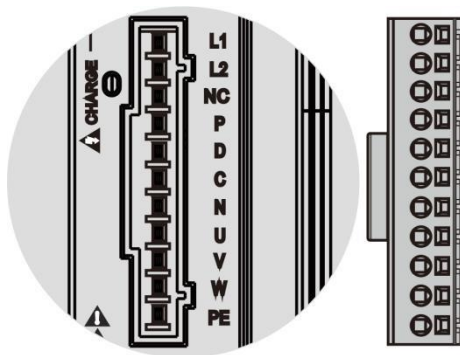


Figure 4.3 Main circuit terminal pin distribution

Name	Terminal symbol	Detailed description
Main circuit power input terminal	L1, L2	Single phase 220VAC -15%~+10%, 50/60Hz
	NC	Empty end
Braking resistor terminals	P.D.	When using the internal braking resistor, short-circuit P and D
	P.C.	When using an external braking resistor, short-circuit P and D, and then connect the external braking resistor wiring between P and C respectively. P and N are prohibited from connecting.
Motor connection terminal	U, V, W	Connect to the U, V, W phases of the servo motor.
	⊕	The driver ground terminal is connected to the power supply and motor ground terminals.



The factory default connection method of the internal braking resistor is: P and D are short-circuited.

4.3.2 Braking resistor wiring instructions

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

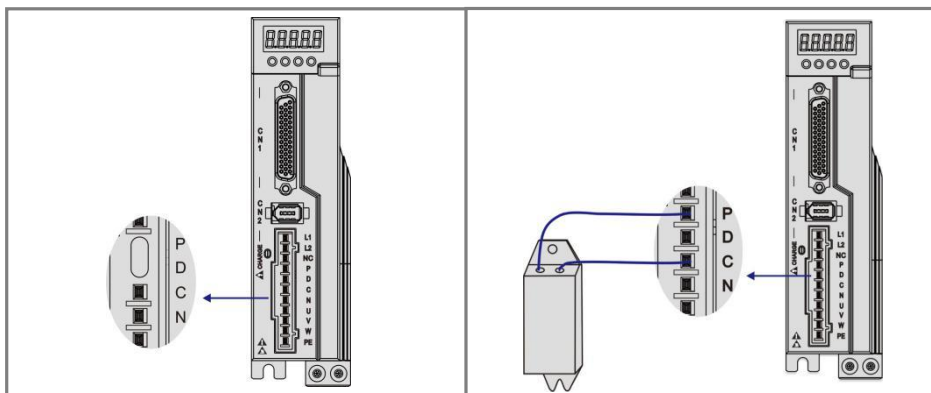


Figure A

Picture B



Precautions for wiring the braking resistor:

- Do not connect the external braking resistor to the positive and negative poles P and N of the bus, otherwise it will cause the machine to explode and cause a fire;
- Do not be less than the minimum allowable resistance value of 25Ω , otherwise it will cause the driver to alarm or damage the driver;
- Please install the external braking resistor on non-combustible materials such as metal.



It is recommended to use 24-26AWG wire diameter cable.

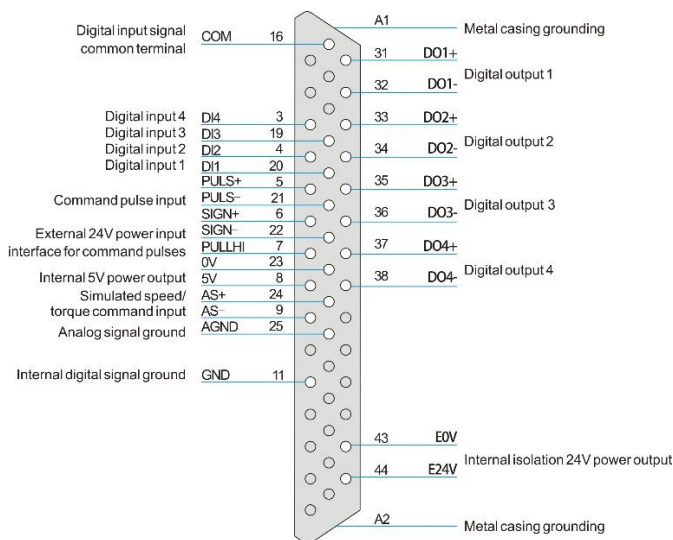


Figure 4.5 Driver CN1 terminal pin diagram

4.4.3 Position command input signal description

Signal name		Pin number	Function
Position pulse command	PULS+	5	High-speed photoelectric isolation input, parameter FA14 setting working mode:
	PULS-	twenty one	
	SIGN+	6	
	SIGN-	twenty two	● pulse+direction ● CCW/CW pulse ● A and B two-phase quadrature pulse input ● Internal position control input
	PULLHI	7	Additional 24V power input interface for command pulse
	GND	11	Internal digital signal ground

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

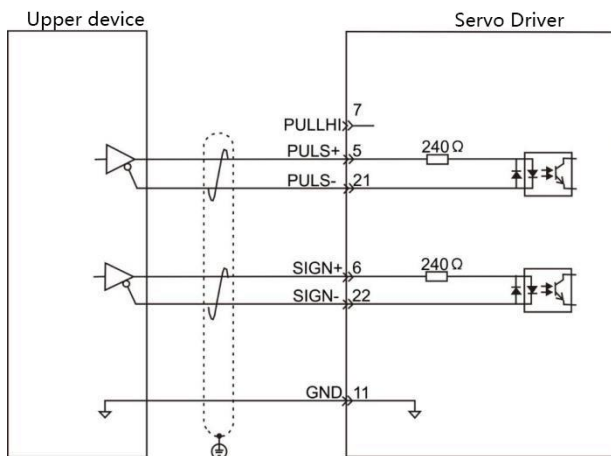
Pulse mode	Maximum frequency (pps)	Minimum pulse width (us)
Difference	500k	1
Open collector	200k	2.5



If the output pulse width of the host device is less than the minimum pulse width value, it will cause the driver to receive pulse errors. The ports between PULS+ and PULS- and between SIGN+ and SIGN- only support signal level input below 5V. Signals exceeding 5V must be connected in series with an external resistor, otherwise the driver will be damaged.

Schematic diagram of pulse command input circuit

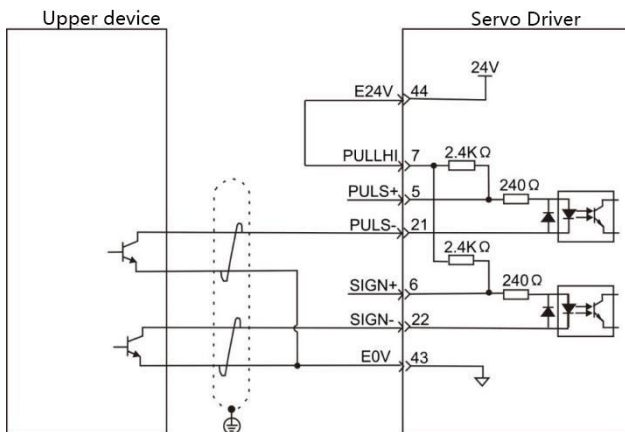
1. When in differential mode



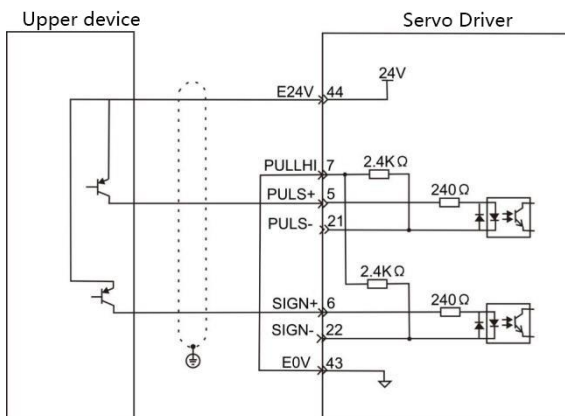
2. When the collector is in open circuit mode

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

- Common anode connection method , such as: Mitsubishi PLC.

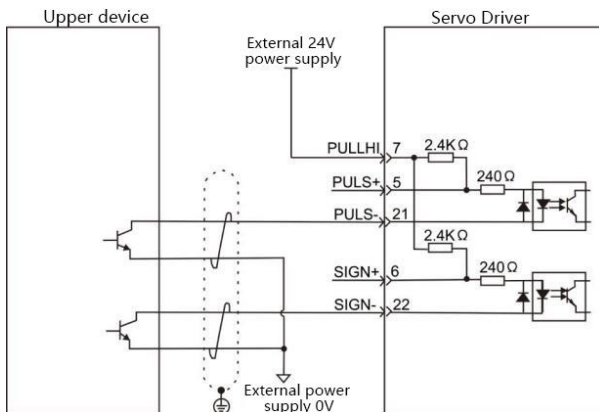


- Common cathode connection method : For example: Siemens PLC.

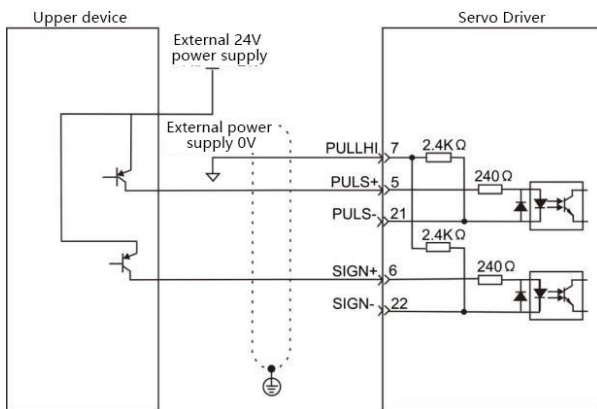


B) When using an external power supply:

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

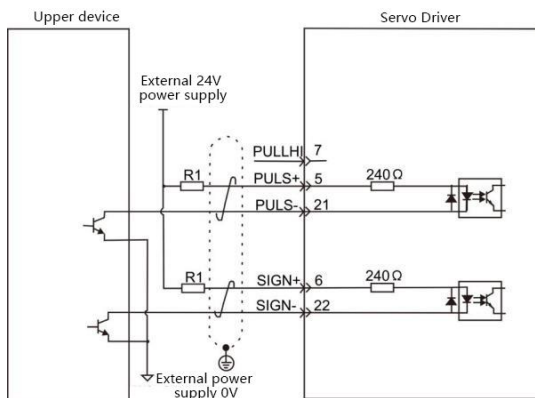


- Common anode connection method :

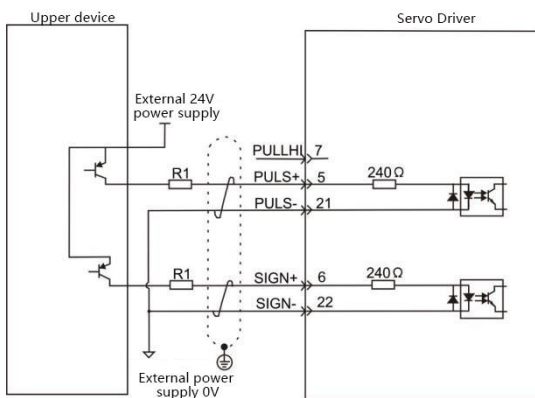


Solution 2: Use driver external resistor

- Common anode connection method



- Common cathode connection method



◆ Selection formula of resistor R1:

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

Table 4-1 recommended resistance value of R1

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

4.4.4 Digital input and output signal description

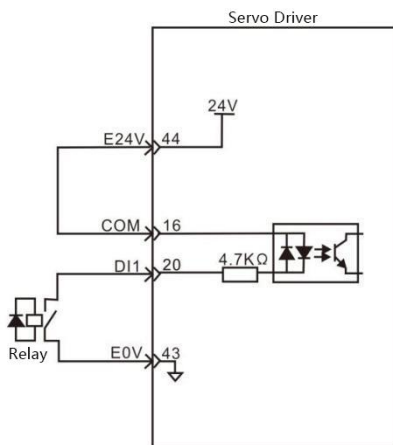
Signal name		Pin number	Default function	Description
Number input	DI1	20	Servo enable	Photoelectric isolation input, Function programmable, Defined by PC group parameters PC-0~PC-17. Note: the COM terminal is a common anode or common cathode interface, the input level is12V-24V.
	DI2	4	Alarm clear	
	DI3	19	Forward drive prohibited	
	DI4	3	Reverse drive prohibited	
	COM	16	Digital input signal common terminal	
Number output	DO1+	31	Servo ready	Photoelectric isolation output, programmable function, defined by PC group parameters PC-20~PC-23.
	DO1-	32		
	DO2+	33	Alarm output	
	DO2-	34		
	DO3+	35	Positioning completed	
	DO3-	36		
	DO4+	37	Electromagnet ic brake	
	DO4-	38		
Internally isolated power output	E0V	43	Internal 0V	Internally isolated 24V power output, voltage range 20V~28V, maximum output current 100mA.
	E24V	44	Internal 24V	

● Digital input circuit diagram

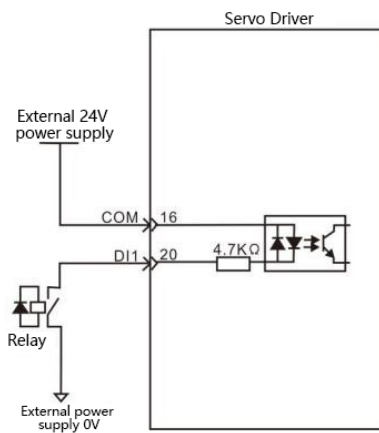
Taking DI1 as an example, the interface circuits of DI1~DI4 are the same.

1) When the upper device is a relay output

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

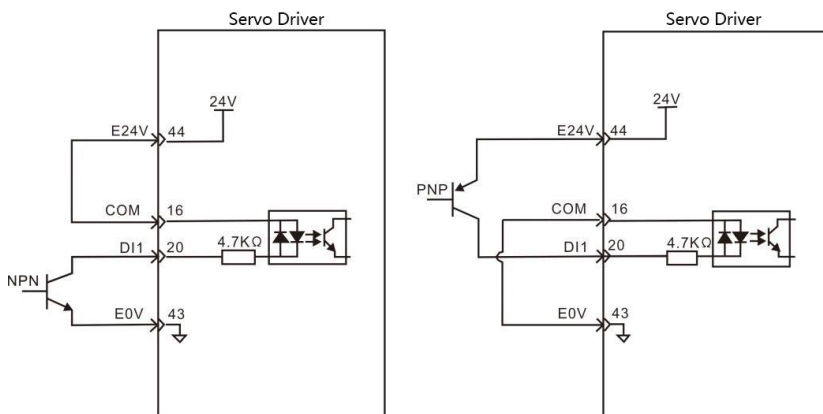


B) When using external 24V power supply:

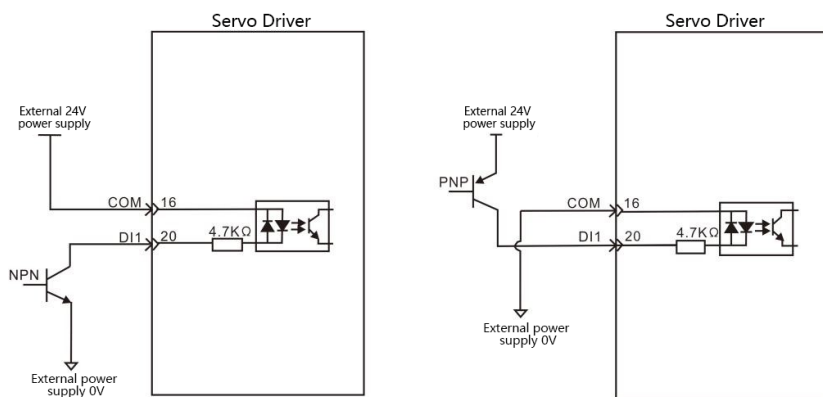


2) When the host device is an open collector output

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



B) When using an external 24V power supply:



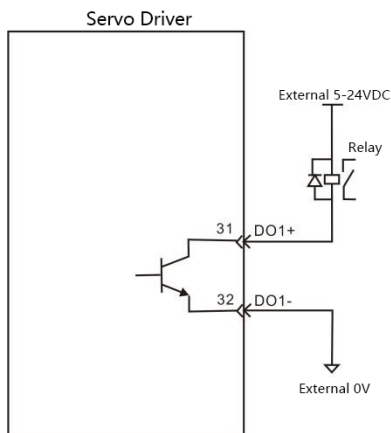
Note:

- ◆ Does not support mixed use of PNP and NPN inputs.

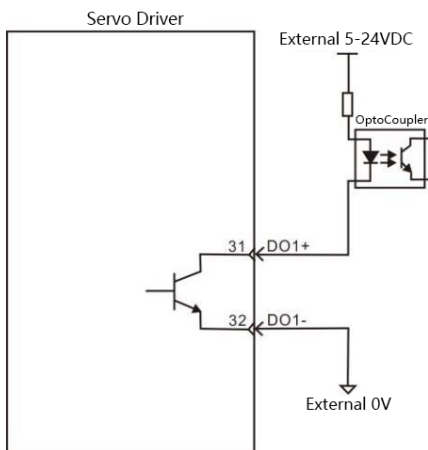
● Digital output circuit diagram

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

1) When the upper device is a relay input:



2) When the host device is an optocoupler input:





- ◆ When the upper device is a relay, be sure to connect a freewheeling diode, otherwise it may damage the DO port or cause strong signal interference.
- ◆ The maximum allowable voltage and current capacity of the optocoupler output circuit inside the servo driver are as follows:
 - Voltage: DC30V
 - Current: DC50mA

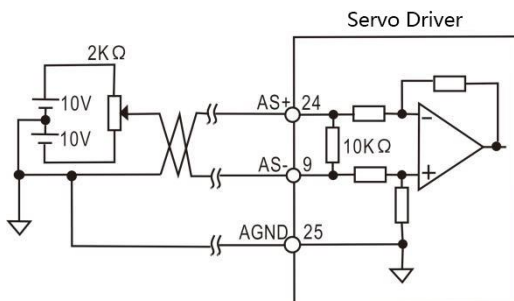
4.4.5 Analog command signal description

Signal name		Pin number	Function
Analog command input	AS+、AT+	24	Analog input for speed/rotation speed, range: -10V~+10V.
	AS-、AT-	9	
	AGND	25	

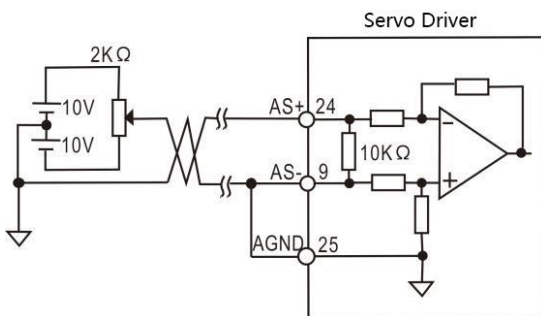
Schematic diagram of pulse command input interface

There are two connection methods of differential input and single-end input, and it is recommended to use the differential input connection method. Speed and torque share one analog input, input range: -10V~ + 10V, input impedance is about 10 K Ω . The analog input has zero bias and can be compensated by parameters.

1) When the simulated differential input



2) When it is an analog single-end input



4.4.6 Brake wiring instructions

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

Schematic diagram of brake signal circuit

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

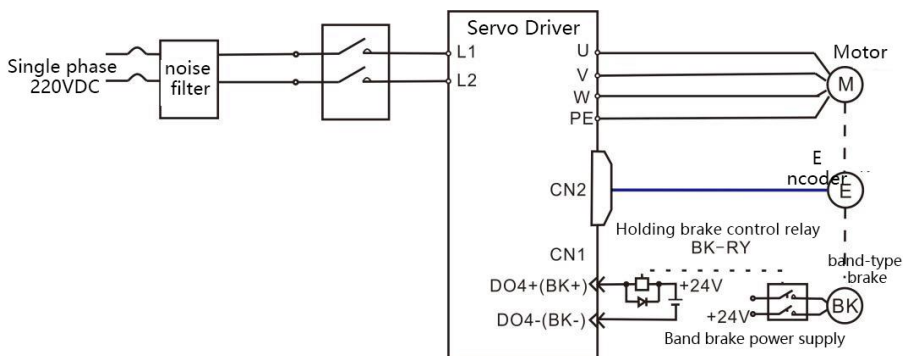


Figure 4.6 Brake signal wiring diagram

**Notice:**

- ◆ The brake mechanism built into the servo motor is a non-energized fixed special mechanism and cannot be used for braking. It is only used to keep the servo motor in a stopped state.
- ◆ The brake coil has no polarity.
- ◆ After the servo motor stops, the servo on signal (Servo On) should be cut off.
- ◆ When a motor with a built-in brake is running, the brake may make a clicking sound, but it has no functional impact.
- ◆ When the brake coil is energized (the brake is open), magnetic flux leakage may occur at the shaft end and other parts. Please be careful when using instruments such as magnetic sensors near the motor.
- ◆ It is forbidden for the holding brake to share the power supply with other electrical appliances to prevent the voltage or current from being reduced due to the operation of other electrical

4.5 CN2 Encoder signal terminal

4.5.1 CN2Terminal plug diagram

Connection diagram between CN2 encoder signal terminal and motor encoder.

The terminal connected to the encoder uses a 6PIN socket. The appearance and pin distribution are:

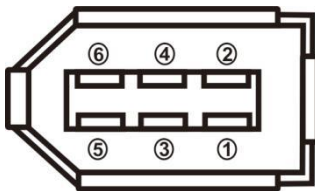


Figure 4.7 CN2 encoder signal terminal

4.5.2 Encoder terminal signal description

Signal name		Pin number	Function
Encoder signal power supply	5V	5	The encoder uses a 5V power supply (provided by the driver). When the cable is more than 20m, in order to prevent the encoder voltage from decreasing, the power supply and ground wires can be connected in multiple lines or use thick wires.
	0V	6	
Absolute encoder communication positive terminal	SD +	1	Absolute encoder communication positive terminal
Absolute encoder communication negative terminal	SD-	2	Absolute encoder communication negative terminal
Empty end	NC	3	Reserve
Empty end	NC	4	Reserve
Shielded wire protective ground	Plug metal shell		Connect the encoder wire shield

4.6 CN3 and CN4 communication interface

4.6.1 Communication port wiring diagram

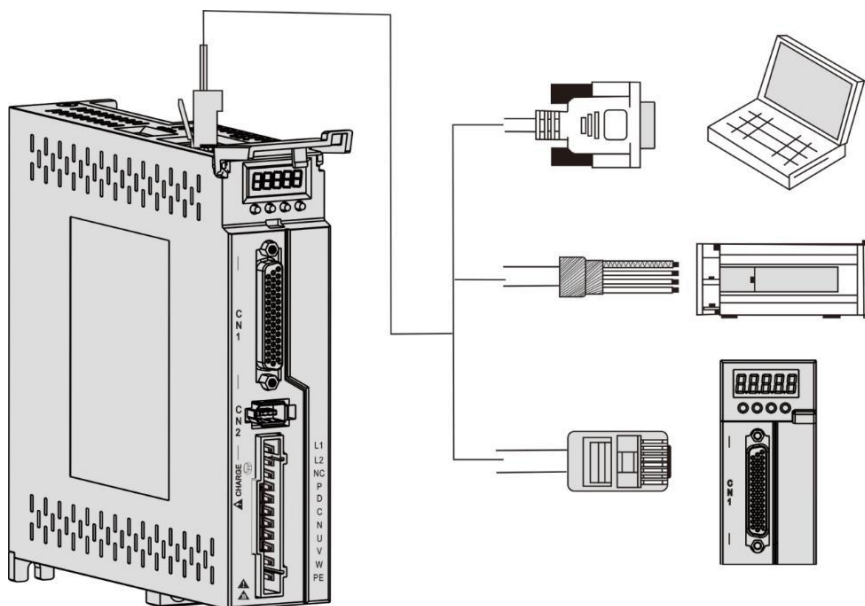
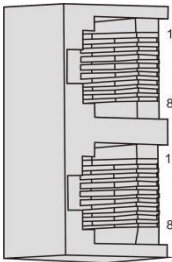


Figure 4.8 Communication port wiring diagram

4.6.2 Communication port pin definition description

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

Pin No.	CN3	Name	CN4	Name	Illustration
1	NC	Empty end	NC	Empty end	
2	E0V	CAN signal ground	E0V	CAN signal ground	

3	CAN H	CAN bus interface	CAN H	CAN bus interface	
4	RS485 -	RS485 communication interface	RS485 -	RS485 communication interface	
5	RS485+		RS485+		
6	CAN L	CAN bus interface	CAN L	CAN bus interface	
7	GND	485signal ground	GND	485signal ground	
8	NC	empty end	NC	empty end	



Notice:

- ◆ Can be connected to a PC or host computer controller through a dedicated serial port cable, and hot plugging and unplugging are prohibited.
- ◆ It is recommended to use twisted pair or shielded wire, with the wire length less than 2 meters.
- ◆ When multiple machines are connected in series, CN3 is connected to CN4 of the previous drive, and CN4 is connected to CN3 of the next drive.
- ◆ When using RS485 bus communication, when the 485 signal ground of the host computer is connected to the earth (PE), please connect the PE terminal of the host computer to the driver terminal through reasonable grounding. In this case, it is prohibited to connect the 485 signal ground of the host computer to the driver 485 signal ground (GND), otherwise the driver may be damaged.

4.6.3 485 communication group network connection instructions

1. 485 communication connection with PLC

When using 485 communication network, the connection cable between the driver and PLC is as follows:



Figure 4.9 Schematic diagram of communication cable between servo driver and PLC

Table 4-2 Pin connection relationship between servo driver and PLC communication cable

Driver side RJ45 (A side)		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 (shielding mesh layer)	shell	PE (shielding mesh layer)	shell

2. 485 communication connection for multiple machines in parallel

When using 485 communication network, the connecting cables for parallel connection of multiple servo drives are as follows:

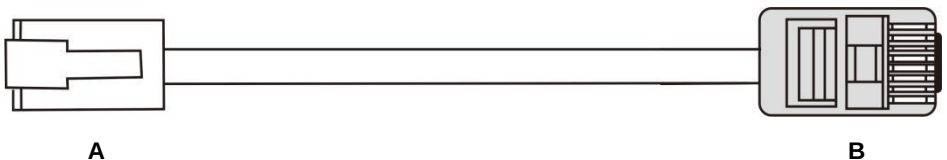


Figure 4.10 Schematic diagram of multi-machine parallel cables for servo drives

Table 4-3 Servo drive multi-machine parallel communication cable pin connection relationship

Driver side RJ45 (A side)		Driver 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 (Shielding network layer)	shell	PE (Shielding network layer)	shell

3.485 Communication grounding precautions

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

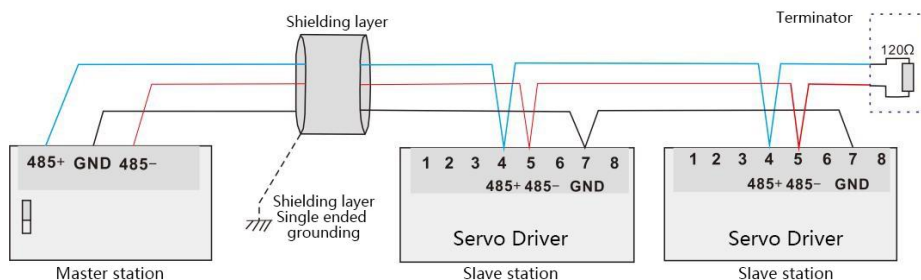
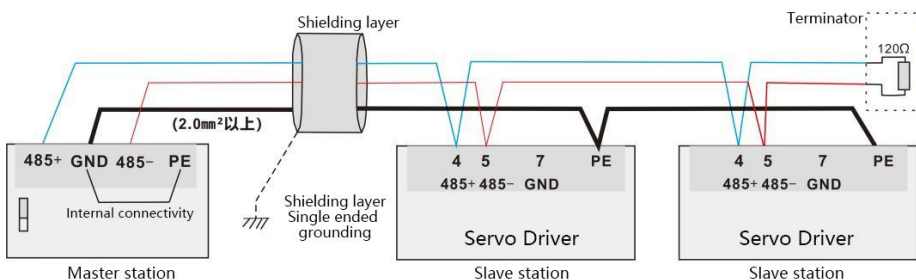


Figure 4.11 485 communication connection diagram

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



**Notice:**

- ◆ PLC has built-in 485 communication terminal resistor.
- ◆ It is recommended to ground the shielding layer at one end.
- ◆ Do not connect the GND terminal of the host device to the E0V terminal of the servo drive, otherwise the machine will be damaged.

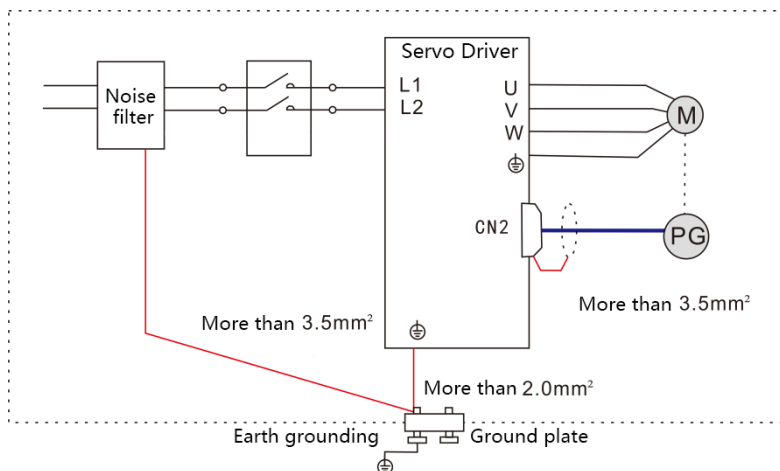
4.7 Anti-interference countermeasures for power wiring

To suppress interference, please take the following measures:

- The length of the command input cable should be less than 3m, and the length of the encoder cable should be less than 20m.
- Use thick wires as much as possible for ground wiring. (2.0mm² or more) .
- Please use a noise filter to prevent radio frequency interference. When using it in a civil environment or in an environment with strong power interference, please install a noise filter on the input side of the power cord.
- To prevent erroneous operations caused by electromagnetic interference, the following processing methods can be used:
 - a) Install the host device and noise filter as close to the servo drive as possible.
 - b) Install surge suppressors on the coils of relays, solenoids, and electromagnetic contactors.
 - c) When wiring, separate strong current lines from weak current lines, and keep a distance of more than 30cm. Do not put them in the same pipe or bundle them together.
 - d) Do not share the power supply with welding machines, electrical discharge processing equipment, etc. When there is a high-frequency generator nearby, install a noise filter on the input side of the power cord.

4.7.1 Examples of anti-interference wiring and grounding treatment

1. Anti-interference wiring examples



- ◆ The outer box connection wire for grounding should be thicker than 3.5mm² as much as possible, and braided copper wire is recommended.
- ◆ When using a noise filter, please observe the precautions described in "How to use the noise filter" below.

2. Grounding treatment

To avoid possible electromagnetic interference problems, please ground as follows.

1) Grounding of servo motor shell

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

2) Encoder cable shielding layer is grounded

Please ground the shielding layer of the motor encoder cable at both ends.

4.7.2 How to use the noise filter

In order to prevent interference from the power line and weaken the impact of the servo drive on other sensitive equipment, please select a corresponding noise filter at the power input end based on the input current. Also, install a noise filter on the power cord of the peripheral device if necessary. Please observe the following precautions when installing and wiring the noise filter to avoid weakening the actual use effect of the filter.

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

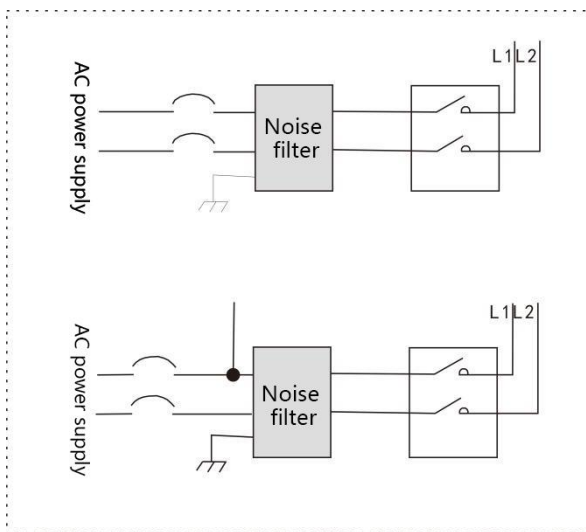


Figure 4.13 Example diagram of separate wiring of noise filter input and output wiring

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

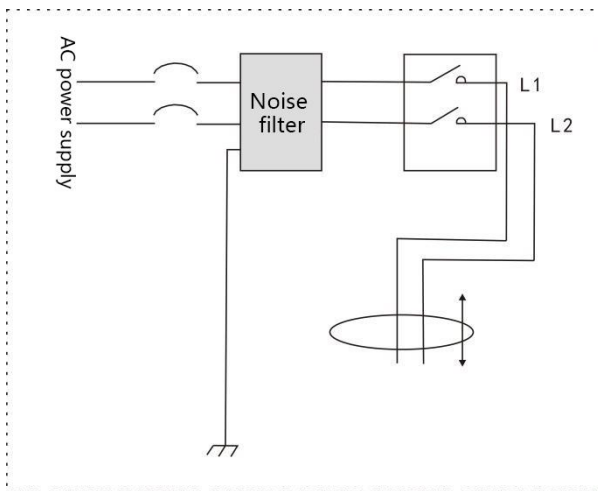


Figure 4.14 Schematic diagram of the separation of noise filter ground wire and output wiring

- The noise filter needs to be grounded separately using a thick wire as short as possible. Do not share a ground wire with other grounding equipment.

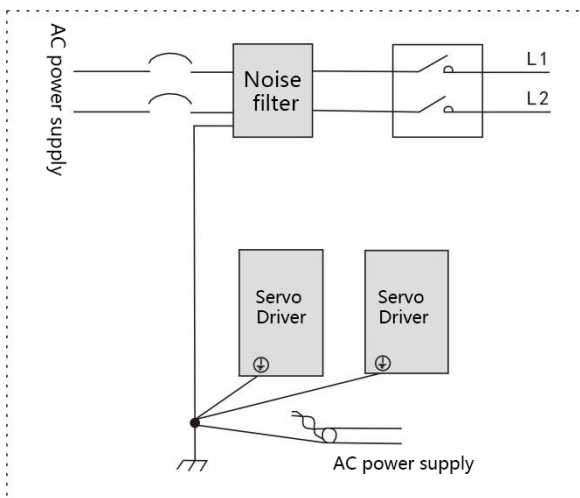


Figure 4.15 Schematic diagram of single point grounding

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

When the noise filter and the servo driver are installed in the same control cabinet, it is recommended to fix the filter and the servo driver on the same metal plate, ensure that the contact parts are conductive and have good overlap, and ground the metal plate.

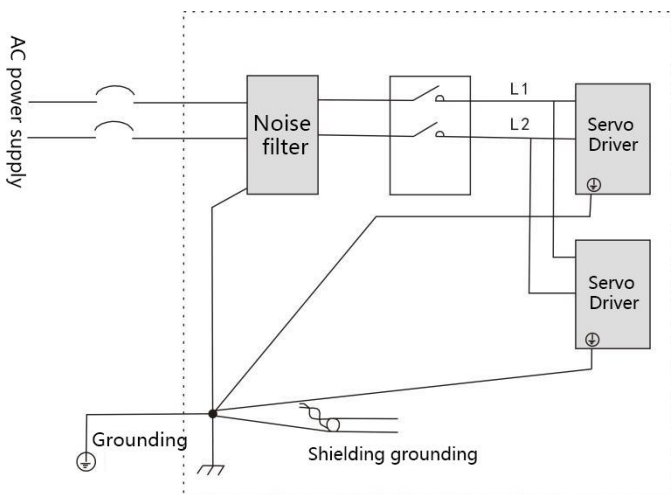


Figure 4.16 Schematic diagram of noise filter ground wire processing

Chapter 5 Operation Mode and Control Wiring Diagram

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

- The position control mode generally determines the moving displacement through the number of pulses, and the externally input pulse frequency determines the rotation speed. Since the position mode can strictly control the position and speed, it is generally used in positioning devices. It is the control mode with the most servo applications and is mainly used in manipulators, placement machines, engraving, milling and engraving, CNC machine tools, etc.
- The speed control mode controls the rotation speed through analog input, digital input, and communication input, and is mainly used in some constant-speed situations. For example, in the application of engraving and milling machines, the host computer adopts position control mode and the servo driver adopts speed control mode.
- Torque control mode controls the torque through analog input, digital input, and communication input. It is mainly used in winding and unwinding devices that have strict requirements on the force of the material, such as winding devices or optical 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 The force on the material does not change as the winding radius changes.

5.1 Position control mode

5.1.1 Position mode description

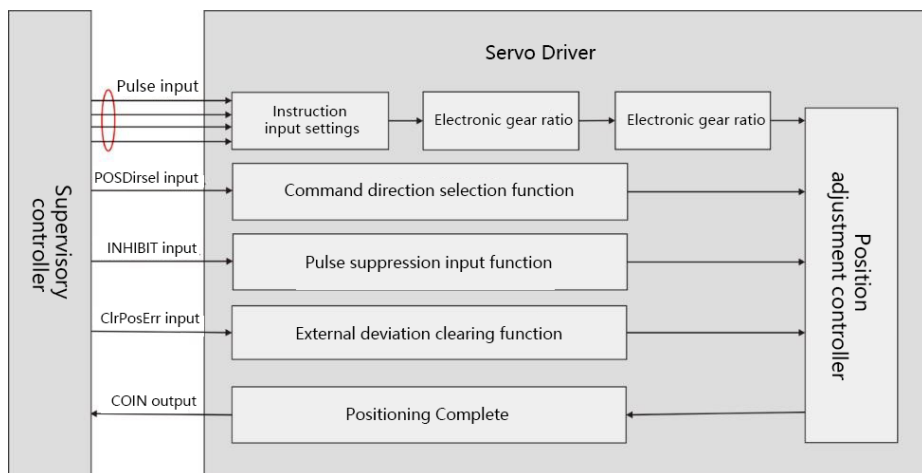


Figure 5.1 Block diagram of position control mode

Position mode is a common working mode of servo drives. Its main usage steps are as follows:

- 1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After powering on, the servo panel displays "r 0", which means that the servo power supply and encoder wiring are correct.
- 2) Perform servo JOG test run by pressing the button to confirm whether 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, positioning completion signal, etc.
- 4) Make settings related to position mode. Set the DI/DO used according to the actual situation.

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

5.1.2 Position mode wiring

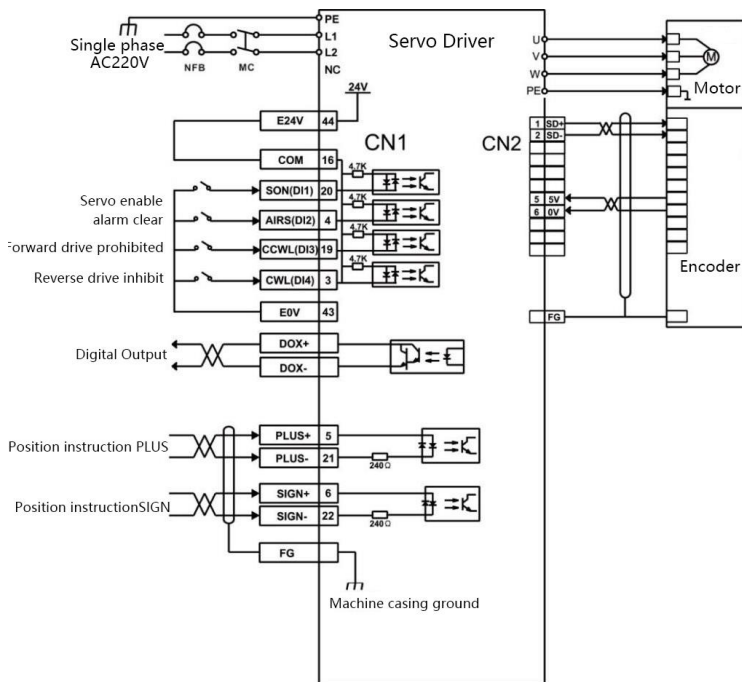


Figure 5.2 Position mode wiring diagram



- ◆ The internal +24V power supply voltage range is 20V~28V, and the maximum operating current is 100mA. If using an external 24V power supply, please connect the external power supply +24V to pin 16 (COM), and the external power supply 0V to pin 43 (E0V).
- ◆ Users need to prepare their own DO output power supply, the power supply range is 5V~24V. The maximum allowable voltage of the DO port is DC30V, and the maximum allowable current is 50mA.

5.1.3 Parameters that need to be adjusted in position control mode

- Gain and smoothing filter parameter adjustment

Necessary parameters	Parameter description	Parameter value	Factory default value
FA4	control mode selection	0	0
FA9	position proportional gain	1-1000	80
FA19	position command smoothing filter	0-1000×0.1ms	100
FA100	command filter selection	0-1	0

- DI input related parameter adjustment

Necessary parameters	Parameter description	Parameter value	Factory default value
FA11	Number of command pulses for one motor revolution	0-30000	10000
FA12	Position command pulse electronic gear first molecule	1-32767	0
FA13	Position command pulse electronic gear denominator	1-32767	10000
FA14	Position command pulse input method	0-3	0
FA15	Position command pulse direction is reversed	0-1	0
FA59	Command pulse valid edge	0-1	0
FA77	Position command pulse electronic gear ratio second numerator	1-32767	0
FA78	Position command pulse electronic gear ratio third numerator	1-32767	0
FA79	Position command pulse electronic gear ratio fourth numerator	1-32767	0

Necessary parameters	Parameter description	Parameter value	Factory default value
FA80	Effective level of command direction signal	0-1	0
FA81	Command pulse PULS signal filtering	0-15	4
FA82	Command pulse SIGN signal filtering	0-15	4

- DO output related parameter adjustment**

Necessary parameters	Parameter description	Parameter value	Factory default value
FA16	Positioning completion range	0-3000 pulse	130
FA17	Position out-of-tolerance range detection	0-30000×100 pulse	6000
FA18	Position out of tolerance error is invalid	0-1	0
FA83	CWL,CCWL direction prohibition mode	0-1	0
FA84	Positioning completion return difference	0-32767	65
FA85	Positioning proximity range	0-32767	6500
FA86	Positioning proximity hysteresis	0-32767	650

- Input and output terminal related parameter adjustment**

Necessary parameters	Parameter description	Parameter value	Factory default value
FA55	Input terminal effective level control word	0000-1111	0000
FA57	Output terminal effective level control word	0000-1111	0000
FA58	IO input terminal debounce time constant	1-20ms	2
PC-0	Digital input DI1 function	0-99	1
PC-1	Digital input DI2 function	0-99	2

Necessary parameters	Parameter description	Parameter value	Factory default value
PC-2	Digital input DI3 function	0-99	3
PC-3	Digital input DI4 function	0-99	4
PC-15	Digital input DI is forced to be valid 1	00000000-11111111	00000000
PC-16	Digital input DI is forced to be valid 2	00000000-11111111	00000000
PC-17	Digital input DI is forced to be valid 3	00000000-11111111	00000000
PC-20	Digital output DO1 function	0-99	2
PC-21	Digital output DO2 function	0-99	3
PC-22	Digital output DO3 function	0-99	5
PC-23	Digital output DO4 function	0-99	8

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

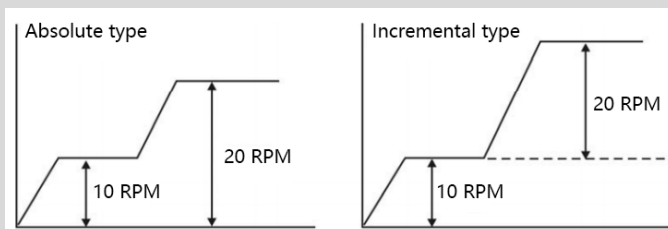
The source of Pr position command is to use parameters (PD-2, PD-3)-(PD-23, PD-24) 8 sets of built-in position command registers, which can be used with external I/O (CN1、POS0-POS 2 and CTRG) Select one of the eight groups to use as a position command:

Position command	POS2	POS1	POS0	CTRG	Corresponding Parameter	Description	Moving speed register
P1	0	0	0	↑	PD-2	Number of turns (+/-30000)	PD-4 (V1)
					PD-3	Pulse (+/-max cnt)	
P2	0	0	1	↑	PD-5	Number of turns (+/-30000)	PD-7 (V2)
					PD- 6	Pulse (+/-max cnt)	
PC	0	1	0	↑	PD-8	Number of turns (+/-30000)	PD-10 (V3)
					PD-9	Pulse (+/-max cnt)	
PD	0	1	1	↑	PD-11	Number of turns (+/-30000)	PD-13 (V4)

Position command	POS2	POS1	POS0	CTRG	Corresponding Parameter	Description	Moving speed register
					PD-12	Pulse (+/-max cnt)	
P5	1	0	0	↑	PD-14	Number of turns (+/-30000)	PD-16 (V5)
					PD-15	Pulse (+/-max cnt)	
P6	1	0	1	↑	PD-17	Number of turns (+/-30000)	PD-19 (V6)
					PD-18	Pulse (+/-max cnt)	
P7	1	1	0	↑	PD-20	Number of turns (+/-30000)	PD-22 (V7)
					PD-21	Pulse (+/-max cnt)	
P8	1	1	1	↑	PD-23	Number of turns (+/-30000)	PD-25 (V8)
					PD-24	Pulse (+/-max cnt)	



- ◆ POS0-2 status: 0 represents the contact is break (open), 1 represents the contact is path (close). CTRG ↑ represents the moment when the connection changes from open circuit (0) to open circuit (1). max represents the command pulse for one revolution of the motor.
- ◆ Absolute position registers are widely used and are equivalent to a simple program control. Users can easily complete periodic operation by using the above table. For example, if the position command P1=10 revolutions and P2=20 revolutions, the position command P1 is issued first, and then the position command P2 is issued. The difference between the two is as follows:



5.2 Speed control mode

5.2.1 Speed mode description

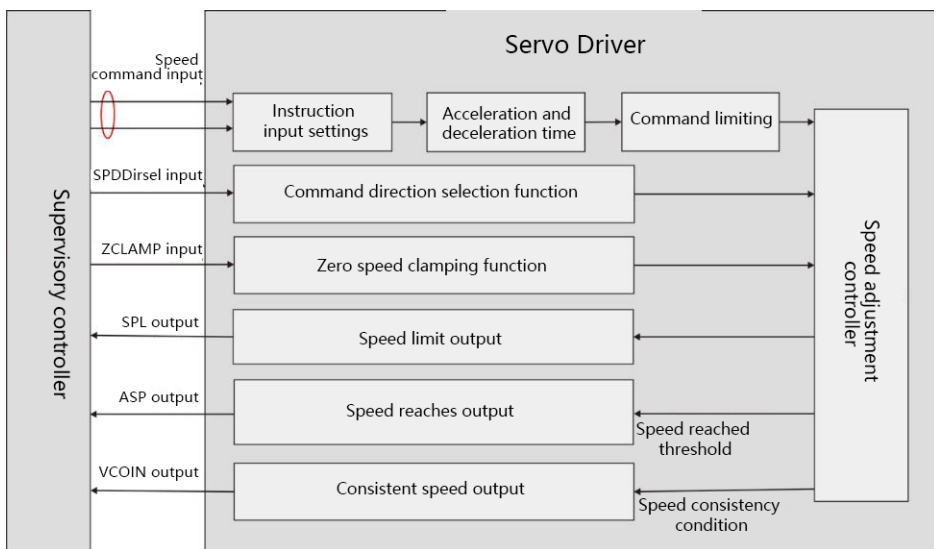


Figure 5.3 Speed control mode block diagram

The main steps to use speed mode are as follows:

- 1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After powering on, the servo panel displays "r 0", which means that the servo power supply and encoder wiring are correct.
- 2) Perform servo JOG test run by pressing the button to confirm whether the motor can operate normally.
- 3) Refer to Figure 5.4 for wiring instructions to connect the required DI/DO signals in the CN1 terminal, such as servo enable, alarm clear, positioning completion signal, etc.
- 4) Make settings related to speed mode. Set the DI/DO used according to the actual situation.

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

5.2.2 Speed mode wiring

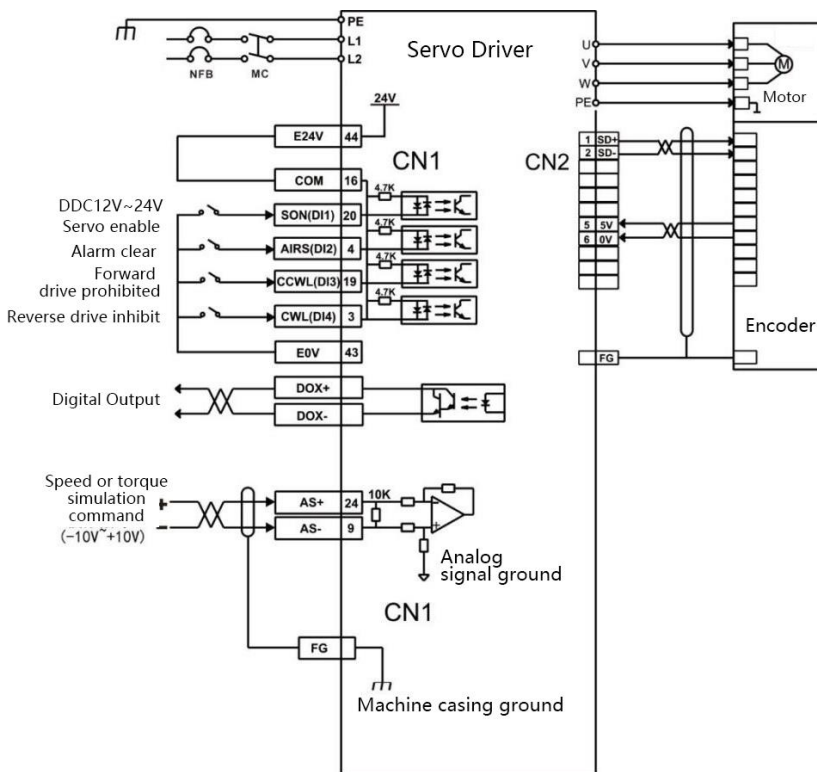


Figure 5.4 Wiring diagram of the speed mode

5.2.3 Parameters that need to be adjusted in speed control mode

- Relevant parameters that need to be adjusted in the speed control method

Necessary parameters	Parameter description	Parameter value	Factory default value
FA4	Control mode selection	1	0
FA5	Speed proportional gain	5-2000Hz	150
FA6	Speed integral constant	1-1000ms	75
FA22	Internal and external speed command selection	0-5	0
FA24	Internal speed 1	-6000-6000r/min	100
FA25	Internal speed 2	-6000-6000r/min	500
FA26	Internal speed 3	-6000-6000r/min	1000
FA27	Internal speed 4	-6000-6000r/min	2000
FA28	Arrival speed	0-3000r/min	3000
FA40	Acceleration time constant	1-10000ms	100
FA41	Deceleration time constant	1-10000ms	100
FA42	S-shaped acceleration and deceleration time constant	0-1000ms	0
FA43	Analog speed command input gain	10-3000r/min/v	300
FA44	Analog speed command direction inversion	0-1	0
FA45	Analog speed command zero offset compensation	-5000-5000	0
FA46	Analog speed command filter	1-300Hz	300
FA75	Zero speed detection point	0-1000r/min	10
FA76	Speed consistent setting value	0-1000r/min	10
FA87	Arrival speed	0-5000r/min	30

Necessary parameters	Parameter description	Parameter value	Factory default value
	hysteresis		
FA88	Arrival speed polarity	0-1	0
FA92	Zero speed detection hysteresis	0-1000r/min	5

5.3 Torque control mode

5.3.1 Torque mode description

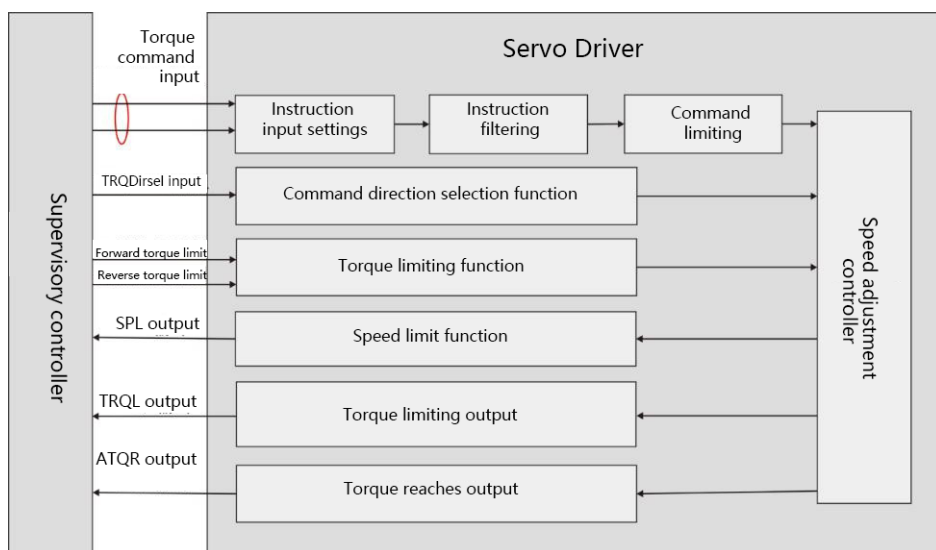


Figure 5.5 Torque control mode block diagram

The main steps for using torque mode are as follows:

- 1) Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and encoder line. After powering on, the servo panel displays "r 0", which means that the servo power supply and encoder wiring are correct.
- 2) Perform servo JOG test run by pressing the button to confirm whether the motor can operate normally.

- 3) Refer to Figure 5.6 for wiring instructions to connect the required DI/DO signals in the CN1 terminal, such as servo enable, alarm clear, positioning completion signal, etc.
- 4) Make settings related to torque mode. Set the DI/DO used according to the actual situation.
- 5) Servo is enabled, and the position command is issued through the host computer to control the rotation of the servo motor. First, rotate the motor at low speed and confirm whether the rotation direction and electronic gear ratio are normal, and then adjust the gain.

5.3.2 Torque mode wiring

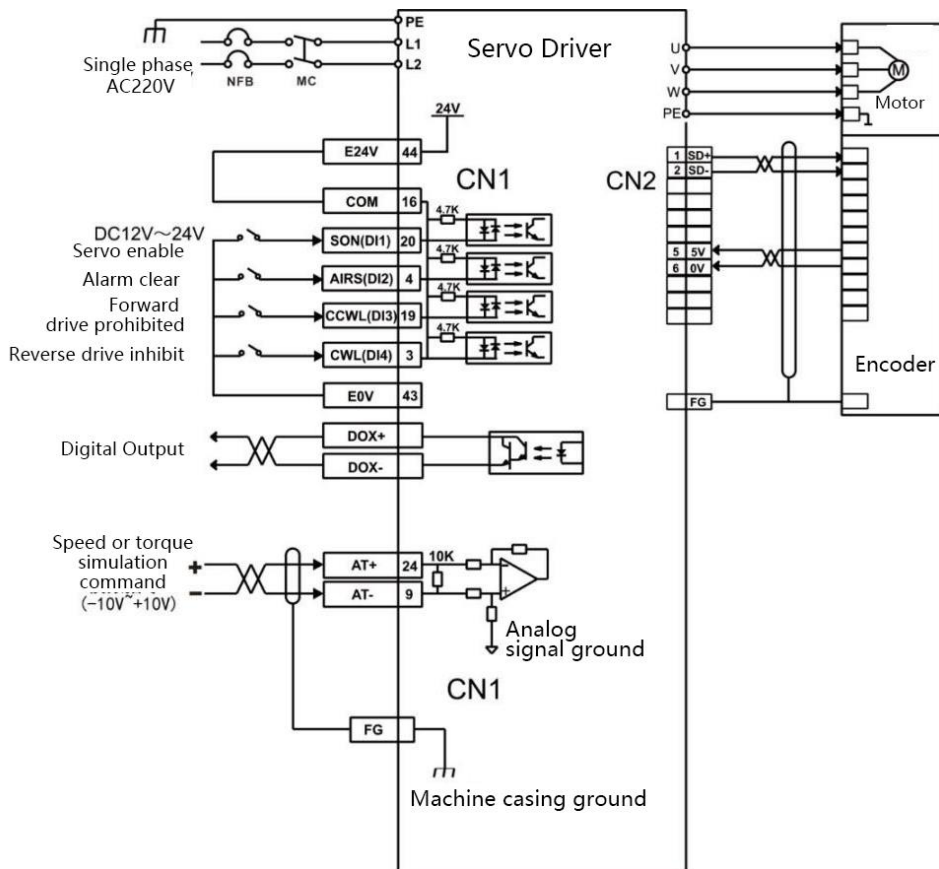


Figure 5.6 Wiring diagram of the torque mode

5.3.3 Parameters that need to be adjusted in speed control mode

- Torque control mode requires parameter adjustment

Necessary parameters	Parameter description	Parameter value	Factory default value
FA4	Control mode selection	2	0
FA29	Analog torque command input gain	Set as needed	30
FA32	Internal and external torque command selection	0-2	0
FA33	Analog torque command input direction inversion	0	0
FA39	Analog torque command zero offset compensation	0	0
FA50	Speed limit during torque control	Set as needed	Rated speed
FA64	Internal torque 1	-300-300	0
FA65	Internal torque 2	-300-300	0
FA66	Internal torque 3	-300-300	0
FA67	Internal torque 4	-300-300	0
FA83	Prohibition mode	0-1	0
FA89	Arrival torque	-300%-300%	100
FA90	Arrival torque hysteresis	0%-300%	5
FA91	Arrival torque polarity	0-1	0

5.4 Origin return function and related parameter description

5.4.1 Related setting parameters

Required parameters	Parameter Description	Parameter value	Factory default
PD-32	Origin detector type and search direction settings	0-5	0
PD-33	Short distance movement setting	0-2	0

Required parameters	Parameter Description	Parameter value	Factory default
	to reach the origin		
PD-34	Origin trigger start mode	0-2	0
PD-35	Origin stop mode setting	0-1	0
PD-36	First stage high speed origin return speed setting	1-2000 r/min	1000
PD-37	Second stage low speed origin return speed setting	1-500 r/min	50
PD-38	Origin return offset turns	+/-30000	0
PD-39	Number of origin return offset pulses	+/-max cnt	0

5.4.2 Origin return mode description (must be used in internal position mode)

A. Origin trigger start mode (PD-34)

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

1. PD-34 = 0: Turn off the origin return function. When PD-34 is set to 0, regardless of other setting values, the origin return function cannot be activated.
2. PD-34 = 1: Automatically execute the origin return function when the power is turned on. This function is only valid once when the power supply and servo start are turned on, that is, it can be used under working conditions where the return to origin does not need to be repeated during servo operation. Use this function to omit an input contact used to perform return-to-origin.
3. PD-34 = 2: The origin return function is triggered by the SHOM input contact. When setting this function, any register in the input pin function planning register (PC-0~PC-3) must be set to the SHOM trigger origin input function. The SHOM contact can be triggered at any time during servo

operation and the origin return function can be executed.

B. Origin detector type and search direction setting (PD-32)

The origin detector can use the left or right limit switch as the origin reference point, or an additional detector (such as a proximity or light gate type switch) as the origin reference point. When the servo motor only moves within one revolution, the Z pulse can also be set as the origin reference point.

1. PD-32 =0: Find the origin in the forward direction, and use the CCWL limit input point as the rough reference point of the origin. When the origin positioning is completed, CCWL switches to the limit input function. Subsequent retriggering will generate a limit warning. When using the limit input point as a rough reference point for the origin, it is recommended to set the return search Z pulse (PD-33 =0) as the precise mechanical origin.
2. PD-32 =1: Reverse the direction to find the origin, and use the CWL limit input point as the rough reference point for the origin. When the origin positioning is completed, CWL switches to the limit input function. Subsequent retriggering will generate a limit warning. When using the limit input point as a rough reference point for the origin, it is recommended to set the return search Z pulse (PD-33 =0) as the precise mechanical origin.
3. PD-32 =2: Find the origin in the forward direction, and use ORGP (external detector input point) as the reference point of the origin. At this time, the precise mechanical origin can be set to return to search (PD-33 =0) or not to return to search. (PD-33 =1) Z-phase pulse. When the Z-phase pulse is not used as the mechanical origin, the positive edge of ORGP can also be set as the mechanical origin (PD-33 =2).
4. PD-32 =3: Reverse the direction to find the origin, and use ORGP (external detector input point) as the reference point of the origin. At this time, the precise mechanical origin can be set to the Z-phase pulse that returns to search (PD-33 =0) or does not return to search (PD-33 =1). When the Z-phase pulse is not used as the mechanical origin, the positive edge of ORGP can also be set as the mechanical origin (PD-33 =2).

5. PD-32 =4: Directly search for the single-turn absolute position zero point in the forward direction. This function is usually used for motion control of the servo motor in only one rotation range. In this case, no external detection switch is required.
6. PD-32 =5: Directly search for the single-turn absolute position zero point in the reverse direction. This function is usually used for motion control of the servo motor in only one rotation range. In this case, no external detection switch is required.

C. Short distance movement mode setting to reach the origin (PD-33)

1. PD-33=0: After finding the reference origin, the motor turns back and searches for the nearest single-turn absolute position zero point at the second speed as the mechanical origin.
2. PD-33=1: After finding the reference origin, the motor turns to the second speed and continues to move forward to find the nearest single-turn absolute position zero point as the mechanical origin.
3. PD-33=2: Find the rising edge of the detector ORGP as the mechanical origin and stop according to deceleration. It is suitable for settings with PD-32 values 2 and 3; or find the single-turn absolute position zero point and stop according to deceleration. , suitable for settings with PD-32 values of 4 and 5.

D. Origin stop mode setting (PD-35)

1. PD-35=0: After the origin detection is completed, the motor decelerates and pulls back to the origin. After obtaining the origin detection signal during the second stage speed operation, the motor decelerates and stops. After stopping, it moves to the mechanical origin position at the second-stage speed.
2. PD-35=1: After the origin detection is completed, the motor decelerates and stops in the forward direction. After obtaining the origin detection signal during the second stage speed operation, the motor decelerates and stops. The position overshoot after stop will no longer be corrected. At this time,

the mechanical origin position will not change due to the difference in position override.

5.5 Pre-run inspection

Please first disconnect the load connected to the servo motor, the coupling connected to the servo motor shaft and its related accessories. Make sure that the servo motor can work normally without load before connecting the load to avoid unnecessary danger.

- **Please check and make sure before running:**

- 1) There is no obvious damage to the appearance of the servo drive;
- 2) The wiring terminals have been insulated;
- 3) There are no conductive objects or flammable objects such as screws or metal sheets inside the driver, and there are no conductive foreign objects at the wiring terminals;
- 4) The servo drive or external braking resistor is not placed on flammable objects;
- 5) The wiring is complete and the wiring is correct.

- **The driver power supply, auxiliary power supply, ground terminal, etc. are wired correctly; each control signal cable is wired correctly; each limit switch and protection signal are wired correctly.**

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

- **When the controller does not send a run command signal, power on the servo drive. Check and guarantee:**

- 1) The servo motor can rotate normally without vibration or excessive operating

sound;

- 2) Unexpected actions may occur depending on the mechanical characteristics .
Please do not over-set extreme parameters;
- 3) The bus voltage indicator light and digital tube display are normal.

Chapter 6 Operation and display interface

6.1 Driver panel description

6.1.1 Panel composition

The panel consists of 5 LED digital tube displays and 4 buttons ▲, ▼, ◀, and SET keys, which are used to display various system status, setting parameters, etc. The operations are hierarchical operations, which are unfolded layer by layer from the main menu.

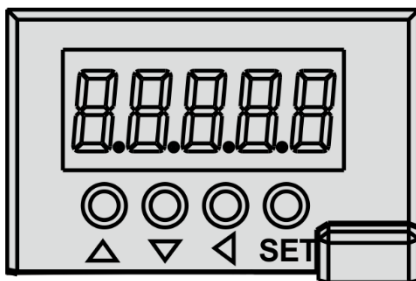


Figure 6.1 Driver panel display interface

6.1.2 Button description

Symbol	Name	Function
▲	add key	Increase serial number or value; long press has repeat effect
▼	Decrease key	Decrease the serial number or value; long press has a repeating effect
◀	escape key	Menu exit; operation canceled
SET	Enter	Operation confirmation

6.2 Main menu

The first level is the main menu, with a total of 8 operating modes. ▲Use ▼the

and keys to change the mode. Press the SET key to enter the second level and perform specific operations. Press the key to return to the main menu from the second level. ◀

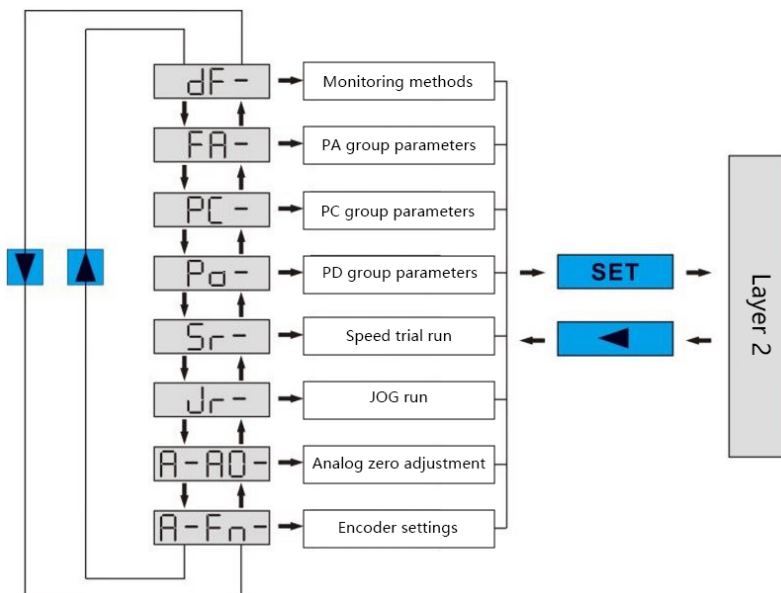


Figure 6.2 Main menu operation block diagram

6.3 Parameter setting process

Parameters are represented by parameter segment + parameter number. The hundreds digit is the segment number, and the tens and ones digits are the parameter number. For example, for parameter FA53, the segment number is "FA", the parameter number is "53", and the display shows "FA-53".

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

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

6.4 Monitoring status content

The first layer is used to select the operation mode. There are 7 modes in total.

Use ▲ the and ▼ keys to change the mode. Press the SET key to enter the second layer of the selected mode, and press the key to return to the first layer from the second layer.◀

DF-- " in the first layer and press the SET key to enter monitoring mode. There are 25 display states in total. The user uses ▲ the and ▼ keys to select the desired display mode, and then presses the SET key to enter the specific display state.

Monitoring method	Operate	Monitoring examples	Illustrate
P-SPd		r 1000	Motor speed 1000r/min
P-PoS		04580	Current location 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-tq		t 0.70	Motor torque 70%

P- I		I 2.3	Motor current 2.3A
P-Cnt		Cnt 0	Current control mode 0: position control mode
P- CS		r. 500	The speed corresponding to the analog input in speed mode is 500 r/min.
P- Ct		t 0.50	The torque corresponding to the analog input in torque mode is 50%.
P-APo		A3265	Rotor absolute position 3265.
P-APo.		A. 0	
P- In		n 1111	Input terminal
P-oUt		oUt,111	Output terminal
P-UdC		UC336	Bus voltage 336V
P-Err		Err 4	Alarm No. 4
P- rL		rL-on	Relay open state
		rL.-oF	Relay closed state
		rL-Er	Relay alarm status
P- rn		rn-on	Main circuit operates normally
		rn.-oF	Main circuit is not charging
		rn-CH	The main circuit is charging but the servo is not enabled
		rn-Er	Main circuit alarm
P- US		U-on	Bus voltage is normal
		U-.LoU	Bus voltage is too low
		U-Err	Alarm exists

P- AS		43210	Motor absolute position 876543210
P- AS.		A.8765	

6.5 Analog zero adjustment

After using this operation, the driver automatically detects the analog zero offset and writes the zero offset value into parameter FA39 (or FA45). This operation has saved the zero offset parameters to EEPROM, so there is no need to perform parameter writing operations.

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

6.6 Encoder selection

Select "F-res" to reset the encoder and reset the multi-turn information of the encoder to zero. By setting the PC-36 parameter value, the single-turn information can be cleared to achieve the purpose of setting the origin; select "F-clr ", perform the alarm clearing operation on the encoder. Alarm No. 53 caused by battery power failure can be cleared through this operation. After selecting the operation, press and hold the SET key for more than 3 seconds. After " donE " is displayed , activate the operation. After completion, you can press the button  again to return to the menu selection state.

6.7 Restoring parameter default values

Please use the restore default parameters (factory parameters) function when the following situations occur:

- The parameters are adjusted randomly and the system cannot work normally.

The steps to restore default parameters are as follows:

1. Check whether the motor code (parameter FA1) is correct.
2. Change the password (FA0) to 358.
3. Enter parameter management and perform the following operations:

All parameters are restored to their default values, and parameters modified by the user are also restored to their factory default values. Press the button  to return to the main menu, use  and  select "FA-" mode, press the SET button to enter the second level operation interface, and then press it again  to  make FA=0, then press **the SET** button to enter the third level interface, and set FA0 to Value is 358, press **SET** key to save. Next, press the button to return to the "FA-" interface and set FA1 to DEF-.  Press and hold **the SET** button for 5 seconds. After the LED indicator light flashes several times, the default parameter saving is completed. It will take effect after powering on again.

Chapter 7 Parameter function description

7.1 FA group parameters

Serial number	Name	Function	Parameter range	Factory default																
0	password	1. The user password is 315. 2. The model code is 358.	0-9999	315																
1	model code	This parameter is read-only and cannot be modified. The driver automatically recognizes the motor model, no selection is required.	40-80	See Table 7-1																
<table><tr><th>Driver</th><th>GS10-40</th><th>GS10-75</th></tr><tr><td rowspan="6">Motor</td><td>40-00130</td><td>80-01330</td></tr><tr><td>40-00330</td><td>80-02430</td></tr><tr><td>60-00630</td><td>80-03230</td></tr><tr><td>60-01330</td><td>--</td></tr><tr><td>60-01930</td><td>--</td></tr><tr><td>80-01330</td><td>--</td></tr></table> Table 7-1					Driver	GS10-40	GS10-75	Motor	40-00130	80-01330	40-00330	80-02430	60-00630	80-03230	60-01330	--	60-01930	--	80-01330	--
Driver	GS10-40	GS10-75																		
Motor	40-00130	80-01330																		
	40-00330	80-02430																		
	60-00630	80-03230																		
	60-01330	--																		
	60-01930	--																		
	80-01330	--																		
2	software Version	The software version number can be viewed, but cannot be modified.																		
3	initial Display state	0: Display motor speed; 1: Display the lower 5 digits of the current position; 2: Display the top 5 digits of	0-25	0																

Serial number	Name	Function	Parameter range	Factory default
		the current position; 3: Display the lower 5 digits of the position command (command pulse accumulation amount); 4: Display the high 5 digits of the position command (command pulse accumulation amount); 5: Display position deviation is lower than 5 digits; 6: The display position deviation is 5 digits high; 7: Display motor torque; 8: Display motor current; 9: Current control mode; 10: Display current temperature; 11: Display speed command; 12: Display torque command; 13: Display the lower 5 digits of the absolute position of the rotor in one revolution; 14: Display the upper 5 digits of the absolute position of the rotor in one revolution; 15: Display input terminal		

Serial number	Name	Function	Parameter range	Factory default
		status; 16: Display the output terminal status; 17: Display the encoder input signal; 18: Display the main circuit bus voltage value; 19: Display alarm code; 20: Display the logic chip version number; 21: Display the relay closing status; 22: Display running status; 23: Display external voltage status; 24: Display the lower 5 digits of the absolute value position; 25: Display the 5 higher digits of the absolute value position.		
4	control Method selection	This parameter can be used to set the drive control mode: 0: Position control mode; 1: Speed control mode; 2: Torque control mode; 3: Position-speed hybrid control method; 4: Position-torque hybrid	0-6	0

Serial number	Name	Function	Parameter range	Factory default
		control method; 5: Speed and torque hybrid control mode; 6: Encoder zero adjustment mode.		
5	Speed Scale gain	1. Set the proportional gain of the speed loop regulator. 2. The larger the setting value, the higher the gain and the greater the stiffness. Parameter values are determined according to the specific servo drive system model and load conditions. Generally, the larger the load inertia, the larger the setting value. 3. Under the condition that the system does not oscillate, try to set it as large as possible.	5-2000 Hz	150
6	Speed Integration constant	1. Set the integral time constant of the speed loop regulator. 2. The smaller the setting value, the faster the integration speed, and the stronger the system's resistance to deviation, that is, the greater the stiffness, but if it is too small, it will easily cause overshoot.	1-1000 ms	75

Serial number	Name	Function	Parameter range	Factory default
7	Torque filter	1. Set the torque command filter characteristics. 2. Used to suppress resonance caused by torque. 3. The smaller the value, the lower the cutoff frequency, and the smaller the vibration and noise generated by the motor. If the load inertia is large, the setting value can be appropriately reduced. If the value is too small, the response will slow down and may cause oscillation. 4. The larger the value, the higher the cutoff frequency and the faster the response. If a higher torque response is required, the setting value can be increased appropriately.	20-500%	100
8	Speed detection filter	1. Set the speed detection filter characteristics. 2. The smaller the value, the lower the cutoff frequency and the smaller the noise generated by the motor. If the load inertia is large, the setting value can be appropriately reduced. If the	20-500%	100

Serial number	Name	Function	Parameter range	Factory default
		value is too small, the response will slow down and may cause oscillation. 3. The larger the value, the higher the cutoff frequency and the faster the speed feedback response. If higher speed response is required, the setting value can be increased appropriately.		
9	Location proportional gain	1. Set the proportional gain of the position loop regulator. 2. The larger the setting value, the higher the gain, the greater the stiffness, and the smaller the position lag under the same frequency command pulse condition. But too large a value may cause oscillation. 3. Parameter values are determined according to the specific servo drive system model and load conditions.	1-1000	80
11	Number of command pulses per motor rotation	1. Set the number of command pulses equivalent to one revolution of the motor. 2. When this setting value is 0, FA-12 (position command pulse	0-30000	10000

Serial number	Name	Function	Parameter range	Factory default
		frequency division numerator) and FA-13 (position command pulse frequency division denominator) are valid.		
12	Position command pulse electronic gear first molecule	1. Set the frequency multiplication of the position command pulse (electronic gear). 2. In the position control mode, by setting the FA12 and FA13 parameters, it can be easily matched with various pulse sources to achieve the user's ideal control resolution (i.e. angle /pulse). 3. $P \times G = N \times C \times 4$. P: The number of pulses of the input command; G: Electronic gear ratio; G = frequency division numerator/frequency division denominator N: number of motor rotations; C: number of photoelectric encoder lines/revolution, this system $C=2500$. 4. For example, when the input command pulse is 6000, the servo motor rotates once $G=(N$	0-32767	0

Serial number	Name	Function	Parameter range	Factory default																	
		$\times C \times 4) / P = (1 \times 2500 \times 4) / 6000 = 5/3$ Then parameter FA12 is set to 5 and FA13 is set to 3. 5. The command pulse electronic gear molecule is determined by Gear1 and Gear2. The denominator is set by parameter FA13. The combination is as follows: Note: 0 means OFF, 1 means ON. <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 FA112)</td></tr><tr><td>0</td><td>1</td><td>Second molecule (parameter FA 77)</td></tr><tr><td>1</td><td>0</td><td>Third molecule (parameter FA 78)</td></tr><tr><td>1</td><td>1</td><td>Fourth molecule (parameter FA 79)</td></tr></table>	DI signal (note)		Command pulse electronic gear denominator	Gear 2	Gear 1	0	0	First molecule (parameter FA112)	0	1	Second molecule (parameter FA 77)	1	0	Third molecule (parameter FA 78)	1	1	Fourth molecule (parameter FA 79)		
DI signal (note)		Command pulse electronic gear denominator																			
Gear 2	Gear 1																				
0	0	First molecule (parameter FA112)																			
0	1	Second molecule (parameter FA 77)																			
1	0	Third molecule (parameter FA 78)																			
1	1	Fourth molecule (parameter FA 79)																			
13	Denominator of position command pulse electronic gear	See parameter FA12.	1-32767	10000																	
14	Position command pulse input	1. Set the input form of position command pulse.	0-3	0																	

Serial number	Name	Function	Parameter range	Factory default
	Way	2. Set to one of 3 input methods through parameters: 0: Pulse + direction; 1: CCW pulse/CW pulse; 2: A and B two-phase orthogonal pulse input; 3: Internal position input. Note: CCW is viewed from the axial direction of the servo motor and rotates counterclockwise, which is defined as forward; CW is viewed from the axial direction of the servo motor and rotates clockwise and is defined as reverse.		
15	Command pulse direction is reversed	Set as: 0: normal; 1: The position command pulse direction is reversed.	0-1	0
16	Positioning completed range	1. Set the positioning completion pulse range under position control. 2. This parameter provides the basis for the driver to judge whether positioning is	0-30000 pulses	130

Serial number	Name	Function	Parameter range	Factory default
		completed in position control mode. When the number of remaining pulses in the position deviation counter is less than or equal to the setting value of this parameter, the COIN (positioning completion) of the digital output DO is ON, otherwise it is OFF. 3. The comparator has hysteresis function. Set by parameter FA84.		
17	Position out-of-tolerance range detection	1. Set the position out-of-tolerance alarm detection range. 2. In position control mode, when the value of the position deviation counter exceeds the value of this parameter, the driver will give a position alarm.	0-30000× 100 pulse	6000
18	Position out of tolerance error is invalid	Set as: 0: Position out-of-tolerance alarm detection is valid; 1: Position out-of-tolerance alarm detection is invalid, stop detecting position out-	0-1	0

Serial number	Name	Function	Parameter range	Factory default
		of-tolerance errors.		
19	Position command smoothing filter	1. Perform smooth filtering on the command pulse, with exponential acceleration and deceleration, and the numerical value represents the time constant. 2. The filter will not lose input pulses, but will cause command delays. 3. This filter is used for: (1) The upper controller does not have acceleration and deceleration functions; (2) The electronic gear frequency multiplication is large (>10); (3) The instruction frequency is low. 4. Step jumps and instability occur when the motor is running. 5. When set to 0, the filter has no effect.	0-1000× 0.1ms	100
20	Driver prohibition input is invalid	Set as: 0: CCW and CW input	0-1	1

Serial number	Name	Function	Parameter range	Factory default
		prohibition is valid. When the CCW drive prohibition switch (FSTP) is ON, CCW drive is allowed; when the CCW drive prohibition switch (FSTP) is OFF, the CCW direction torque remains at 0; the same is true for CW. If both CCW and CW drive inhibits are OFF, a drive inhibit input error alarm will occur; 1: Cancel CCW and CW input prohibition. Regardless of the status of the CCW and CW drive prohibition switches, CCW and CW drives are allowed. At the same time, if both CCW and CW drive inhibition are OFF, there will be no drive inhibition input error alarm.		
21	JOG running speed	Set the running speed of JOG operation.	0-6000 r/min	100
22	Speed command source	During speed control, set the source of the speed command. Parameter meaning: 0: The analog speed command is input from the	0-5	0

Serial number	Name	Function	Parameter range	Factory default																																		
		analog ports AS+ and AS-; 1: Internal speed command, determined by DI input SP1 and SP2: <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 FA24)</td></tr><tr><td>0</td><td>1</td><td>Internal speed 2 (parameter FA25)</td></tr><tr><td>1</td><td>0</td><td>Internal speed 3 (parameter FA26)</td></tr><tr><td>1</td><td>1</td><td>Internal speed 4 (parameter FA27)</td></tr></table> 2: Analog speed command + internal speed command: <table><tr><th colspan="2">DI signal {note}</th><th rowspan="2">Speed command</th></tr><tr><th>SP2</th><th>SP1</th></tr><tr><td>0</td><td>0</td><td>Analog speed command</td></tr><tr><td>0</td><td>1</td><td>Internal speed 2 (parameter FA25)</td></tr><tr><td>1</td><td>0</td><td>Internal speed 3 (parameter FA26)</td></tr><tr><td>1</td><td>1</td><td>Internal speed 4 (parameter FA27)</td></tr></table> Note: 0 means OFF, 1 means ON. 3: JOG speed command, when performing jogging (JOG)	DI signal {note}		Speed command	SP2	SP1	0	0	Internal speed 1 (parameter FA24)	0	1	Internal speed 2 (parameter FA25)	1	0	Internal speed 3 (parameter FA26)	1	1	Internal speed 4 (parameter FA27)	DI signal {note}		Speed command	SP2	SP1	0	0	Analog speed command	0	1	Internal speed 2 (parameter FA25)	1	0	Internal speed 3 (parameter FA26)	1	1	Internal speed 4 (parameter FA27)		
DI signal {note}		Speed command																																				
SP2	SP1																																					
0	0	Internal speed 1 (parameter FA24)																																				
0	1	Internal speed 2 (parameter FA25)																																				
1	0	Internal speed 3 (parameter FA26)																																				
1	1	Internal speed 4 (parameter FA27)																																				
DI signal {note}		Speed command																																				
SP2	SP1																																					
0	0	Analog speed command																																				
0	1	Internal speed 2 (parameter FA25)																																				
1	0	Internal speed 3 (parameter FA26)																																				
1	1	Internal speed 4 (parameter FA27)																																				

Serial number	Name	Function	Parameter range	Factory default
		operation, Requires setup. 4: Keyboard speed command, when performing keyboard speed adjustment (Sr) operation, Requires setup. 5: IO terminal controls jog operation.		
23	maximum speed limit	Set the maximum speed limit of the servo motor. 1. Regardless of the direction of rotation. 2. If the setting value exceeds the rated speed, the actual maximum speed limit is the rated speed.	0- 6000r/min	5000
24	internal Speed 1	1. Set internal speed 1. 2. Speed control mode (FA22=0), when SP1 is OFF, When SP2 is OFF, internal speed 1 is selected as the speed command.	-6000- 6000 r/min	100
25	internal Speed 2	1. Set internal speed 2. In speed control mode (FA22=0), when SP1 is ON and SP2 is OFF, internal speed	-6000- 6000 r/min	500

Serial number	Name	Function	Parameter range	Factory default											
		2 is selected as the speed finger.													
26	internal Speed 3	1. Set internal speed 3. In speed control mode (FA22=0), when SP1 is OFF and SP2 is ON, internal speed 3 is selected as the speed command.	-6000-6000 r/min	1000											
27	internal Speed 4	1. Set internal speed 4. In speed control mode (FA22=0), when SC1 is ON and SC2 is ON, internal speed 4 is selected as the speed command.	-6000-6000 r/min	2000											
28	arrive speed	1. When the motor speed exceeds this parameter, the ASP of the digital output DO (speed reached) ON, otherwise OFF. 2. The comparator has hysteresis function , which is set by parameter FA87. 3. With polarity setting function: <table><tr><th>FA88</th><th>FA28</th><th>Comparator</th></tr><tr><td>0</td><td>>0</td><td>Speed regardless of direction</td></tr><tr><td rowspan="2">1</td><td>>0</td><td>Only detect forward speed</td></tr><tr><td><0</td><td>Only detects reverse</td></tr></table>	FA88	FA28	Comparator	0	>0	Speed regardless of direction	1	>0	Only detect forward speed	<0	Only detects reverse	0-3000 r/min	3000
FA88	FA28	Comparator													
0	>0	Speed regardless of direction													
1	>0	Only detect forward speed													
	<0	Only detects reverse													

Serial number	Name	Function	Parameter range	Factory default
		speed		
29	Analog torque command input gain	1. Set the proportional relationship 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, corresponding to 3v/100%, that is, inputting 3v voltage produces 100% rated torque.	10-100 (0.1v/100%)	30
30	User torque overload alarm value	1. Set the user torque overload value, which is a percentage of the rated torque. The torque limit value does not distinguish between directions, and both forward and reverse directions are protected. In the case of FA31>9, when the motor torque>FA30 and the duration>FA31, the driver alarms, the alarm number is Err-29, and the motor stops. After an alarm occurs, the driver must be powered on again to clear the alarm.	1-300	300
31	User torque overload	1. User torque overload	0-32767	0

Serial number	Name	Function	Parameter range	Factory default																															
	alarm detection time	detection time, in milliseconds. When set to zero, the user torque overload alarm has no effect.																																	
32	Torque command source	During torque control, set the source of the torque command: 0: Analog torque command, input from analog ports AS+ and AS-. 1: Internal torque command, determined by DI input TRQ1 and TRQ2: <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>Internal torque 1 (parameter FA64)</td></tr><tr><td>0</td><td>1</td><td>Internal torque 2 (parameter FA65)</td></tr><tr><td>1</td><td>0</td><td>Internal torque 3 (parameter FA66)</td></tr><tr><td>1</td><td>1</td><td>Internal torque 4 (parameter FA67)</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><tr><td>0</td><td>1</td><td>Internal torque 2 (parameter FA65)</td></tr><tr><td>1</td><td>0</td><td>Internal torque 3</td></tr></table>	DI signal (note)		Torque command	TRQ2	TRQ1	0	0	Internal torque 1 (parameter FA64)	0	1	Internal torque 2 (parameter FA65)	1	0	Internal torque 3 (parameter FA66)	1	1	Internal torque 4 (parameter FA67)	DI signal (note)		Torque command	TRQ2	TRQ1	0	0	Analog torque command	0	1	Internal torque 2 (parameter FA65)	1	0	Internal torque 3	0-1	0
DI signal (note)		Torque command																																	
TRQ2	TRQ1																																		
0	0	Internal torque 1 (parameter FA64)																																	
0	1	Internal torque 2 (parameter FA65)																																	
1	0	Internal torque 3 (parameter FA66)																																	
1	1	Internal torque 4 (parameter FA67)																																	
DI signal (note)		Torque command																																	
TRQ2	TRQ1																																		
0	0	Analog torque command																																	
0	1	Internal torque 2 (parameter FA65)																																	
1	0	Internal torque 3																																	

Serial number	Name	Function	Parameter range	Factory default						
		<table><tr><td></td><td></td><td>(parameter FA66)</td></tr><tr><td>1</td><td>1</td><td>Internal torque 4 (parameter FA67)</td></tr></table> Note: 0 means OFF, 1 means ON.			(parameter FA66)	1	1	Internal torque 4 (parameter FA67)		
		(parameter FA66)								
1	1	Internal torque 4 (parameter FA67)								
33	Analog torque command input direction Negate	Reverse the polarity of the analog torque input.	0-1	0						
34	Internal CCW torque limit	1. The setting value is a percentage of the rated torque. For example, if it is set to 2 times the rated torque, the setting value is 200. 2. This restriction is valid at all times. 3. If the setting value exceeds the maximum overload capacity allowed by the system, the actual torque is limited to the maximum overload capacity allowed by the system.	0-300%	300						
35	Internal CW torque limit	1. The setting value is a percentage of the rated torque. For example, if it is set to 2 times the rated torque,	-300-0%	-300						

Serial number	Name	Function	Parameter range	Factory default
		the setting value is -200. 2. This restriction is valid at all times. 3. If the setting value exceeds the maximum overload capacity allowed by the system, the actual torque is limited to the maximum overload capacity allowed by the system.		
36	External CCW torque limit	1. The setting value is a percentage of the rated torque. For example, if it is set to 1 times the rated torque, the setting value is 100. 2. This limit is only effective when the CCW torque limit input terminal (CCWL) is ON. 3. When the limit is valid, the actual torque limit is the minimum value among the maximum overload capacity allowed by the system, the internal CCW torque limit, and the external CCW torque limit.	0-300%	100
37	External CW moment limit	Set the external torque limit value of the servo motor in the CW direction.	-300-0%	-100

Serial number	Name	Function	Parameter range	Factory default
		1. The setting value is a percentage of the rated torque. For example, if it is set to 1 times the rated torque, the setting value is -100. 2. This limit is only valid when the CW torque limit input terminal is ON. 3. When the limit is valid, the actual torque limit is the minimum absolute value among the maximum allowable overload capacity of the system, the internal CW torque limit, and the external CW torque limit.		
38	temperature Alarm value	Set the drive temperature to reach the upper limit alarm value.	200-1350	
39	Analog torque command zero offset compensation	Zero offset compensation amount for analog torque input.	-2000-2000	0
40	Acceleration time constant	The setting value represents the acceleration time of the motor from 0-1000r/min. 1. The acceleration and deceleration characteristics	1-10000ms	100

Serial number	Name	Function	Parameter range	Factory default
		are linear. 2. Only used for speed control and internal position control, other control methods are invalid.		
41	Deceleration time constant	The setting value represents the deceleration time of the motor from 1000-0r/min. 1. The acceleration and deceleration characteristics are linear. 2. Only used for speed control and internal position control, other control methods are invalid.	1-10000ms	100
42	S-shaped acceleration and deceleration time constant	Make the motor start and stop smoothly, and set the S-shaped acceleration and deceleration curve part time.	0-1000ms	0
43	Analog speed command input gain	Set the proportional relationship between the analog speed input voltage and the actual operating speed of the motor.	10-3000 r/min/v	300
44	Analog speed command direction	The analog speed input. 1. When set to 0, when the	0-1	0

Serial number	Name	Function	Parameter range	Factory default
	inversion	analog speed command is positive, the speed direction is CCW. 2. When set to 1, when the analog speed command is positive, the speed direction is CW.		
45	Analog speed command zero offset compensation	Zero offset compensation amount for analog speed input.	-5000-5000	0
46	Analog speed command filter	1. Low-pass filter for analog speed input. 2. The larger the setting, the faster the response speed to the speed input analog quantity, and the greater the influence of signal noise. The smaller the setting, the slower the response speed, and the smaller the influence of signal noise.	1-1000 Hz	300
47	Mechanical brake action setting when the motor stops	1. Define the delay time from the mechanical brake action (the output terminal BRK changes from ON to OFF) to the motor current cutoff	0-200×10ms	0

Serial number	Name	Function	Parameter range	Factory default
		during the motor stop. 2. This parameter should not be less than the delay time of mechanical braking (Tb) to avoid small displacement of the motor or working fall.		
48	Mechanical brake action setting when the motor is running	1. Define the delay time from the motor current cutoff to the mechanical braking action (the output terminal BRK changes from ON to OFF) during the motor stop. 2. This parameter is used to decelerate the motor from a high rotation state to a low speed and then activate the mechanical brake to avoid damage to the brake. 3.The actual action time is the time required for FA48 or the motor to decelerate to the FA49 value, whichever is the minimum.	0-200× 10ms	50
49	Mechanical brake action speed when the motor is	1. Define the speed value from motor current cutoff to mechanical brake action (output terminal BRK changes	0-3000 r/min	100

Serial number	Name	Function	Parameter range	Factory default
	running	from ON to OFF) during motor operation. 2. The actual action time is the time required for FA48 or the motor to decelerate to the value of FA49, whichever is the minimum.		
50	Speed during torque control limit	1. During torque control, the motor operating speed is limited to this parameter. 2. It can prevent overspeeding under light loads.	0-5000 r/min	3000
53	Servo forced enable	Set as: 0: The enable signal is controlled by the SON of the DI input; 1: Software forced enablement.	0-1	0
54	Servo enable delay closing time	Define the delay time to cut off the motor current after the servo enable signal is turned off.	0-30000ms	0
55	Input terminal effective level control word	1. Set the input terminal to be inverted. The non-inverted terminal is valid when the switch is closed and is invalid when the switch is open; the inverted terminal is invalid when the switch is closed and	0000-1111	0000

Serial number	Name	Function	Parameter range	Factory default								
		valid when the switch is open. 2. Represented by a 4-digit binary number. If the bit is 0, it means that the output terminal represented is not inverted, and 1 means that the output terminal represented is inverted. The input terminals represented by binary numbers are as follows: <table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr></table> 0: High level is valid; 1: Active at low level.	3	2	1	0	DI4	DI3	DI2	DI1		
3	2	1	0									
DI4	DI3	DI2	DI1									
57	Output terminal effective level control word	1. Set the output terminal to be inverted. For the inverted terminal, the definitions of on and off are exactly opposite to the standard definitions. 2. Represented by a 4-digit binary number, the output terminal represented by 0 is not inverted, and the output terminal represented by 1 is inverted. The input terminals represented by binary	0000-1111	0000								

Serial number	Name	Function	Parameter range	Factory default								
		numbers are as follows: <table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>DO4</td><td>DO3</td><td>DO2</td><td>DO1</td></tr></table> 0: High level is valid; 1: Active at low level.	3	2	1	0	DO4	DO3	DO2	DO1		
3	2	1	0									
DO4	DO3	DO2	DO1									
58	IO input terminal debounce time constant	1. Set the debounce filtering time for the input terminal. 2. The smaller the value, the faster the terminal input response. 3. The larger the value, the better the anti-interference performance of the terminal input, but the response becomes slower.	1-20ms	2								
59	command pulse Valid edge	Set as: 0: The rising edge of the pulse is valid; 1: The pulse falling edge is valid.	0-1	0								
60	soft reset	0: Soft reset is invalid; 1: Soft reset is valid and the system will restart.	0-1	0								
61	System alarm clear	Set as: 0: System alarm clearing is invalid; 1: System alarm clearing is valid.	0-1	0								

Serial number	Name	Function	Parameter range	Factory default
62	Encoder selection	4: Single-turn absolute encoder; 5: Multi-turn absolute encoder.	4-5	Determined by the motor
63	Load to inertia ratio	1. Set the load inertia ratio corresponding to the motor inertia moment. 2. The setting value is: $=((\text{load inertia} + \text{rotational inertia}) / \text{rotational inertia}) \times 100.$	1-500	100
64	Internal torque 1	In torque control mode (FA4=2), when TRQ1 OFF When TRQ2 is OFF, internal torque 1 is selected as the torque command.	-300-300	0
65	Internal torque 2	In torque control mode (FA4=2), when TRQ1 is ON When TRQ2 is OFF, internal torque 2 is selected as the torque command.	-300-300	0
66	Internal torque 3	In torque control mode (FA4=2), when TRQ1 OFF When TRQ2 is ON, internal torque 3 is selected as the torque command.	-300-300	0
67	Internal torque 4	In torque control mode (FA4=2), when TRQ1 is ON When TRQ2 is ON, internal torque 3 is selected as the	-300-300	0

Serial number	Name	Function	Parameter range	Factory default
		torque command.		
71	MODBUS slave address	MODBUS communication slave address value.	1-254	1
72	MODBUS communication baud rate	MODBUS communication baud rate.	48-1152×100	96
73	MODBUS communication protocol selection	Set as: 0: 8, N, 2 (MODBUS, RTU); 1: 8, E, 1 (MODBUS, RTU); 2: 8, O, 1 (MODBUS, RTU); 3: 8, N, 1 (MODBUS, RTU). This parameter determines the communication protocol. The number 8 indicates that the transmitted data bits are 8 bits; the English letters N, E, and O represent parity: N: Indicates not using this bit; E: indicates 1 even position; O: Indicates 1 odd position. The number 1 or 2 indicates that the communication bit is 1 or 2 bits.	0-3	0
74	Communication error handling	When communication signal error occurs, select: 0: continue to operate; 1: Alarm and stop operation.	0-1	0
75	Zero speed detection point	1. When the motor speed is lower than this parameter, the ZSP (zero speed) of the digital	0-1000 r/min	10

Serial number	Name	Function	Parameter range	Factory default
		output DO is ON, otherwise it is OFF. 2. When the ZCLAMP of the digital input DI is ON and the speed command value is lower than this value, the speed command value is forced to zero.		
76	consistent speed Settings	When the difference between the actual speed and the command speed is less than this setting , the UCO2N (speed consistent) of the digital output DO is ON, otherwise it is OFF.	0-1000 r/min	10
77	Position command pulse electronic gear ratio second molecule	See parameter FA12 for details.	0-32767	0
78	Position command pulse electronic gear ratio third molecule	See parameter FA12 for details.	0-32767	0
79	Position command pulse	See parameter FA12 for	0-32767	0

Serial number	Name	Function	Parameter range	Factory default
	electronic gear ratio fourth molecule	details.		
80	Effective level of command direction signal	Set as: 0: High level positive direction; 1: Low level positive direction.	0-1	0
81	Command pulse PULS signal filter	1. Digitally filter the pulse input PULS signal. The larger the value, the larger the filtering time constant. 2. The default value is the maximum pulse input frequency of 500kHz (kpps). The larger the value, the smaller the maximum pulse input frequency will be. 3. Used to filter out noise on signal lines to avoid counting errors. If there is a phenomenon of inaccurate movement due to inaccurate counting, the parameter value can be increased appropriately. 4. After the parameters are modified, they must be saved and then powered on again to take effect.	0-15	4

Serial number	Name	Function	Parameter range	Factory default
82	Command pulse SIGN signal filtering	1. Digitally filter the pulse input SIGN signal. The larger the value, the larger the filtering time constant. 2. The default value is the maximum pulse input frequency of 500kHz (kpps). The larger the value, the maximum pulse input frequency will be reduced accordingly. 3. Used to filter out noise on signal lines to avoid counting errors. If there is a phenomenon of inaccurate movement due to inaccurate counting, the parameter value can be increased appropriately. 4. After the parameters are modified, they must be saved and then powered on again to take effect.	0-15	4
83	CWL, CCWL direction prohibition method	1. When the machine encounters the mechanical limit switch and triggers the CWL and CCWL limits, this parameter is used to select	0-1	0

Serial number	Name	Function	Parameter range	Factory default
		the prohibited method. Parameter meaning: 0: Limit the torque in this direction to 0; 1: Disable pulse input in this direction.		
84	Positioning completion return difference	1. Set the positioning completion pulse range under position control. 2. When the number of remaining pulses in the position deviation counter is less than or equal to the setting value of this parameter, the COIN (positioning completion) of the digital output DO is ON, otherwise it is OFF. 3. The comparator has hysteresis function , which is set by parameter FA85.	0-32767 pulse	65
85	Positioning proximity range	1. Set the positioning to approach the pulse range under position control. 2. When the number of remaining pulses in the position deviation counter is	0-32767 pulse	6500

Serial number	Name	Function	Parameter range	Factory default						
		less than or equal to the setting value of this parameter, the NEAR of the digital output DO is ON, otherwise it is OFF. 3. The comparator has hysteresis function, which is set by parameter FA86. 4. Used when positioning is about to be completed, the host computer receives the NEAR signal to prepare for the next step. Generally, the parameter value should be larger than the positioning completion range.								
86	Positioning proximity hysteresis	See the description of parameter FA85 for details.	0-32767 pulse	650						
87	Arrival speed hysteresis	1. When the motor speed exceeds this parameter, the ASP of the digital output DO is ON, otherwise it is OFF. 2. The comparator has hysteresis function. 3. With polarity setting function: <table><tr><th>FA88</th><th>FA28</th><th>Comparators</th></tr><tr><td>0</td><td>>0</td><td>Speed regardless of direction</td></tr></table>	FA88	FA28	Comparators	0	>0	Speed regardless of direction	0-5000 r/min	30
FA88	FA28	Comparators								
0	>0	Speed regardless of direction								

Serial number	Name	Function			Parameter range	Factory default											
		1	>0	Only detect forward speed													
			<0	Only detects reverse speed													
88	reach speed polarity	Refer to the description of parameter FA87.			0-1	0											
89	reached torque	1.When the motor torque exceeds this parameter, the ATRQ of the digital output DO is ON, otherwise it is OFF. 2.The comparator has hysteresis function , which is set by parameter FA90. 3.With polarity setting function: <table><tr><th>FA91</th><th>FA89</th><th>Comparators</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>Only detects forward torque</td></tr><tr><td><0</td><td>Only detects reverse torque</td></tr></table>			FA91	FA89	Comparators	0	>0	Torque regardless of direction	1	>0	Only detects forward torque	<0	Only detects reverse torque	-300%-300%	100
FA91	FA89	Comparators															
0	>0	Torque regardless of direction															
1	>0	Only detects forward torque															
	<0	Only detects reverse torque															
90	Arrival torque hysteresis	1. When the motor torque exceeds this parameter, the ATRQ (torque arrival) of the digital output DO is ON, otherwise it is OFF. 2. The comparator has hysteresis function , which is set by parameter FA90. 3. With polarity setting			0-300%	5											

Serial number	Name	Function	Parameter range	Factory default											
		function:<table><tr><th>FA91</th><th>FA89</th><th>Comparators</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>Only detects forward torque</td></tr><tr><td><0</td><td>Only detects reverse torque</td></tr></table>	FA91	FA89	Comparators	0	>0	Torque regardless of direction	1	>0	Only detects forward torque	<0	Only detects reverse torque		
FA91	FA89	Comparators													
0	>0	Torque regardless of direction													
1	>0	Only detects forward torque													
	<0	Only detects reverse torque													
91	Arrival torque polarity	1. When the motor torque exceeds this parameter, the ATRQ (torque arrival) of the digital output DO is ON, otherwise it is OFF. 2. The comparator has hysteresis function , which is set by parameter FA90. 3. With polarity setting function:<table><tr><th>FA91</th><th>FA89</th><th>Comparators</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>Only detects forward torque</td></tr><tr><td><0</td><td>Only detects reverse torque</td></tr></table>	FA91	FA89	Comparators	0	>0	Torque regardless of direction	1	>0	Only detects forward torque	<0	Only detects reverse torque	0-1	0
FA91	FA89	Comparators													
0	>0	Torque regardless of direction													
1	>0	Only detects forward torque													
	<0	Only detects reverse torque													
92	Zero speed detection hysteresis	1.When the motor speed is lower than this parameter, the ZSP (zero speed) of the digital output DO is ON, otherwise it is OFF. The comparator has hysteresis function.	0-1000 r/min	5											

Serial number	Name	Function	Parameter range	Factory default
94	Electromagnetic brake opening delay time	1. Set the delay time for electromagnetic brake opening. When the system changes from the disable state to the enable state, define the delay time from the motor current opening to the electromagnetic brake release (DO output terminal BRK ON).	0-200 ms	0
95	Motor encoder resolution	Encoder resolution, the default is 2 to the 17th power = 131072, the setting value is 17, please modify it with caution, otherwise incorrect settings will cause speeding.	10-32	17
96	Number of motor pole pairs	This parameter indicates the number of motor pole pairs. Please modify it carefully, otherwise incorrect settings will cause speeding.	1-360	5
97	Motor zero position Offset angle	The offset angle between the encoder zero position and the motor zero position is determined by the motor.	0-3600	216
99	Maximum duty cycle during braking	Maximum duty cycle setting when braking.	5-90	50
100	position	Set as:	0-1	0

Serial number	Name	Function	Parameter range	Factory default
	ring Filter selection	0: digital moving average filter; 1: Exponential smoothing filter.		
101	position ring Feedforward gain	Feedforward can reduce the position tracking error during position control. When set to 100, the position tracking error is always 0 under command pulses of any frequency.	0-100	0
102	Position loop feedforward filter time constant	The position loop feedforward amount is filtered to increase the stability of the feedforward control amount.	20-500	100

7.2 PC group multi-function terminal series parameters

7.2.1 List of PC group series parameters

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

Parameter	Name	Scope	Factory default
PC-0	Digital input DI1 function	0-99	1
PC-1	Digital input DI2 function	0-99	2
PC-2	Digital input DI3 function	0-99	3
PC-3	Digital input DI4 function	0-99	4

PC-15	Digital input DI is forced to be valid 1	00000000-11111111	00000000
PC-16	Digital input DI forced valid 2	00000000-11111111	00000000
PC-17	Digital input DI is forced to be valid 3	00000000-11111111	00000000
PC-18	Digital input DI is forced to be valid 4	00000000-11111111	00000000
PC-19	Digital input DI is forced to be valid 5	00000000-11111111	00000000
PC-20	Digital output DO1 function	0-99	2
PC-21	Digital output DO2 function	0-99	3
PC-22	Digital output DO3 function	0-99	5
PC-23	Digital output DO4 function	0-99	8
PC -30	Virtual input terminal control	0-2	0
PC-31	Virtual input terminal status value	00000000-11111111	00000000
PC-32	Virtual output terminal control	0-1	0
PC-33	Virtual output terminal status value	0000-1111	0000
PC-38	Virtual IO input DI1 function	0-99	5
PC-39	Virtual IO input DI2 function	0-99	6
PC-40	Virtual IO input DI3 function	0-99	7
PC-41	Virtual IO input DI4 function	0-99	8
PC-42	Virtual IO input DI5 function	0-99	9
PC-43	Virtual IO input DI6 function	0-99	10
PC-44	Virtual IO input DI7 function	0-99	11
PC-45	Virtual IO input DI8 function	0-99	12

Notice:

- ◆ When PC-30=0, the IO input is determined by DI1 ~ DI4. The number of input IO is 4, corresponding to the parameters PC-0 ~ PC-3;
- ◆ Is determined by the corresponding bit of virtual IOPC-31. The number of input IOs is 8, corresponding to parameters PC-38~PC-45;

- ◆ When PC-30=2, the IO input is determined by DI1~DI4 and PC-31. The number of input IOs is 12, corresponding to parameters PC-0~PC-3 and PC-38~PC-45.

7.2.2 DI function list

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

Define value	Symbol	Function	Function analysis
0	NULL	No function	The input status has no impact on the system.
1	SON	Servo enable	Servo enable input terminal. OFF: The servo drive cannot be used, and the motor does not carry current; ON: The servo drive is enabled and the motor passes current.
2	ARST	Alarm clear	Alarm clear input terminal: If there is an alarm, if the alarm is allowed to be cleared, the rising edge of the input (the moment when OFF turns ON) clears the alarm. Note: Only some alarms can be cleared.
3	CCWL	Forward drive prohibited	CCW drive prohibition input terminal: OFF: forward rotation (CCW) rotation is prohibited; ON: forward rotation (CCW) rotation is allowed. 2. Used for mechanical limit stroke protection, the function is controlled by parameter FA-20. Note that the default value of FA-20 ignores this function. If you need to enable this function, you need to modify FA-20: (1) When FA-20 is 0, the input prohibited function is valid, and whether CCW is prohibited

Define value	Symbol	Function	Function analysis
			is controlled by FA-83 ; (2) When FA-20 is 1, the input prohibition function is invalid, and whether CCW is prohibited is not controlled by FA-83. 3. When the prohibition function is valid (FA-20 is 0): (1) When FA-83 is 0, the forward torque limit is 0, and the forward pulse input is not limited; (2) When FA-83 is 1, it is prohibited Forward pulse input.
4	CWL	Reverse drive prohibited	CW drive prohibition input terminal: OFF: forward rotation (CW) rotation is prohibited; ON: forward rotation (CW) rotation is allowed. 2. Used for mechanical limit stroke protection, the function is controlled by parameter FA-20. Note that the default value of FA-20 is to ignore this function. If you need to enable this function, you need to modify FA-20: (1) When FA-20 is 0, the input disabled function is valid, and whether CW is disabled is controlled by FA-83; (2) When FA-20 is 1, the input prohibition function is invalid, and whether CW is prohibited is not controlled by FA-83. 3. When the prohibition function is valid (FA-20 is 0): (1) When FA-83 is 0, the reverse torque limit is 0, and the reverse pulse input is not limited; (2) When FA-83 is 1, it is prohibited Reverse

Define value	Symbol	Function	Function analysis
			pulse input.
5	TCCW	Forward torque limit	OFF: The CCW direction torque is not limited by the FA-36 parameter; ON: The CCW direction torque is limited by the FA-36 parameter. Note: Regardless of whether TCCW is valid or invalid, the CCW direction torque is still limited by parameter FA-34.
6	TCW	Reverse torque limit	OFF: The CW direction torque is not limited by the FA-37 parameter; ON: The CW direction torque is limited by the FA-37 parameter. Note: Regardless of whether TCW is valid or invalid, the CW direction torque is still limited by parameter FA-35.
7	ZCLAMP	zero speed clamp	When the following conditions are met, the zero-speed clamp function is turned on (speed is forced to zero): Condition 1: Speed control mode (FA4=1), when selecting external speed (FA22=0); Condition 2: ZCLAMP ON; Condition 3: The speed command is lower than parameter FA-75. When any of the above conditions are not met, normal speed control is performed.
8	CZERO	zero instruction	Under speed or torque control, the speed or torque commands are: OFF: normal command; ON: zero command.

Define value	Symbol	Function	Function analysis
9	CINV	Negate the instruction	Under speed or torque control, the speed or torque commands are: OFF: normal command; ON: command inversion.
10	SP1	Speed selection 1	In speed control mode (FA4=1), when selecting internal speed (FA22=1), SP1 and SP2 are combined to select different internal speeds: SP2=OFF SP1=OFF: Internal speed 1 (parameter FA-24) SP2=OFF SP1=ON: Internal speed 2 (parameter FA-25) SP2=ON SP1=OFF: Internal speed 3 (parameter FA-26) SP2=ON SP1=ON: Internal speed 4 (parameter FA-27)
11	SP2	Speed selection 2	
13	TRQ1	Torque selection 1	In torque control mode (FA4=2), when internal torque is selected (FA32=1), the combination of TRQ1 and TRQ2 selects different internal torques: TRQ2=OFF TRQ1=OFF: Internal torque 1 (parameter FA-64) TRQ2=OFF TRQ1=ON: Internal torque 2 (parameter FA-65) TRQ2=ON TRQ1=OFF: Internal torque 3 (parameter FA-66) TRQ2=ON TRQ1=ON: Internal torque 4 (parameter FA-67)
14	TRQ2	Torque selection 2	
16	CMODE	Composite mode control	When FA-4 is set to 3, 4, or 5, it is in mixed control mode, and the control mode can be switched through this input terminal:

Define value	Symbol	Function	Function analysis
		mode setting	(1) When FA-4 is 3, CMODE OFF means position mode; CMODE ON means speed mode; (2) When FA-4 is 4, CMODE OFF means position mode; CMODE ON means torque mode; (3) When FA-4 is 5, CMODE OFF means speed mode; CMODE ON means torque mode.
18	GEAR1	Electronic gear selection 1	When FA-11 is 0, the combination of GEAR1 and GEAR2 is used to select the numerator of different electronic gear ratios: GEAR2=OFF GEAR1=OFF: Numerator 1 (parameter FA-12) GEAR2=OFF GEAR1=ON: Numerator 2 (parameter FA-77) GEAR2=ON GEAR1= OFF: Numerator 3 (parameter FA-78) GEAR2=ON GEAR1=ON: Numerator 4 (parameter FA-79)
19	GEAR2	Electronic gear selection 2	
20	CLR	Position deviation clearing	In position control mode, position deviation counter clear input terminal.
21	INH	Pulse input disabled	In position control mode, position command pulse prohibition terminal: OFF: command pulse input is valid; ON: command pulse input is prohibited.
22	JOGP	forward inching	In speed mode, when FA22=5, this signal is turned on, the motor moves in the positive direction, and the speed is set by FA21. Note: This signal is turned on at the same time as the reverse inching function, and the inching function is invalid.

Define value	Symbol	Function	Function analysis																		
23	JOGN	reverse inching	In speed mode, and FA22=5; when this signal is turned on, the motor inches in the opposite direction, and the speed is set by FA21. Note: This signal is turned on at the same time as forward inching, and the inching function is invalid.																		
27	HOLD	Internal position control command stops	In the internal position register mode, when this signal is turned on, the motor will stop running (can only be used when the internal position mode FA-14=3).																		
28	CTRG	internal location command trigger	In the internal position register mode, after selecting the internal position register control command (POS0-2) , this signal is triggered and the motor runs according to the internal position register command. Only after the digital output zero speed signal (ZSPD=1) will the next trigger internal position command be accepted.																		
29	POS0	internal location command select 0	The relationship corresponding to the internal position selection:																		
			<table><tr><th>Location Order</th><th>POS2</th><th>POS1</th><th>POS0</th><th>CTRG</th><th>Correspond parameter</th></tr><tr><td>P1</td><td>0</td><td>0</td><td>0</td><td>↑</td><td>PD-2</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>PD-3</td></tr></table>	Location Order	POS2	POS1	POS0	CTRG	Correspond parameter	P1	0	0	0	↑	PD-2						PD-3
			Location Order	POS2	POS1	POS0	CTRG	Correspond parameter													
			P1	0	0	0	↑	PD-2													
					PD-3																

Define value	Symbol	Function	Function analysis					
30	POS1	internal location command select 1	P2	0	0	1	↑	PD-5
								PD-6
			PC	0	1	0	↑	PD-8
								PD-9
			PD	0	1	1	↑	PD-11
								PD-12
31	POS2	internal location command select 2	P5	1	0	0	↑	PD-14
								PD-15
			P6	1	0	1	↑	PD-17
								PD-18
			P7	1	1	0	↑	PD-20
								PD-21
P8	1	1	1	↑	PD-23			
					PD-24			
33	SHOM	Start return to origin	In the internal position register mode, it is necessary to search for the origin. After this signal is turned on, the search for the origin function is started (please refer to the setting of PD-34).					
34	ORGP	Return to origin	In the internal position register mode, when searching for the origin, the servo will regard the position of this point as the origin after this signal is turned on (please refer to the setting of parameter PD-32).					

7.2.3 DO function list

The definition values of the output terminals (the four terminals corresponding to the PC group parameters are PC-20, PC-21, PC-22, and PC-23):

Define value	symbol	Function	Function analysis
1	ON	Always valid	Force the output to be ON.
2	RDY	Servo ready	OFF: The servo main power supply is not closed or there is an alarm; ON: The servo main power supply is normal and there is no alarm.
3	ALM	Call the police	OFF: There is an alarm; ON: No alarm.
4	ZSP	zero speed	During speed and torque control, OFF: Motor speed is higher than parameter FA-75 (regardless of direction); ON: The motor speed is lower than parameter FA-75 (regardless of direction).
5	COIN	Positioning completed	During position control, OFF: The position deviation is greater than parameter FA-16; ON: The position deviation is less than parameter FA-16.
6	ASP	Arrive at speed	During speed and torque control, OFF: Motor speed is lower than parameter FA-28; ON: Motor speed is higher than parameter FA-28. It has polarity setting function, please refer to the description of parameter FA-28.
7	ATRQ	Torque reached	OFF: The motor torque is lower than parameter FA-89; ON: The motor torque is higher than parameter FA-89. It has polarity setting function, please

Define value	symbol	Function	Function analysis
			refer to the description of parameter FA-89.
8	BRK	Electromagnetic brake	OFF: electromagnetic brake braking; ON: Electromagnetic brake released.
9	RUN	Servo is running	OFF: The servo motor is running without power; ON: The servo motor is powered on and running.
10	NEAR	Positioning close to	During position control, OFF: The position deviation is greater than parameter FA-85; ON: Position deviation is smaller than parameter FA-85.
11	TRQL	Torque limited	OFF: The motor torque does not reach the limit value; ON: The motor torque reaches the limit value. The torque limit method is through parameters FA-34, FA-35, FA-36, and FA-37.
12	SPL	speed limit	During torque control, OFF: The motor speed does not reach the limit value; ON: The motor speed reaches the limit value. The speed limit method is set through parameter FA-50.
13	VCOIN	consistent speed	OFF: The absolute value of the difference between the actual speed and the command speed is greater than FA76;

Define value	symbol	Function	Function analysis
			ON: The absolute value of the difference between the actual speed and the command speed is less than FA76.
15	HOME	Return to origin completed	OFF: When the origin return is not completed, no signal is output; ON: The signal is output when the origin return is completed.
16	CMDOK	internal location command completed	OFF: When the internal position command is not completed or the internal position command is not stopped, no signal is output; ON: When the internal position command is completed or the internal position command is stopped, the signal is output after the PD-1 setting time has passed.

7.2.4 DI is forced to be effective

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

(1) PC-15 corresponding functions are represented by 8-bit binary:

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

(2) PC-16 corresponding functions are represented by 8-bit binary:

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

(3) PC-17 corresponding functions are represented by 8-bit binary:

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

(4) PC-18 corresponding functions are represented by 8-bit binary:

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

(5) PC-19 corresponding functions are represented by 8-bit binary:

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

Parameter meaning:

Any one of the 5 parameters	Corresponding function	Functional results
0	Not planned	OFF(invalid)
	Planned	determined by signal
1	Not planned or planned	ON (forced to be effective)



- ◆ Planned refers to the function where the parameters have been selected by the input terminals in P3-0~P3-3, otherwise the opposite is true.

7.3 PD group internal position command series parameters

Serial number	Name	Function	Parameter scope	Factory default
PD-0	Internal position command control mode	0: Absolute position command; 1: Incremental position command.	0-1	0

Serial number	Name	Function	Parameter scope	Factory default
PD-1	Internal position command completion digital output delay	1. When the internal position command is completed or the internal position command is stopped, after the delay time set by PD-1, the internal position command completion (CMDOK) DO signal is output. 2. When the PD-1 delay time is set to 0, when the DO signal zero speed detection (ZSPD) is set to 1, the internal position command of the trigger signal is accepted again. 3. When the PD-1 delay time is not set to 0, it is set to 1 when the DO signal internal position command is completed (CMDOK), and then the internal position command triggered by the DI signal command trigger (CTRG) is accepted.	0-200 ms	0
PD -2	Position circle setting of internal position command 1	Set the position circle number of the internal position of the first segment.	30000-30000	0

Serial number	Name	Function	Parameter scope	Factory default
PD-3	Setting the number of pulses in the position circle of internal position command 1	1. Set the number of position pulses for the first segment internal position. 2. Internal position command 1 = the first-stage internal position circle setting value + the first-stage internal position pulse number setting value. (Max is the set number of pulses for one revolution of the motor, please refer to the settings of FA-11 FA-12 FA-13).	+/- max.cnt /rev	0
PD-4	Internal position command controls the movement speed of 1 set up	Set the movement speed of internal position command control 1.	0-5000 r/min	1000
PD-5	Position circle setting of internal position command 2	Set the number of position turns for the inner position of segment 2.	-30000- 30000	0
PD-6	Setting the number of pulses in the position circle of internal position command 2	1. Set the number of position pulses for the 2nd segment internal position. 2. Internal position command 2 = the second-stage internal position circle setting value + the second-	+/- max.cnt /rev	0

Serial number	Name	Function	Parameter scope	Factory default
		stage internal position pulse number setting value.		
PD-7	Internal position command controls the movement speed of 2 set up	Set the movement speed of internal position command control 2.	0-5000 r/min	1000
PD -8	Position circle setting of internal position command 3	Set the number of position turns for the inner position of segment 3.	-30000-30000	0
PD-9	Setting the number of pulses in the position circle of internal position command 3	1. Set the number of position pulses for the 3rd segment internal position. 2. Internal position command 3 = 3rd segment internal position circle setting value + 3rd segment internal position pulse number setting value.	+/- max.cnt /rev	0
PD-10	Internal position command controls the movement speed of 3 set up	Set the movement speed of internal position command control 3.	0-5000 r/min	1000

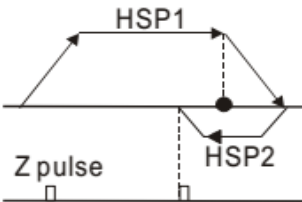
Serial number	Name	Function	Parameter scope	Factory default
PD-11	Position circle setting of internal position command 4	Set the number of position turns for the inner position of segment 4.	-30000-30000	0
PD-12	Setting the number of pulses in the position circle of internal position command 4	1. Set the position pulse number of the 4th segment internal position. 2. Internal position command 4 = the 4th-stage internal position circle setting value + the 4th-stage internal position pulse number setting value.	+/- max.cnt /rev	0
PD-13	Internal position command controls the movement speed of 4 set up	Set the movement speed of internal position command control 4.	0-5000 r/min	1000
PD-14	Position circle setting of internal position command 5	Set the position circle number of the inner position of the 5th segment.	-30000-30000	0
PD -15	Setting the number of pulses in the position circle of internal position command 5	1. Set the position pulse number of the 5th segment internal position. 2. Internal position command 5 = 5th segment internal position circle setting value + 5th segment	+/- max.cnt /rev	0

Serial number	Name	Function	Parameter scope	Factory default
		internal position pulse number setting value.		
PD-16	Internal position command controls the movement speed of 5 set up	Set the movement speed of internal position command control 5.	0-5000 r/min	1000
PD-17	Position circle setting of internal position command 6	Set the number of position turns for the internal position of segment 6.	-30000-30000	0
PD-18	Setting the number of pulses in the position circle of internal position command 6	1. Set the position pulse number of the 6th segment internal position. 2. Internal position command 6 = 6th segment internal position circle setting value + 6th segment internal position pulse number setting value.	+/- max.cnt /rev	0
PD-19	Internal position command controls the movement speed of 6 set up	Set the movement speed of internal position command control 6.	0-5000 r/min	1000

Serial number	Name	Function	Parameter scope	Factory default
PD-20	Position circle setting of internal position command 7	Set the number of position turns for the internal position of segment 7.	-30000-30000	0
PD-21	Setting the number of pulses in the position circle of internal position command 7	1. Set the position pulse number of the 7th segment internal position. 2. Internal position command 7 = 7th segment internal position circle setting value + 7th segment internal position pulse number setting value.	+/- max.cnt /rev	0
PD -22	Internal position command controls the movement speed of 7 set up	Set the movement speed of internal position command control 7.	0-5000 r/min	1000
PD-23	Position circle setting of internal position command 8	Set the number of position turns for the internal position of segment 8.	-30000-30000	0
PD-24	Setting the number of pulses in the position circle of internal position command 8	1. Set the number of position pulses for the 8th segment internal position. 2. Internal position command 8 = 8th segment internal position circle setting value + 8th segment	+/- max.cnt /rev	0

Serial number	Name	Function	Parameter scope	Factory default
		internal position pulse number setting value.		
PD-25	Internal position command controls the movement speed of 8 set up	Set the movement speed of internal position command control 8.	0-5000 r/min	1000
PD-32	Origin detector type and search direction settings	0: Return to the origin in the forward direction, CCWL is used as the return origin; 1: Reverse direction of origin return, CWL is used as the return origin; 2: Origin return in the forward direction, ORGP is used as the return origin; 3: Reverse direction of origin return, ORGP is used as the return origin; 4: Forward rotation, directly find the absolute position zero point of a single circle as the return origin; 5: Reverse and directly find the absolute position zero point of a single circle as the return origin.	0-5	0

Serial number	Name	Function	Parameter scope	Factory default
PD-33	Short distance movement setting to reach the origin	0: After finding the reference origin, return to find the single-turn absolute position zero point as the mechanical origin; 1: Do not return after finding the reference origin, and look forward to find the single-turn absolute position zero point as the mechanical origin; 2: After finding the reference origin (ORGP rising edge or single-turn absolute position zero point) as the mechanical origin, decelerate and stop.	0-2	0
PD-34	origin trigger startup mode	0: Turn off the origin return function; 1: When the power is turned on, the origin return function is automatically executed; 2: The origin return function is triggered by the input contact of the origin search function (SHOM).	0-2	0
PD-35	Stop at origin Mode setting	0: After the origin detection is completed, the motor decelerates and pulls back to the origin; 1: After the origin detection is completed, the motor decelerates and stops in the forward direction.	0-1	0

Serial number	Name	Function	Parameter scope	Factory default
PD-36	First section high-speed origin return speed setting (HSPD1)	Set the first high-speed origin return speed. 	1-2000 r/min	1000
PD-37	Second stage low-speed origin return speed setting (HSPD2)	Set the second low-speed origin return speed.	1-500 r/min	50
PD-38	Origin return offset turns (HOF1)	Set the number of offset turns for origin return.	-30000-30000	0
PD-39	Number of origin return offset pulses (HOF2)	1. Set the number of origin return offset pulses. 2. When parameter functions HOF1 and HOF2 are set to zero, the origin will be the single-turn absolute position zero point or ORGP according to the definition of the origin return mode. If the setting value is not zero, the origin will be based on the above-mentioned single-turn absolute position zero point or ORGP plus a pulse offset $\text{HOF1} \times 10000 + \text{HOF2}$	+/- max.cnt /rev	0

Serial number	Name	Function	Parameter scope	Factory default
		as the new origin.		

Chapter VIII Fault code

Fault symbol	Fault name	Fault content
--	normal	
1	speeding	The servo motor speed exceeds the set value
2	Main circuit overvoltage	Main circuit power supply voltage is too high
3	Main circuit undervoltage	Main circuit power supply voltage is too low
4	Location out of tolerance	The value of the position deviation counter exceeds the set value
5	Drive overheating	Drive temperature is too high
6	Speed amplifier saturation fault	Speed adjustment is saturated for a long time
7	Driver disabled exception	CCW/CW drive prohibition input is both OFF
8	Position deviation counter overflow	The absolute value of the position deviation count value exceeds 2^{30}
11	IPM module failure	IPM intelligent module failure
13	Drive overloaded	Servo drive and motor are overloaded (instantaneous overheating)
14	Brake failure	Brake circuit failure
18	Relay switch failure	The actual status of the relay is inconsistent with the control status
19	Brake delay error	There is pulse input when the brake is not opened
20	EEPROM error	EEPROM error
21	FPGA module failure	FPGA module function abnormality
23	Current collection circuit failure	Current collection circuit failure
29	User torque overload alarm	The motor load exceeds the value and duration set by the user.

Fault symbol	Fault name	Fault content
42	AC input voltage too low	AC input voltage too low
47	The main circuit voltage is too high when powering on	The main circuit voltage is too high when powering on
50	Encoder communication failure	The driver and encoder have not established a communication connection.
51	Encoder communication abnormality	After the encoder communication is established, an interruption occurs and the connection is disconnected.
52	Encoder battery voltage low alarm	The encoder battery voltage is low and alarms. The information is not lost but needs to be replaced as soon as possible.
53	Encoder battery voltage error alarm	Encoder battery voltage error alarm, the stored information has been incorrect, and the encoder needs to be reset.
54	Encoder error alarm	The encoder is not a battery alarm, but the encoder needs to be reset again.
55	CRC check error 3 times in a row	The CRC check of the data received by the encoder communication has errors three times in a row.
56	MODBUS frame too long error	The received MODBUS frame data is too long
57	MODBUS communication format abnormality	Communication parameters are improperly set or the address or value is incorrect.
58	Single lap position value error	The single-turn position offset value stored by the drive exceeds the encoder resolution.
59	Encoder reports CF error	The encoder continuously reports CF domain errors, and the encoder needs to be reset.

Chapter IX Alarm handling methods

Call the police code	Call the police name	Run state	Reason	Approach
1	speeding	Switch on control Appears when powering on	1. Control circuit board failure. 2. Encoder failure.	1. Replace the servo drive. 2. Replace the servo motor.
		Motor running Appear during the process	The input command pulse frequency is too high.	Correctly set the input command pulse.
			The acceleration /deceleration time constant is too small, causing the speed overshoot to be too large.	Increase the acceleration/deceleration time constant.
			The input electronic gear ratio is too large.	Correct settings.
			Encoder failure.	Replace the servo motor.
			Defective encoder cable.	Replace the encoder cable.
			The servo system is unstable, causing overshoot.	1. Reset the relevant gain value. 2. If the gain cannot be set to a suitable value, reduce the load inertia ratio.
		The motor has just started Appears when moving	Load capacity is too large.	1. Reduce the load. 2. Replace the drive and motor with a higher power one.
			1. Encoder zero point error. 2. The UVW lead of the motor is connected incorrectly. 3. The encoder cable leads are connected incorrectly.	1. Replace the servo motor. 2. Ask the manufacturer to readjust the zero point of the encoder. 3. Correct wiring.
2	The main circuit overvoltage	Switch on control Appears when	1. Circuit board failure.	Replace the servo drive.

Call the police code	Call the police name	Run state	Reason	Approach
		powering on		
		Turn on the main power appears when the source	1. The power supply voltage is too high. 2. The power supply voltage waveform is abnormal.	Check the power supply.
		The motor has run appeared in the process	The braking resistor wiring is disconnected.	Rewire.
			1. The brake transistor is damaged. 2. The internal braking resistor is damaged.	Replace the servo drive.
			The brake circuit capacity is insufficient.	1. Reduce the frequency of starts and stops. 2. Increase the acceleration and deceleration time constant. 3. Reduce the torque limit value. 4. Reduce load inertia. 5. Replace the drive and motor with a higher power one.
3	The main circuit Undervoltage	Turn on the main power appears when the source	1. Circuit board failure. 2. The power fuse is damaged. 3. Soft start circuit failure. 4. The rectifier is damaged.	Replace the servo drive.
			1. The power supply voltage is low. 2. Temporary power outage of more than 20ms.	Check the power supply.
		The motor has run appeared in the process	1. The power supply capacity is insufficient. 2. Instantaneous power outage.	Check the power supply.
			Radiator overheated.	Check the load condition.

Call the police code	Call the police name	Run state	Reason	Approach
4	Location out of tolerance	Turn on control power appears when the source	Circuit board failure.	Replace the servo drive.
		Connect the main power supply and control line, input the pulse command, the motor does not rotate or reverses.	1. Encoder zero point changes. 2. Encoder failure.	1. Readjust the encoder zero point. 2. Replace the servo motor.
		The motor has run appeared in the process	The set position out-of-tolerance detection range is small.	Increase the position out-of-tolerance detection range.
			Position proportional gain is too small.	Increase the gain value.
			Insufficient torque.	1. Check the torque limit value. 2. Reduce load capacity. 3. Replace the drive and motor with a higher power one.
			The command pulse frequency is too high.	Reduce frequency.
			Encoder zero point changes.	Readjust the encoder zero point.
5	driver overheat	drive operation Appear during the process	1. Circuit board failure. 2. The drive temperature is too high.	1. Reduce drive temperature. 2. Replace the servo drive.
6	speed amplification saturation fault	The motor has run appeared in the process	1. The load is too large. 2. The motor is mechanically stuck.	1. Reduce load. 2. Replace the drive and motor with a higher power one. 3. Check the load

Call the police code	Call the police name	Run state	Reason	Approach
				mechanical parts.
7	Driver ban Stop exception		The CCW/CW drive prohibition input terminals are all disconnected.	Check the wiring.
8	Position deviation counter overflow		1. The motor is mechanically stuck. 2. The input command pulse is abnormal.	1. Check the load mechanical parts. 2. Check the command pulse. 3. Check whether the motor rotates according to the command pulse.
11	IPM module block fault	Turn on control power appears when the source	4. Circuit board failure.	5. Replace the servo drive.
		The motor has run appeared in the process	1. The power supply voltage is low. 2. Overheat.	1. Check the drive. 2. Power cycle. 3. Replace the drive.
			Short circuit between drivers UVW.	Check the wiring.
			Poor grounding.	Proper grounding.
			The motor insulation is damaged.	Replace the motor.
			Be disturbed.	1. Add line filter. 2. Stay away from sources of interference.
13	overload	Turn on control power appears when the source	Circuit board failure.	Replace the servo drive.
		The motor has run appeared in the process	Operation exceeding rated torque.	1. Check the load. 2. Reduce the frequency of starts and stops. 3. Reduce the torque limit value. 4. The drive and motor with higher power.

Call the police code	Call the police name	Run state	Reason	Approach
			Keep the brake off.	Check the holding brake.
			The motor oscillates unstable.	1. Adjust gain. 2. Increase acceleration /deceleration time. 3. Reduce load inertia.
			1. One phase of UVW is disconnected. 2. Encoder connection error.	Check the wiring.
14	Brake failure		Braking circuit failure.	Replace the drive
18	relay Switch failure		The relay is damaged.	Return to factory for repair.
19	Brake delay not opened		The FA94 parameter value is set too high, the control pulse comes, but the brake has not yet been opened.	Reduce the value of parameter FA94.
20	EEPROM error		The chip or circuit board is damaged.	1. Replace the servo drive. After repair, the drive model must be reset (see FA10), and then the default parameters must be restored.
21	FPGA module failure		The FPGA module functions abnormally.	Replace the drive.
23	Current collection circuit failure		The current collection circuit is faulty.	Replace the servo drive.
29	User torque Overload alarm		1. FA30 and FA31 parameters are unreasonable. An unexpectedly large load occurs.	1. Change parameters. Repair machinery.
42	AC input Voltage	When power off	1. Normal. The external AC	Check AC220V input.

Call the police code	Call the police name	Run state	Reason	Approach
	too low	Runtime	voltage input is too low.	
47	The main circuit voltage is too high when powering on		1. The external AC voltage input is too high. Main circuit failure.	1. Check AC220V input. Replace the drive.
50	Encoder Communication failure		The driver and encoder have not established a communication connection.	Connect the encoder cable and power on again.
51	Encoder Communication abnormality		After the encoder communication is established, an interruption occurs and the connection is disconnected.	Connect the encoder cable and power on again.
52	Encoder battery voltage low alarm		The encoder battery voltage is low and alarms. The information is not 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 wrong, and the encoder needs to be reset.	The encoder battery is exhausted and must be replaced.
54	Encoder Error alarm		The encoder is not a battery alarm, but the encoder needs to be reset.	Reset the encoder.
55	CRC check error 3 times in a row		The CRC check of data received through MODBUS communication has errors three times in a row.	Replace the drive.

Call the police code	Call the police name	Run state	Reason	Approach
56	MODBUS frame too long error		1. Communication protocol mismatch. Be disturbed.	1. Confirm the frame length. Add line filters to stay away from interference.
57	MODBUS communication format abnormality		1. Communication parameters are set improperly. The mailing address or value is incorrect.	Replace the drive.
58	single lap Wrong position value		The single-turn position offset value stored by the drive exceeds the encoder resolution.	Power on again and start.
59	Encoder Report CF error		The encoder continuously reports CF field errors, and the encoder needs to be reset.	Reset the encoder.

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