HKTRobot
恒科通机器人

Control/Drive/Industrial Automation

DL4S AC Servo Manual

Safety Precautions

Before storing, installing, wiring, operating, checking 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.
Notice	Improper operation may cause danger and result in personal injury or death, and may damage the equipment.
Prohibited	Strictly prohibited behavior is prohibited that could result in damage to the equipment or render it inoperable.

1.Using Occasions

Danger

1.It is prohibited to expose the product to places with moisture, corrosive gases, and flammable gases. Otherwise it will cause electric shock or fire.
2.Do not use the product in places with direct sunlight, dust,salt and metal powder.
3.It is prohibited to use the product in places where water, oil and medicine are dripping.

2.Wiring

Danger

1.Ensure that the grounding terminal is properly grounded. Improper 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 speed up and cause equipment damage and casualties.
4.Please tighten the power supply and motor output terminals, otherwise it may cause fire.

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3.Operation

Notice

1.When the mechanical equipment starts to operate, it must be set with the appropriate parameter values. If it is not adjusted to the appropriate setting value, it may cause the mechanical equipment to lose control or malfunction.
2.Before starting operation, please confirm whether the emergency switch can be activated at any time to shut down.
3.Please test whether the servo motor is running normally without load at 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 drive.

4.Running

Prohibited

1.When the motor is running, it is prohibited contact with any rotating parts, otherwise personal casualties may occur.
2.When the device in runtime, it is prohibited to touch the driver and motor, otherwise it may cause electric shock or burns.
3.When the device in runtime, it is prohibited to move the connecting cable, otherwise it may cause personal injury or equipment damage.

5.Maintenance and Inspection

Prohibited

1.Do not to touch the inside of the driver and 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.Within 5 minutes after the power is turned off, do not touch the terminals, otherwise residual high voltage may cause electric shock.
4.Do not 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, please do not use it on devices that may directly endanger personal safety.

CONTENT

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Chapter 1 Product Inspection and Installation

1.1 Product 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 drive and servo motor are damaged or scratched during transportation. If the product is damaged during transportation, do not connect the wiring to the power supply.
- Check the servo drive and servo motor for loose parts. Check for loose screws, unlocked screws, or loose screws.
- Check that the servo motor rotor shaft can rotate smoothly by hand. Motors with brakes cannot be rotated directly.
- Check that the servo operating instructions are included.
- Check that the drive accessories are included in the box.

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

1.2 Product Front Panel

This panel introduces applicable models: DL4S-0050—DL4S-1000

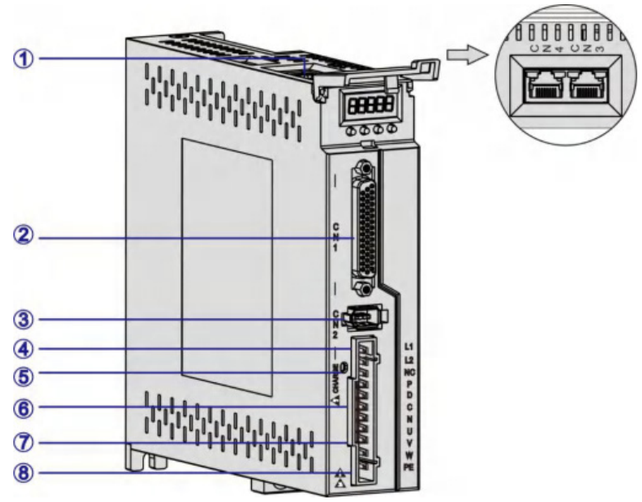


Figure 1.1 DL4S-0050—DL4S-1000 panel introduces applicable models

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	L1,L2	Main power input terminal.
⑤	CHARGE	Bus voltage indicator light.Used to indicate that the bus wcapacitor is charged. When the indicator is lighting, even if the main circuit power supply is turned off, the capacitor inside the servo unit may still be charged load. Therefore, do not touch the power terminals when the light is on to avoid electric shock.
⑥	P,D,C,N	Braking resistor connection terminal.
⑦	U,V,W	Servo motor connection terminals. Connect servo motor U, V, W phases.
⑧	PE	Ground terminal. Connect to the power supply and motor ground terminals for grounding processing.

This panel introduces applicable models: DL4S-1300—DL4S-2300

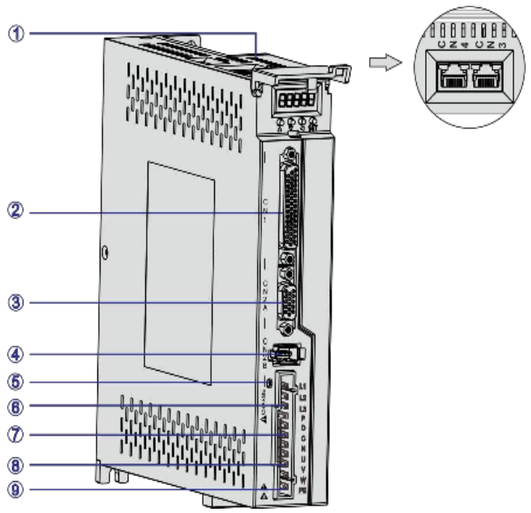


Figure 1.2 DL4S-1300—DL4S-2300 panel introduces applicable models

Serial Number	Terminal Name	Function Description
①	CN3,CN4	Communication terminal.
②	CN1	Input and output control signal terminals.
③	CN2A	Encoder signal terminal,connected to the incremental motor encoder.
④	CN2B	Encoder signal terminal,connected to the absolute motor encoder.
⑤	L1,L2,L3	Main power input terminal.
⑥	CHARGE	Bus voltage indicator light. Used to indicate that the bus capacitor is charged. When the indicator is lighting, even if the main circuit power supply is turned off, the capacitor inside the servo unit may still be charged load. Therefore, do not touch the power terminals when the light is on to avoid electric shock.
⑦	P,D,C,N	Braking resistor connection terminal.
⑧	U,V,W	Servo motor connection terminals. Connect servo motor U, V, W phases.
⑨	PE	Ground terminal. Connect to the power supply and motor ground terminals for grounding processing.

1.3 Servo Installation Method

1.3.1 Drive Installation Method

- Mounting Direction

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

- Installation and Fixation

  When installing, tighten the 2 M4 fixing screws on the rear of the servo drive.

- Grounding

  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.

- Routing requirements

  When wiring the driver, please route the cable downward (refer to the figure below) to prevent liquid from flowing into the driver along the cable if it is attached to the cable at the site.

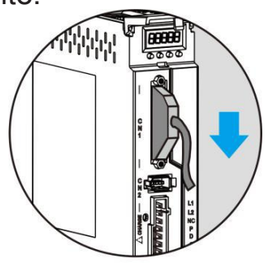


Figure 1.3 Schematic diagram of servo driver cable routing requirements

- Installation Interval

  Please refer to Figure 1.3 for the installation spacing between drives and between other devices. Note that the minimum dimensions marked on the figure are. To ensure the performance and life of the drive, please leave sufficient installation spacing as much as possible.

- Heat Dissipation

  The servo drive adopts both natural and forced cooling methods.

- Installation Precautions

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

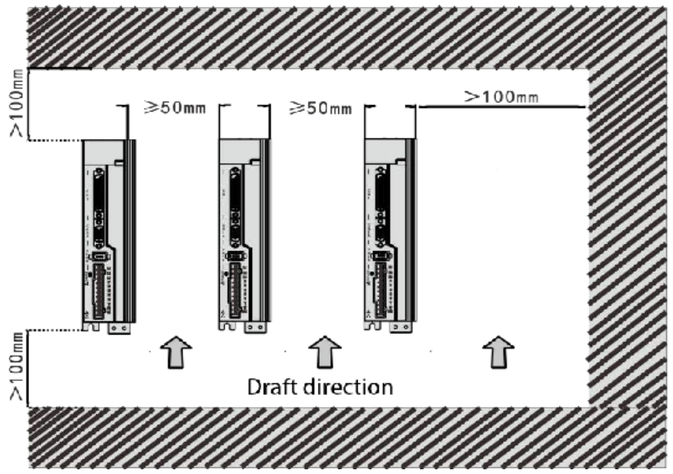


Figure 1.4 Installation Interval

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 below.
- Vertical installation: If the motor shaft is installed upwards and a reducer is attached, care must be taken to prevent oil stains in the reducer from penetrating 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 Motor rotation direction definition

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.

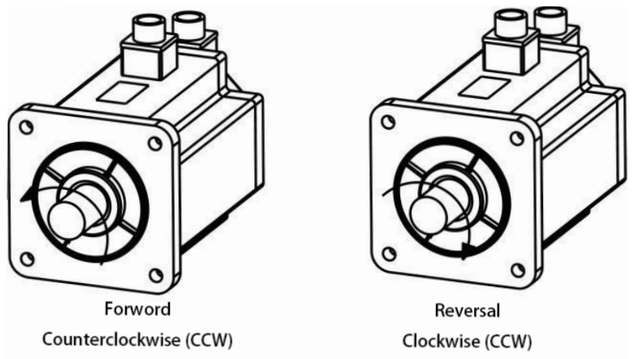


Figure 1.5 Motor rotation direction definition

Chapter 2 Servo Specifications

2.1 Servo drive specifications introduction

Model	DL4S-0050—DL4S-1000	DL4S-1300—DL4S-2300
Output Power	0.5KW - 1KW	1.3KW - 2.3KW
Main Circuit Intput Power	Simplex AC220V-15%~+10% 50/60Hz	
Control Method	0:Position control mode; 1:Speed control mode; 2:Torque control mode 3:Position and speed mixed Combined 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 driver disabled 4:CWdriver disabled 5:Deviation counter cleared 6:Command pulse disabled 7:C CWtorque limit 8:CW torque limit	
Control Output	Servo ready/servo alarm/positioning completed/mechanical brake	
Energy Consumption Braking	Supports built-in and external	
Applicable Load	Less than 3 times the motor inertia	
Display Operation	5 digits LED digital tube display,4 operating 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

Chapter 3 Driver and Motor Dimensions

3.1 Drive Size

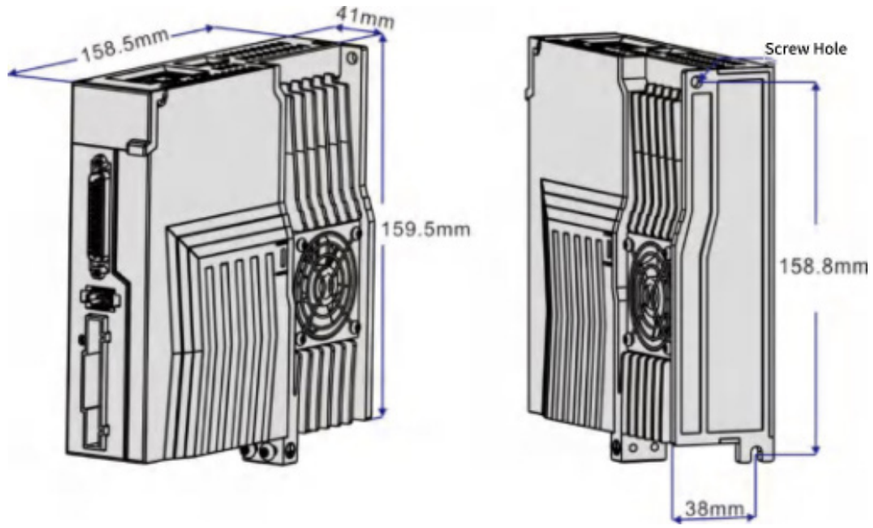


Figure 3.1 DL4S-0050—DL4S-1000 Series imensions

NOTE

◆ The base of the DL4S-0050—DL4S-1000 does not have a cooling fan.

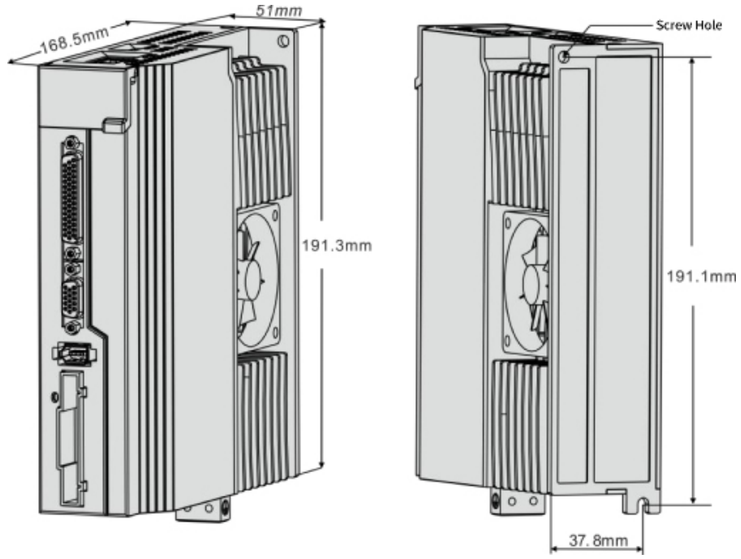
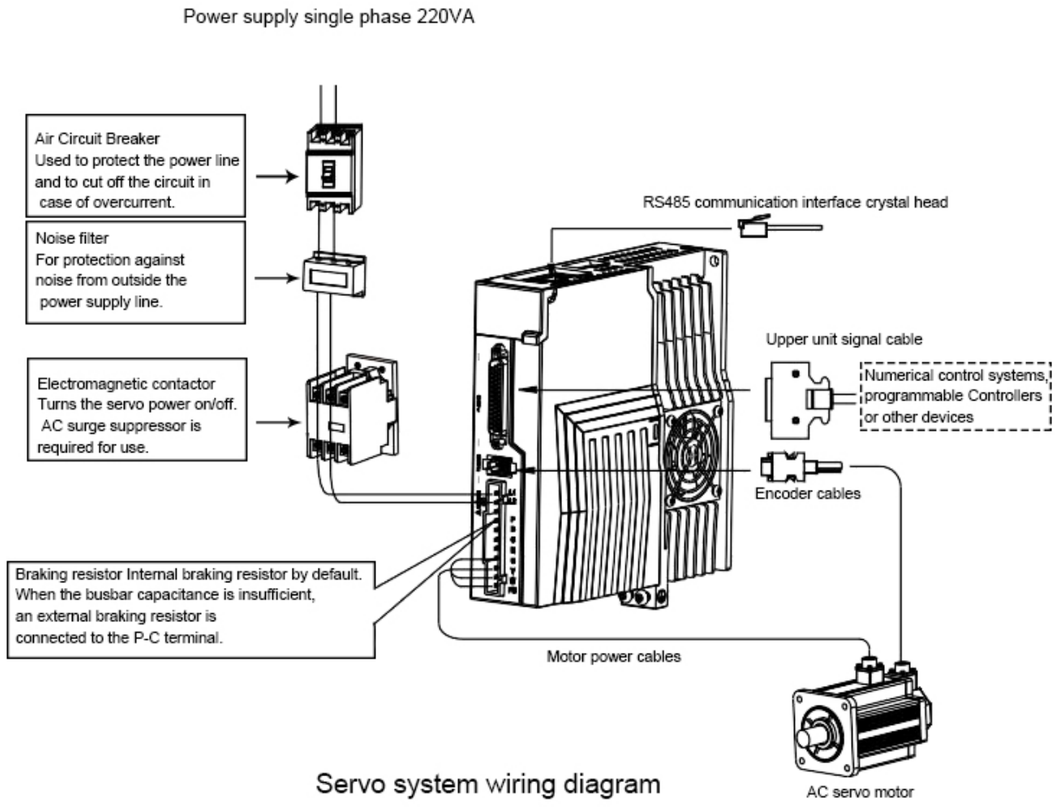


Figure 3.2 DL4S-1300—DL4S-2300 Series Dimensions

Chapter 4 Driver System Wiring and Composition

4.1 Servo System Wiring

4.1.1 Servo Drive Wiring Diagram



Servo system wiring diagram

4.1.2 Wiring Instructions

- Wiring precautions:
- Cable length is within 3m for command cable and 20m for encoder.
- Check that the power supply and wiring of L1 and L2, L3 are correct, and do not connect to a 380VAC power supply if the drive supports only single-phase 220VAC.

- The phase sequence of the motor output U, V, W terminals must correspond to the corresponding terminals of the driver one by one, and the wrong motor may not rotate or fly. The motor cannot be reversed by switching the three-phase terminals, which is different from the asynchronous motor.
- Since the servo motor flows high-frequency switching current, the leakage current is relatively large, and the motor ground terminal must be connected to the servo drive ground terminal PE and well grounded.
- The direction of the diode used to absorb the relay installed in the relay that outputs the signal must be connected in the correct direction, otherwise it will cause malfunction and fail to output the signal.
- To prevent false operation caused by noise, install an insulating transformer and a noise filter on the power supply.
- Please route power wires (motor wires, power supply wires, etc. strong current circuits) and signal wires 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 Specification

Connection Terminal	Symbol	Wire Specifications
Main Circuit Power Supply	L1,L2,L3	1.5~4mm^2
Motor Connection Terminal	U,V,W	1.5~4mm^2
Ground Terminal	⏚	1.5~4mm^2
Control Signal Terminal	CN1	≥0.14mm²(AWG26), including shielded wire
Encoder Signal Terminal	CN2	≥0.14mm²(AWG26), including shielded wire
Braking Resistor Terminals	P,D/P,C	1.5~4mm^2

NOTE

◆ The encoder cable must be twisted pair. If the encoder cable is too long (> 20m), will lead to insufficient power supply of the encoder, its power and ground can be multi-wire connection or use thick wires.

4.2 Terminal Pin Distribution Diagram

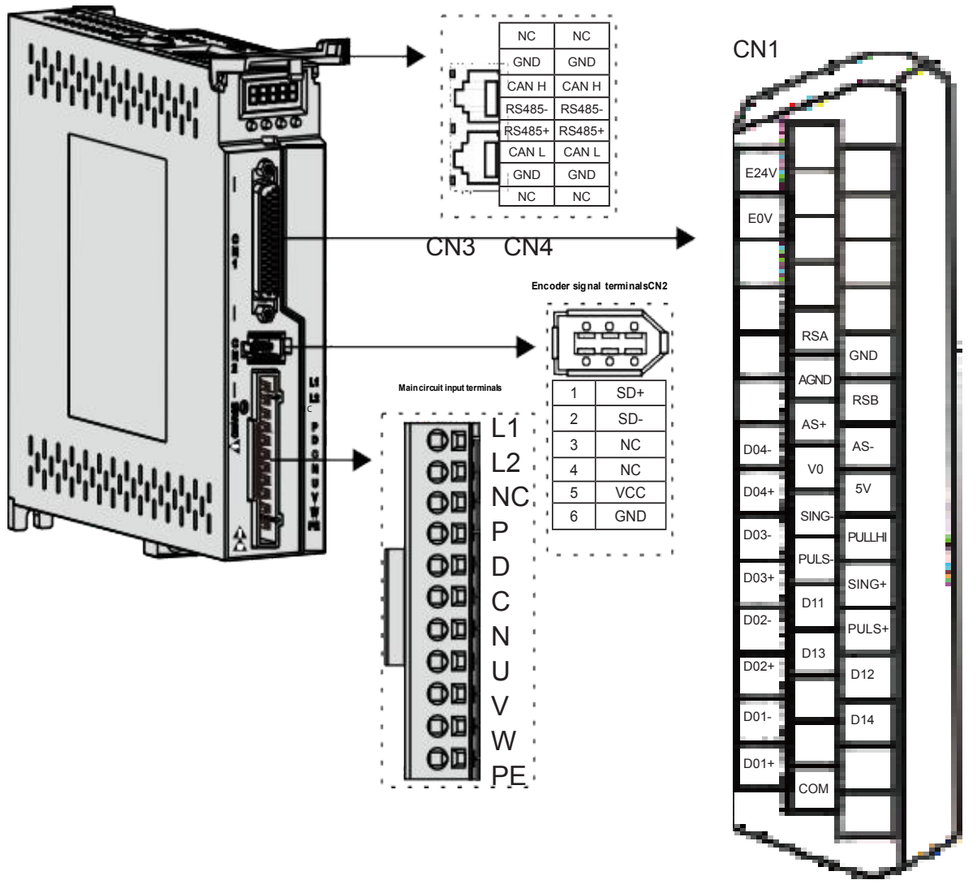


Figure 4.1 DL4S-0050—DL4S-1000 terminal pin distribution diagram

NOTE

◆ The above figure shows the pin arrangement of the terminal that comes with the driver body.

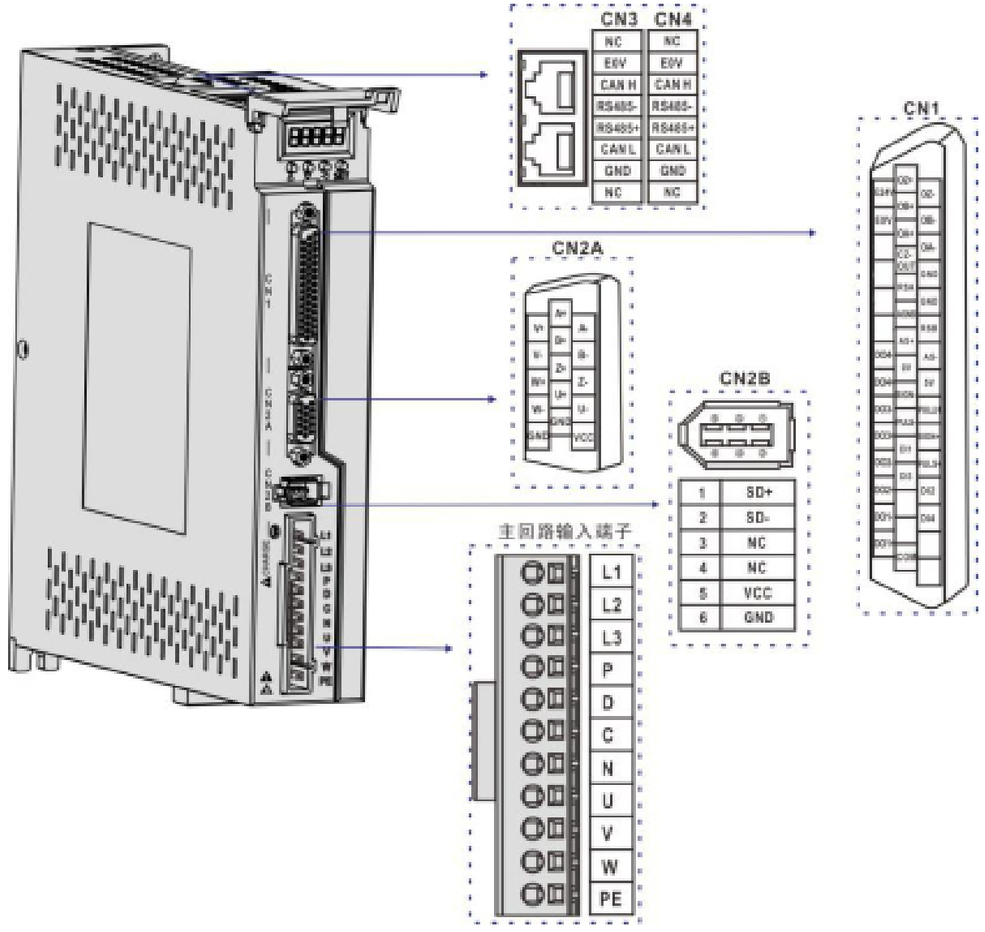


Figure 4.2 DL4S-1300—DL4S-2300 terminal pin distribution diagram

NOTE

◆ The above figure shows the pin arrangement of the terminal that comes with the driver body.

4.3 Servo Drive Main Circuit Connection

4.3.1 Main circuit terminal introduction

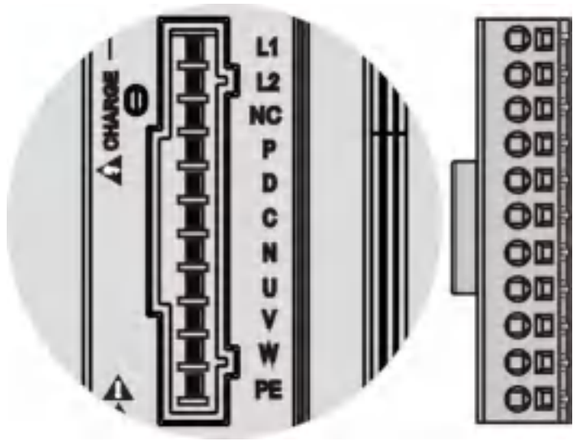


Figure 4.3 DL4S-0050—DL4S-1000 Main circuit terminal pin distribution

Name	Terminal Symbol	Detailed Description
Main Circuit Power Input Terminal	L1, L2	Single phase 220VAC-15%~+10%,50/60 Hz
	NC	Empty end
Braking Resistor Terminals	P.D.	When using the internal braking resistor, short-circuit P and D
	P.C.	When an external brake resistor is used, the P and D are short-circuited, and then the external brake resistor wires are connected between P and C respectively. P and N cannot be connected.
Motor Connection Terminal	U, V, W	Connect to the U,V,W phases of the servo motor.
	⏚	Driver ground terminal,connected to the power supply and motor ground terminals.

NOTE

◆ Factory default internal braking resistor connection: P and D are shorted.

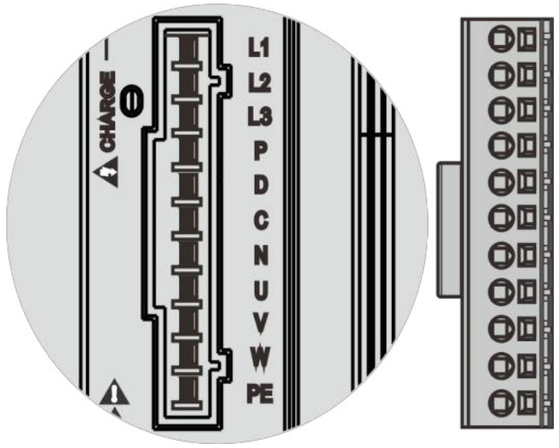


Figure 4.4 DL4S-1300—DL4S-2300 Main circuit terminal pin distribution

Name	Terminal Symbol	Detailed Description
Main Circuit Power Input Terminal	L1、L2	Single phase 220VAC-15%~+10%,50/60 Hz
	L1、L2、L3	Three-phase 220VAC-15%~+10%, 50/60Hz
Braking Resistor Terminals	P.D.	When using the internal braking resistor, short-circuit P and D
	P.C.	When an external brake resistor is used, the P and D are short-circuited, and then the external brake resistor wires are connected between P and C respectively. P and N cannot be connected.
Motor Connection Terminal	U,V,W	Connect to the U,V,W phases of the servo motor.
	⏚	Driver ground terminal,connected to the power supply and motor ground terminals.

NOTE

◆ Factory default internal braking resistor connection: P and D are shorted.

4.3.2 Braking Resistor Wiring Instructions

If the internal braking resistor is used, the driver should short-circuit P and D, so it can be used normally according to the factory condition, 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:

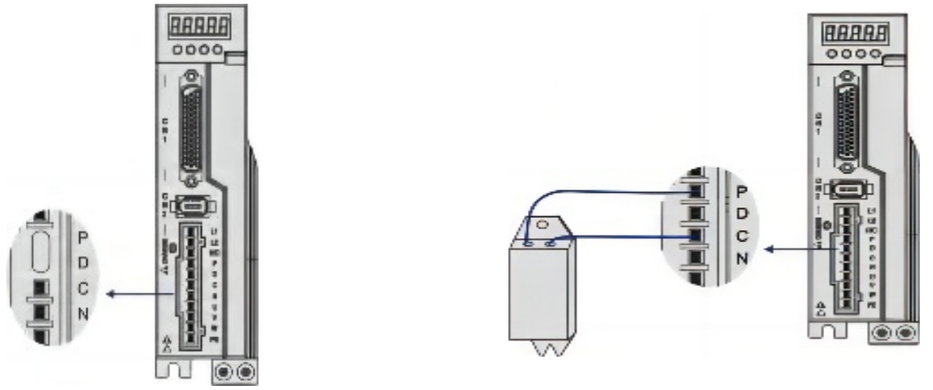


Figure A Figure B

Figure 4.5 DL4S-0050—DL4S-1000 Braking resistor wiring

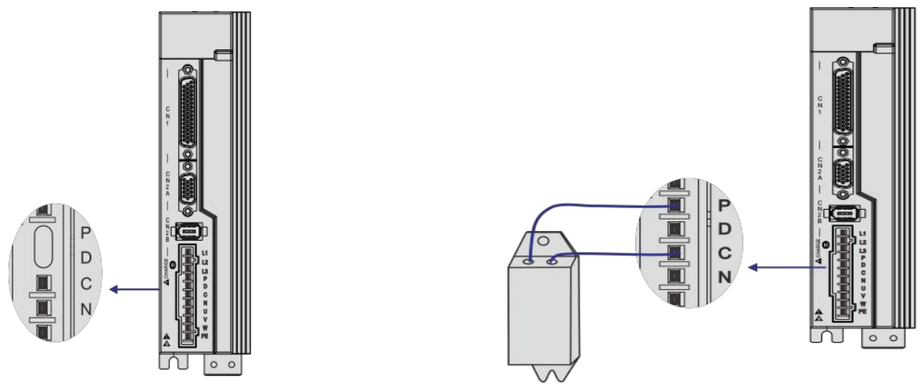


Figure A Figure B

Figure 4.6 DL4S-1300—DL4S-2300 Braking resistor wiring

NOTE

Brake resistor wiring precautions:

- ◆ Do not connect the external braking resistor to the positive and negative terminals P and N of the busbar, otherwise it will blow up the machine and cause a fire;
- ◆ Do not use less than the minimum allowable resistance value of 25Ω, as this may cause an alarm or damage to the driver;
- ◆ Please install the external braking resistor on non-combustible materials such as metal.

4.4 CN1 Control Signal Terminal

4.4.1 CN1 Control Signal Terminal Description

CN1 The control signal terminals provide the signals required for connection to the host controller, using DB44 sockets, the signals are included:

- 4 Programmable Inputs
- 4 Programmable Outputs
- Analog Command Input
- Command Pulse Input

4.4.2 CN1 Terminal Connector Pinout Diagram

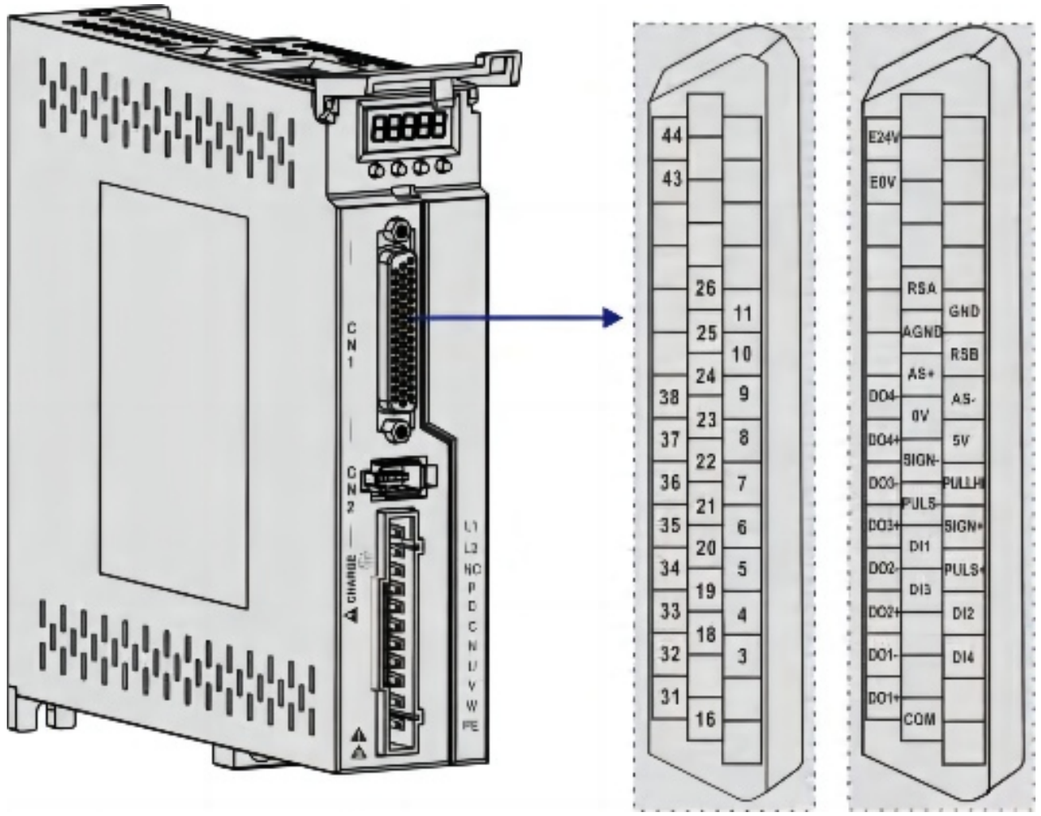


Figure 4.7 DL4S-0050—DL4S-1000 Driver CN1 terminal connection pin distribution diagram

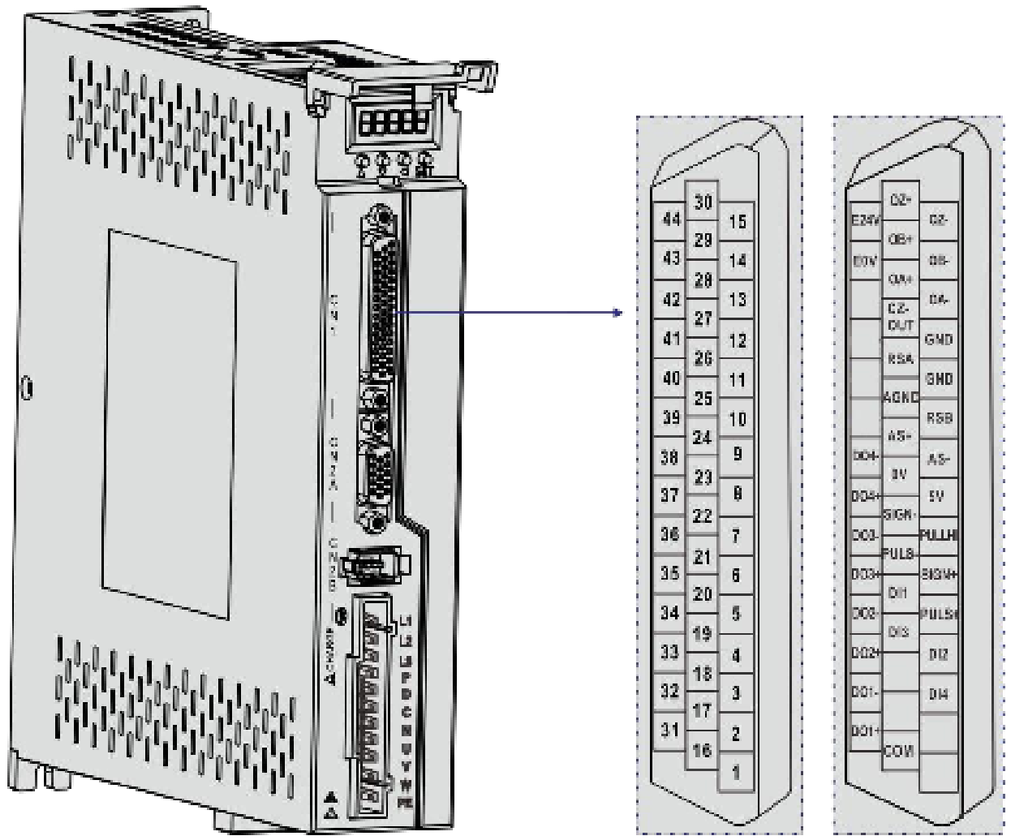


Figure 4.8 DL4S-1300—DL4S-2300 Driver CN1 terminal connection pin distribution diagram

NOTE

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

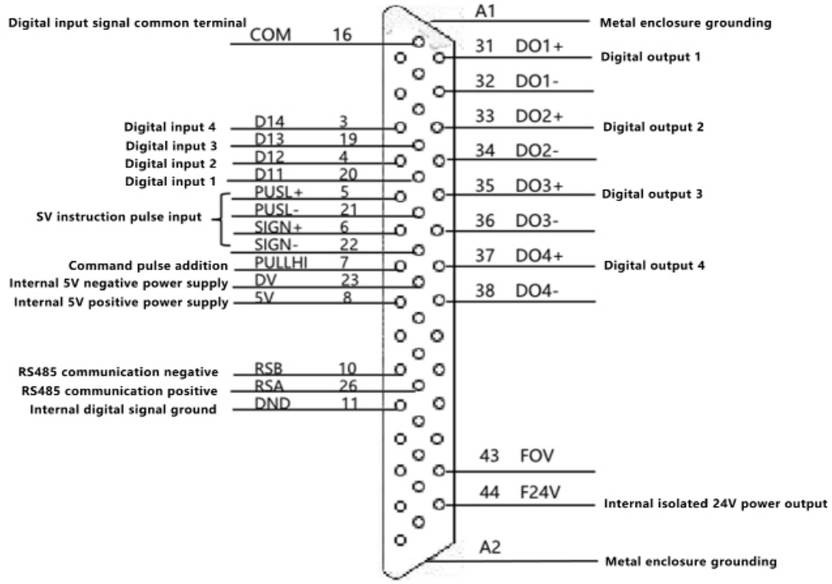


Figure 4.9 Driver CN1 terminal pin diagram

4.4.3 Position Command Input Signal Description

Signal Name		Pin Number	Function
Position Pulse Command	PULS+	5	High-speed photoelectric isolation input, PA14 parameter setting of working mode: 1、Pulse +Direction 2、CCW/CW Pulse 3、A,B two-phase quadrature pulse input 4、Internal position control input
	PULS-	21	
	SIGN+	6	
	SIGN-	22	
	PULLHI	7	External 24V power input connector for command pulses
	GND	11	Internal digital signal ground

The command pulse output circuit on the upper unit side can be selected from two types: differential driver output or open collector output.

The maximum input frequency and minimum pulse width are shown in the table below:

Pulse Mode	Maximum Frequency (pps)	Minimum pulse width (us)
Differential	500k	1
Open Collector	200k	2.5

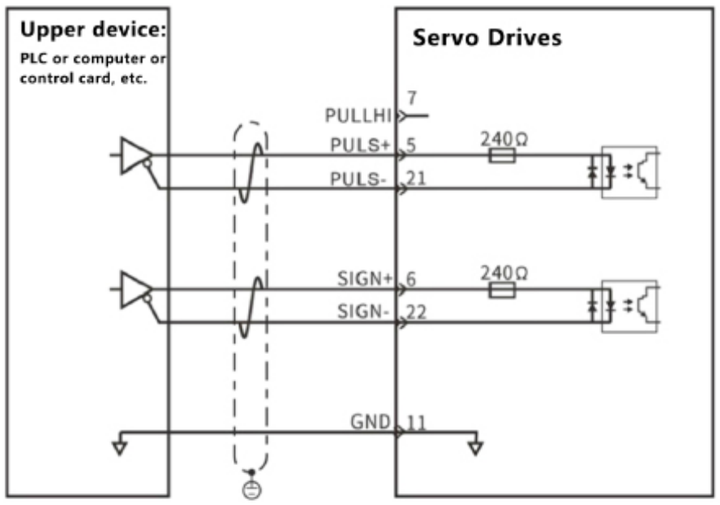
NOTE

- An output pulse width of the upper unit that is less than the minimum pulse width value will cause the driver to receive pulses incorrectly.
- The ports between PULS+ and PULS- and between SIGN+ and SIGN- only support signal level inputs up to 5V, signals above 5V must be connected in series with an external resistor, otherwise the driver will be damaged.

Pulse Command Input Circuit Schematic

1) Differential Mode

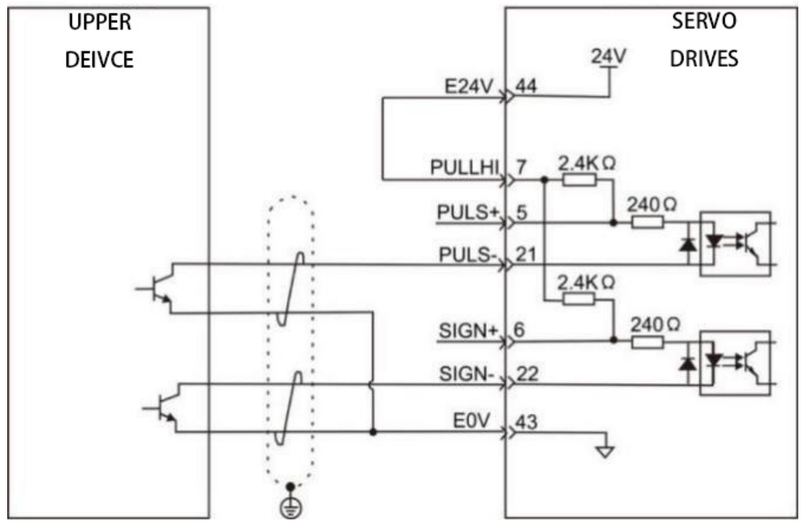
Type A wiring:



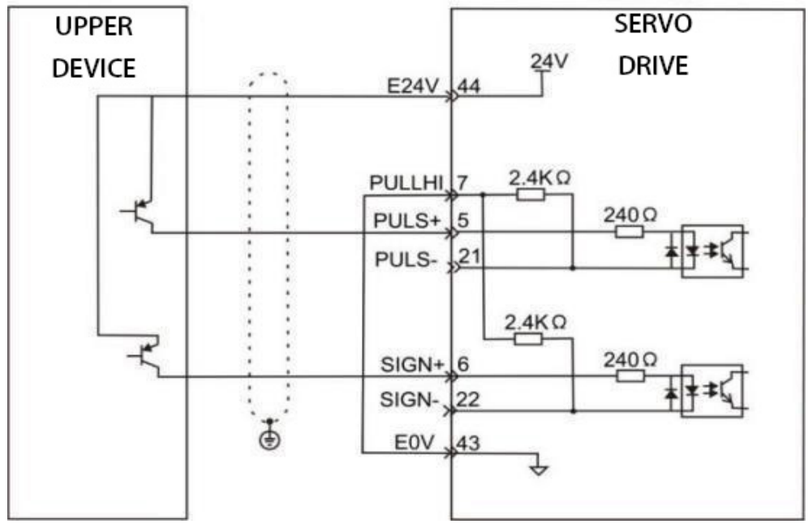
2) Open Collector Mode

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

- Common Anode Connection Method, such as: Mitsubishi PLC.



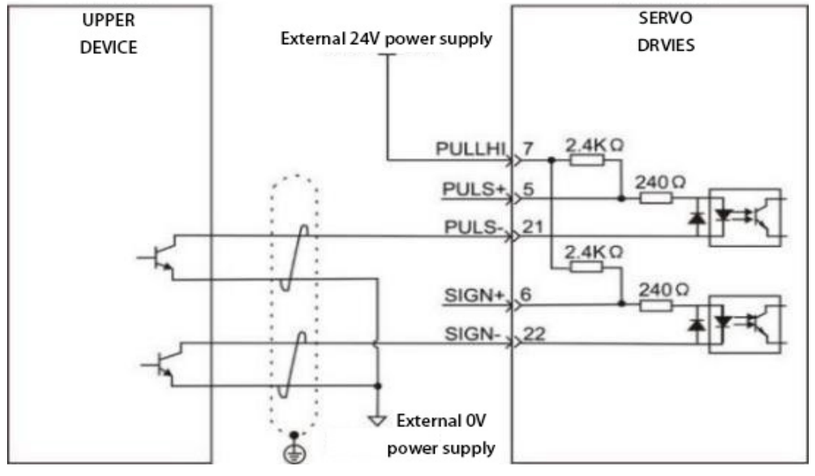
- Common Cathode Connection Method: For example: Siemens PLC.



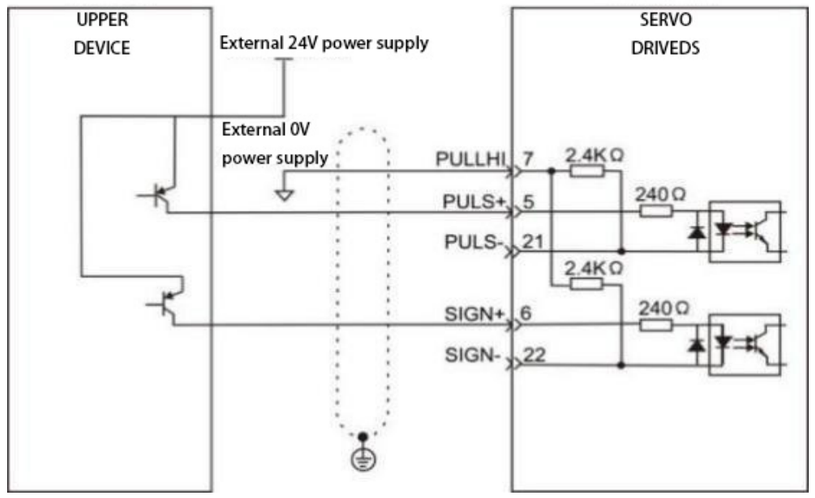
B) When using an external power supply:

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

- Common Anode Connection Method:

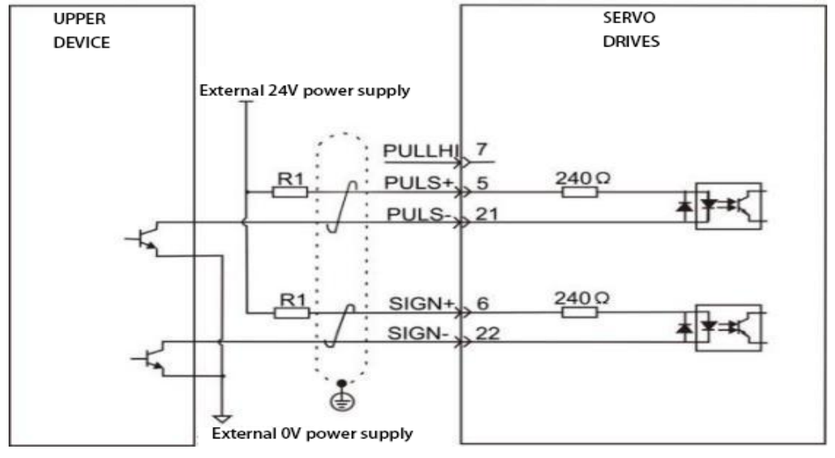


- Common Cathode Connection Method:



Solution 2: Use driver external resistor.

- Common Anode Connection Method:



- Common Cathode Connection Method:

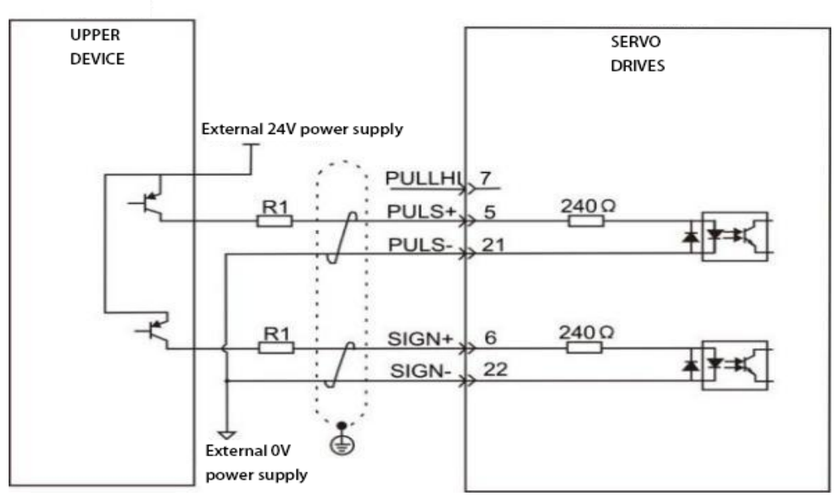


Figure 4.4.3 Recommended R1 Resistor

NOTE

◆ The selection formula of resistor R1:

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

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

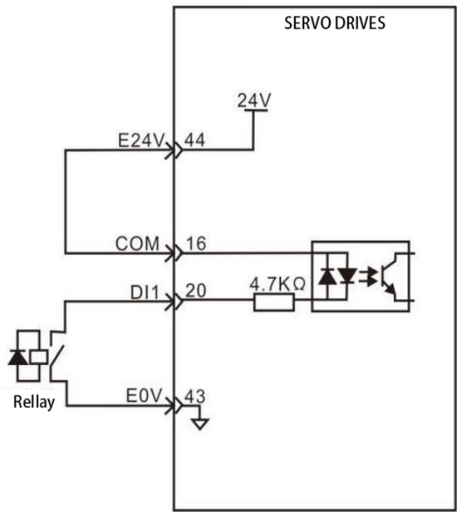
Signal Name		Pin Number	Default Function	Instruction
Digital Input	DI1	20	Servo Enable	Photoelectric isolation input programmable function, defined by P3 group parameters P3-0~P3-17. Note:The COM terminal is a common anode or common cathode interface, and the input level is12V-24V. In positionmode (internal position mode) and non-position mode, 24V is connected to pin 7, DI5 is connected topin 21, DI6 is connected to pin 22; or 0V is connected to pin 7, DI5 is connected to pin 5, DI6 is connected to pin 6.
	DI2	4	Alarm Clear	
	DI3	19	Forward Drive Prohibted	
	DI4	3	Reverse Drive Prohibted	
	PULS-	21	In Position Mode (Interna Position Mode)and Non-Positio Mode	
	SIGN-	22		
	PULS+	5		
	SIGN+	6		
	PULLHI	7		
	COM	16	Digital Input Signal Common Terminal	
Digital Output	DO1+	31	Z Signal Output	Photoelectric isolation output programmable function,defined by P3 group parameters P3-20~P3-23. Note:When PA104 is set to 1, P3-24 is a programmable differential output port.
	DO1-	32		
	DO2+	33	Alarm Output	
	DO2-	34		
	DO3+	35	Positioning Completed	
	DO3-	36		
	DO4+	37	Electromagnetic Brake	
	DO4-	38		
	DO5+/ RSA	26	Z signal Differential Output	
	DO5-/ RSB	10		
Intemal Power Ouput	0V	23	Internal 0V	Intenal 5V power output, maximum output current 200mA.
	5V	8	Intenal 5V	
Intemal Isolation Power Output	E7V	43	Internal 0V	Internal isolated 24V power supply output, voltage range 20V~28V maximum output current 100mA.
	E24V	44	Internal 24V	

- **Digital Input Circuit Diagram**

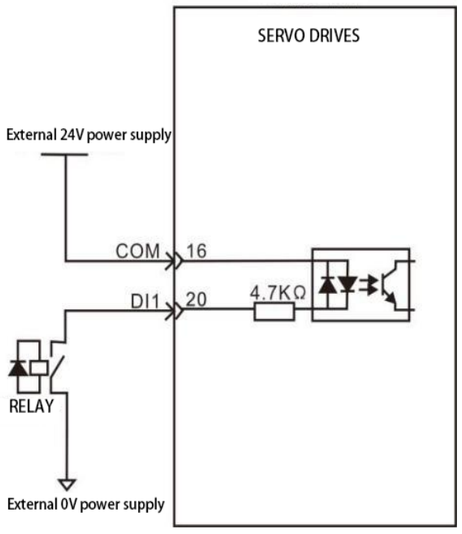
Take DI1 as an example, DI1~DI4 interface circuits are the same.

1) When the upper unit is a relay output.

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

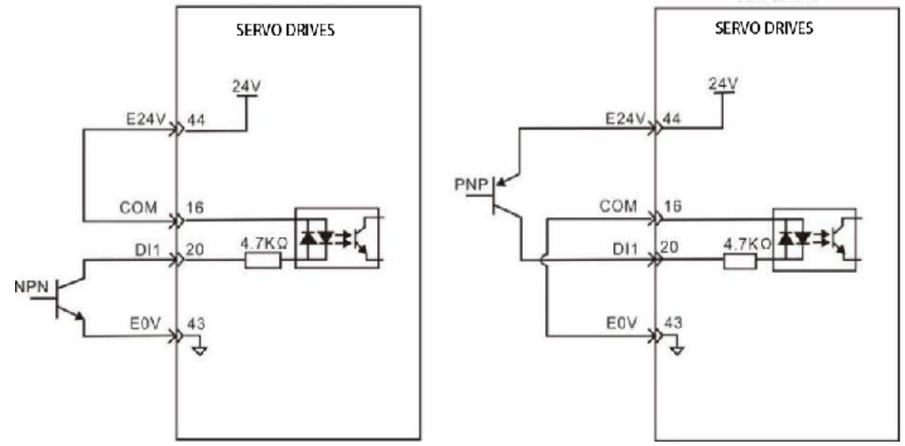


B) When using external 24V power supply:

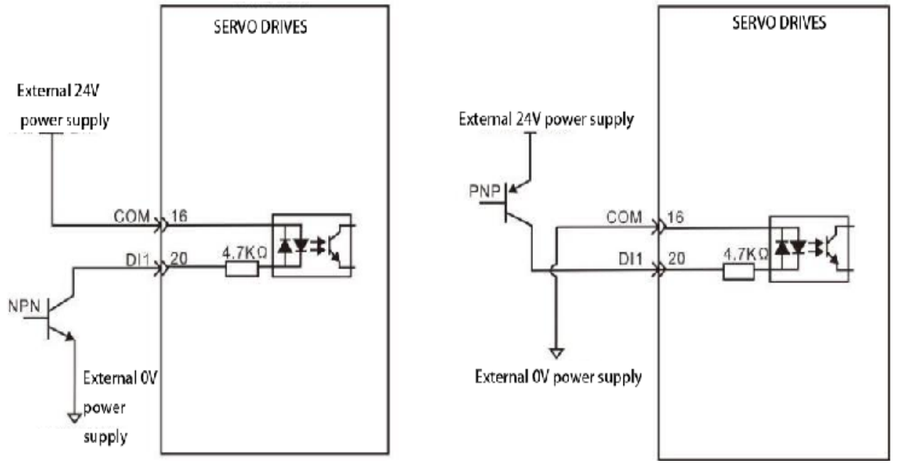


2)When the upper device is an open collector output.

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



B) When using external 24V power supply:



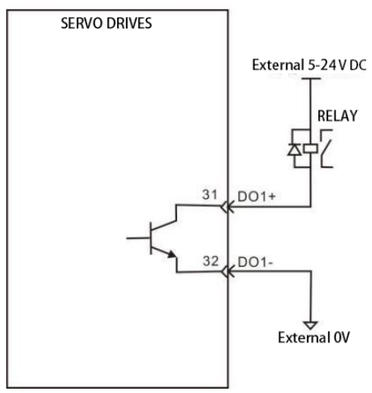
NOTE

Notice:
◆ It's not supported mixed use of PNP and NPN inputs.

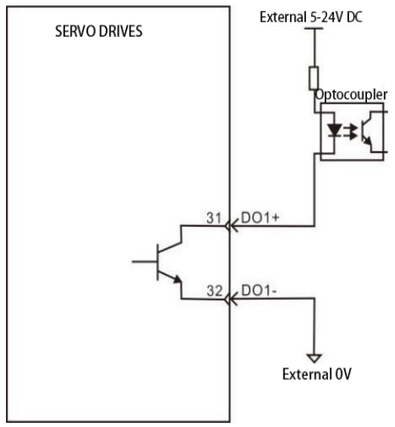
- **Digital Output Circuit Diagram**

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

1) When the upper device is a relay input:



2) When the upper unit is an optocoupler input:



NOTE

◆ When the upper unit is a relay, be sure to connect a current-continuing diode, otherwise the DO port may be damaged or strong signal interference may result.

◆ The maximum allowable voltage and current capacity of the servo driver's internal optocoupler output circuit is as follows:

■ Voltage: DC30V

■ Current: DC50mA

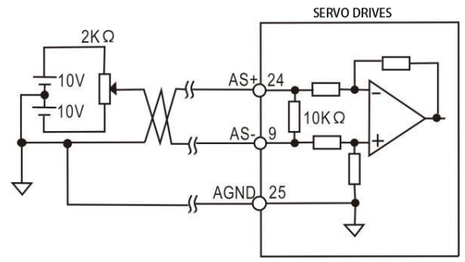
4.4.5 Analog Command Signal Description

Signal Name		Pin Number	Function
Analog Command Input	AS+, AT+	24	Analog input for speed/torque, range:-10V~+10V.
	AS-, AT-	9	
	AGND	25	

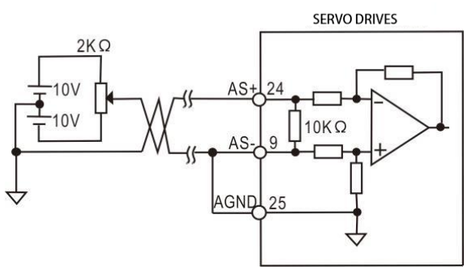
Pulse Command Input Interface Diagram

Differential input and single-ended input are available, and differential input is recommended. The speed and torque share a common analog input with a range of -10V ~ +10V and an input impedance of about 10KΩ. Zero bias in the analog input is normal and can be compensated for by the parameters.

1)When analog differential input:



2) When it is an analog single-ended input:



4.4.6 Brake Wiring instructions

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

Schematicof Brake Signal Circuit Figure

The connection of the lock input signal has no polarity, and the user needs to prepare 24V power supply. An example of a standard connection between the lock signal BK and the lock power supply is shown below:

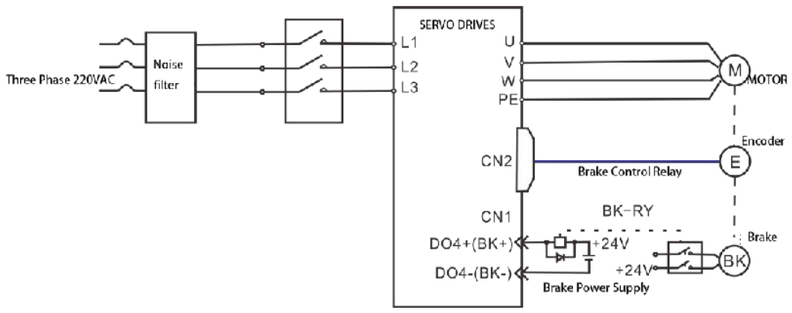


Figure 4.10 Brake signal wiring figure

Notice:

- ◆ The brake mechanism built into the servo motor is a non-energized fixed dedicated 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.
- ◆ The servo on signal (Servo On) should be cut off after the servo motor stops.
- ◆ When the motor with built-in holding brake is running, the holding brake may make a clicking sound, which has no effect on the function.
- ◆ When the 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 as accessories to the motor.

- ◆ It is forbidden to share the power supply with other electrical appliances to prevent the voltage or current from decreasing due to the operation of other electrical appliances, which may eventually cause the brake to malfunction.
- ◆ Recommended for cables of 0.5mm² or more.

4.5 CN2、CN2A and CN2B Encoder Signal Terminal

4.5.1 CN2 Terminal Plug Diagram

CN2 Encoder signal terminal and motor encoder connection figure.

The terminals for the encoder use 6PIN sockets and it's appearance and pinout as follows:

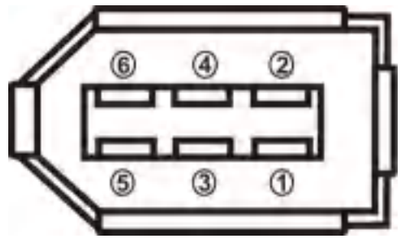


Figure 4.11 CN2 Encoder signal terminal

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 multi-wired 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	Reservations
Empty End	NC	4	Reservations
Shielded Wire Protective Ground	Plugs Metal Shell		Connect the encoder wire shield

4.5.2 CN2A Terminal Plug Diagram

CN2A Encoder signal terminal and motor encoder connection figure.

The terminals for the encoder use 15PIN sockets and it's appearance and pinout as follows:

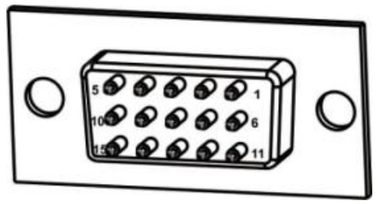


Figure 4.12 CN2A Encoder signal terminal

Signal Name		Pin Nmber	FUNCTION
Encoder signal power supply	5V	5	The encoder uses 5V power supply (provided by the driver). When the cable is above 20m, in order to prevent the encoder voltage from decreasing, the power supply and ground wire can be connected by multiple wires or use thick wires.
	GND	10	
		15	
Encoder A phase input	A+	6	Connected to the encoder A phase output
	A-	1	
Encoder B phase input	B+	7	Connected to the encoder B phase output
	B-	2	
Encoder Z phase input	Z+	8	Connected to the encoder Z phase output
	Z-	3	
Encoder U phase input	U+	9	Connected to the encoder U phase output
	U-	4	
Encoder V phase input	V+	11	Connected to the encoder V phase output
	V-	12	
Encoder W phase input	W+	13	Connected to the encoder W phase output
	W-	14	
Shielded wire protection ground	Plugs Metal Shell		Connect the encoder wire shield

4.5.3 CN2B Terminal Plug Diagram

CN2B Encoder signal terminal and motor encoder connection figure.

The terminals for the encoder use 15PIN sockets and it's appearance and pinout as follows:

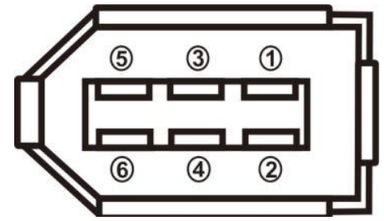


Figure 4.13 CN2B Encoder signal terminal

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 multi-wired 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	Reservations
Empty End	NC	4	Reservations
Shielded Wire Protective Ground	Plugs Metal Shell		Connect the encoder wire shield

4.6 CN3 and CN4 Communication Interface

4.6.1 Communication Port Wiring Diagram

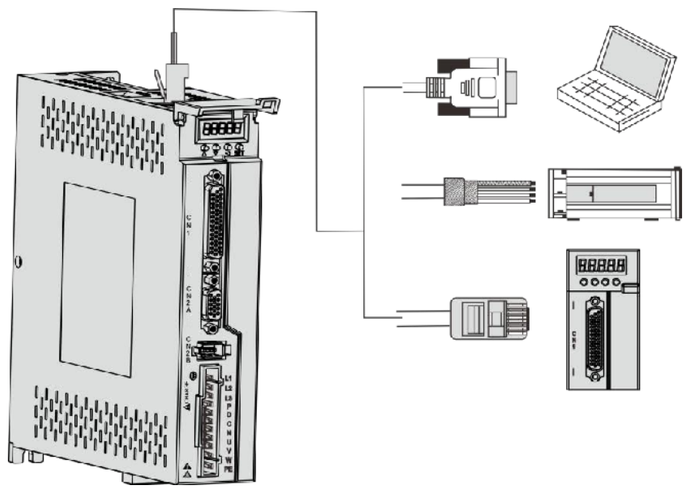
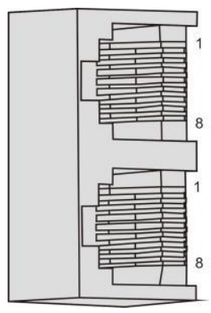


Figure 4.14 Communication port wiring diagram

4.6.2 Communication Port Pin Definition Description

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

pin number	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	485 Signal Ground	GND	485 Signal Ground	
8	NC	Empty End	NC	Empty End	

NOTE

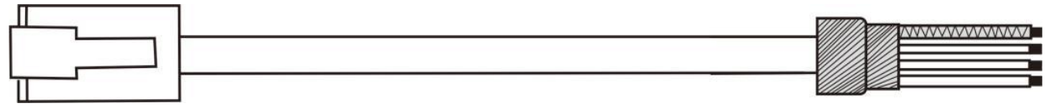
Notice:

- It can be connected to a PC or host computer controller through a special serial cable, and is not allowed to be plugged or unplugged with electricity.
- It is recommended to use a twisted pair or shielded cable with a length of less than 2 meters.
- When multiple machines are connected in series, CN3 is connected to CN4 of the previous drive and CN4 is connected to CN3 of the next drive.
- When using RS485 bus communication, 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 earth. Driver 485 signal ground (GND), otherwise the driver may be damaged.

4.6.2 485 Communication Network Connection Instructions

1. 485 communication connection with PLC

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



A B

Figure 4.15 Servo drive and PLC communication cable schematic diagram

Driver Side RJ45(Side A)		PLC Side(B Side)	
Signal Name	Pin Number	Signal Name	Pin Number
RS485+	5	RS485+	5
RS485-	4	RS485-	4
GND	7	GND	7
PE(Shielded mesh layer)	Clamshell	PE(Shielded mesh layer)	Clamshell

Table 4-2 Servo driver and PLC communication cable pin connection relationship

2. 485 communication connection of multiple parallel connection

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

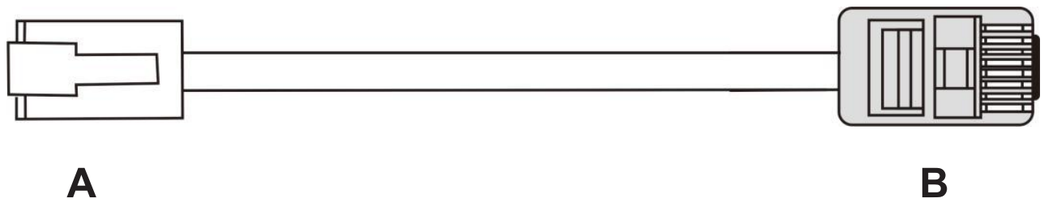


Figure 4.16 Servo drive multi-machine parallel cable schematic diagram

Driver Side RJ45(Side A)		PLC Side(B Side)	
Signal Name	Pin Number	Signal Name	Pin Number
RS485+	5	RS485+	5
RS485-	4	RS485-	4
GND	7	GND	7
PE(Shielded mesh layer)	Clamshell	PE(Shielded mesh layer)	Clamshell

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

3.485 Communication Grounding Precautions

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

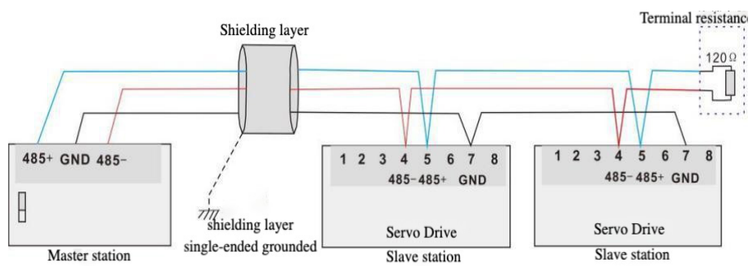


Figure 4.17 485 communication connection diagram

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

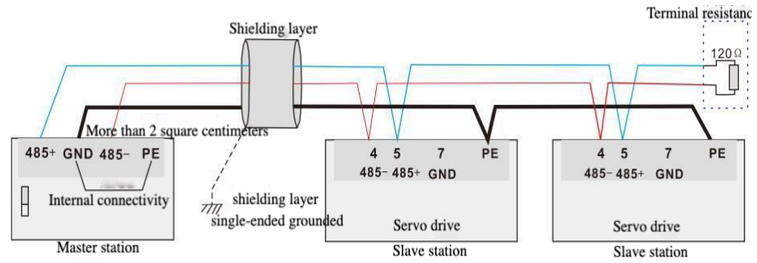


Figure 4.18 485 Communication grounding diagram

NOTE

Notice:
- ◆ The PLC has a built-in 485 communication terminal resistor.
- ◆ It is recommended that the shielding layer be grounded at one end.
- ◆ Do not connect the GND terminal of the host device 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 adopted:

  1) Install the upper unit as well as the noise filter as close to the servo drive as possible.

2) Install surge suppressors on the coils of relays, solenoids, and electromagnetic contactors.

3) When wiring, separate 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.

4) Do not share the power supply with welding machines, electrical discharge machining 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. Examples of Anti-Interference Wiring

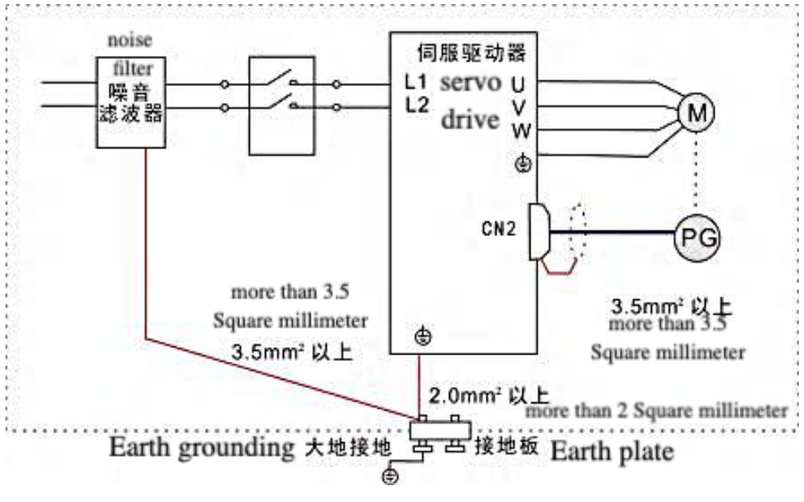


Figure 4.19 DL4S-0050—DL4S-1000 Examples of anti-interference wiring

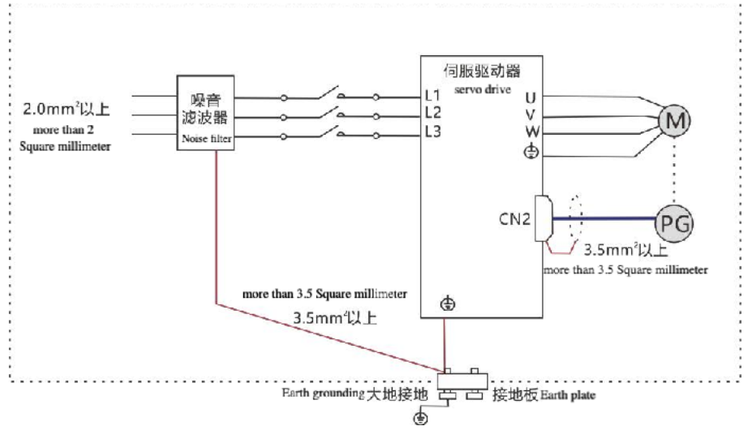


Figure 4.20 DL4S-1300—DL4S-2300 Examples of anti-interference wiring

NOTE

Notice:
- ◆ The outer box connection wire used for grounding should be thicker than 3.5mm² as much as possible, and braided copper wire is recommended.
- ◆ When using the 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 the servo motor housing

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

2) Encoder Cable Shield Grounding

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

4.7.2 Method of using noise filter

In order to prevent the interference of the power line and weaken the influence of the servo driver on other sensitive devices, select the corresponding noise filter at the power input end according to the size of the input current. In addition, install a noise filter at the power line of the peripheral device if necessary. When installing and wiring the noise filter, please observe the following precautions to avoid weakening the actual use effect of the filter.

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

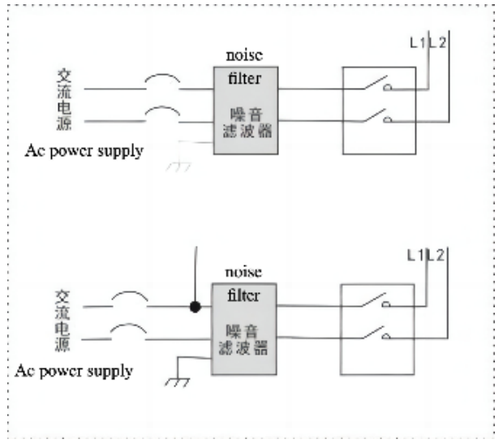


Figure 4.21 DL4S-0050—DL4S-1000 Noise Filter Input and Output Wiring Separation Diagrams

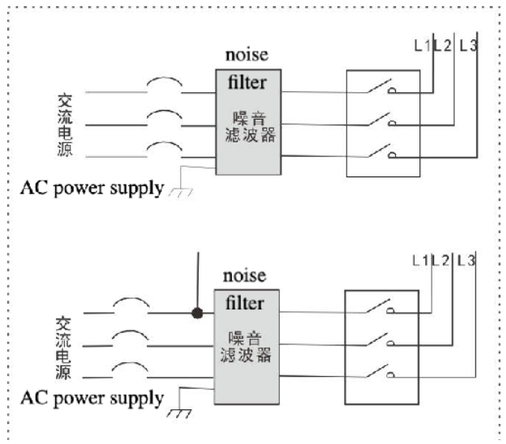


Figure 4.22 DL4S-1300—DL4S-2300 Noise Filter Input and Output Wiring Separation Diagrams

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

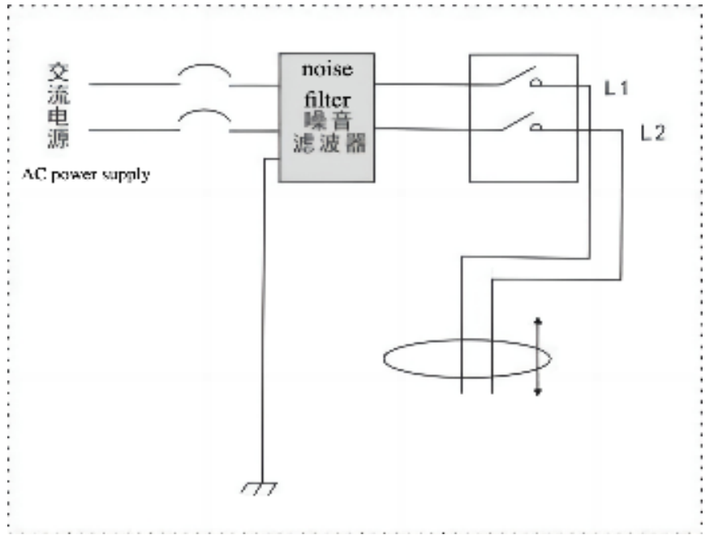


Figure 4.23 DL4S-0050—DL4S-1000 Noise filter ground and output wiring diagram

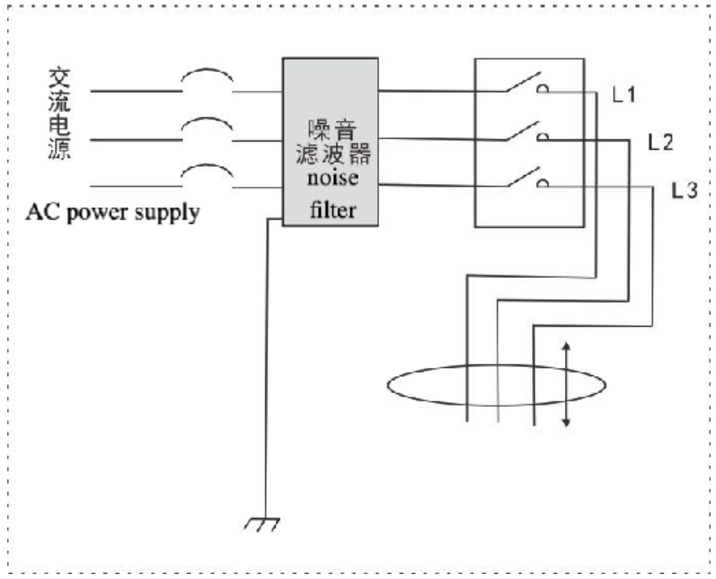


Figure 4.24 DL4S-1300—DL4S-2300 Noise filter ground and output wiring diagram

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

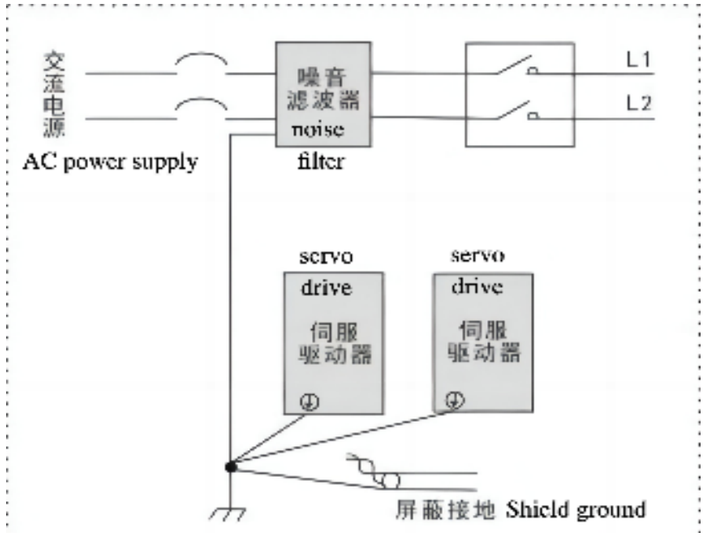


Figure 4.25 DL4S-0050—DL4S-1000 Single point grounding diagram

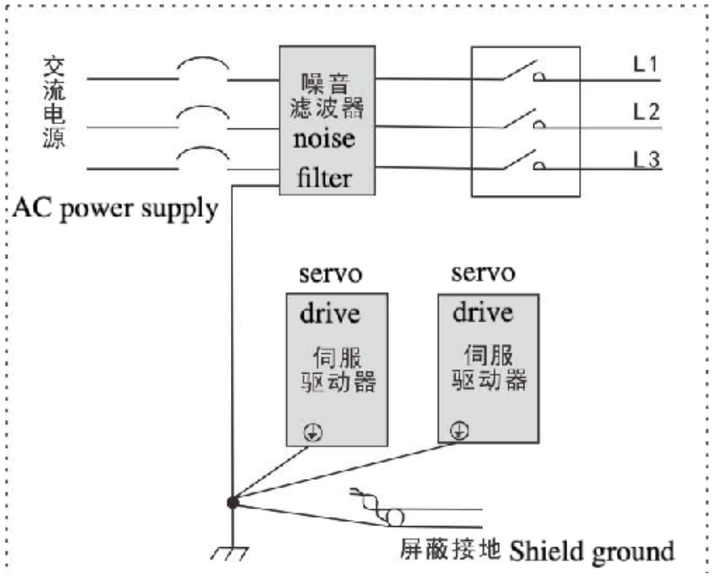


Figure 4.26 DL4S-1300—DL4S-2300 Single point grounding diagram

- 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 well overlapped, and ground the metal plate.

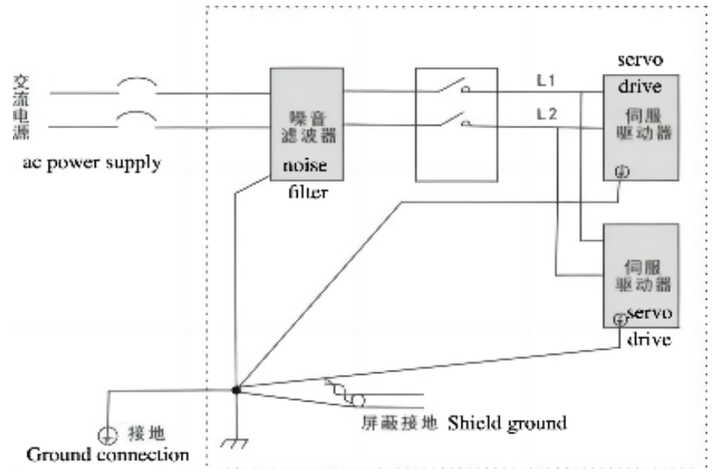


Figure 4.25 DL4S-0050—DL4S-1000 Noise Filter Ground Handling Schematic

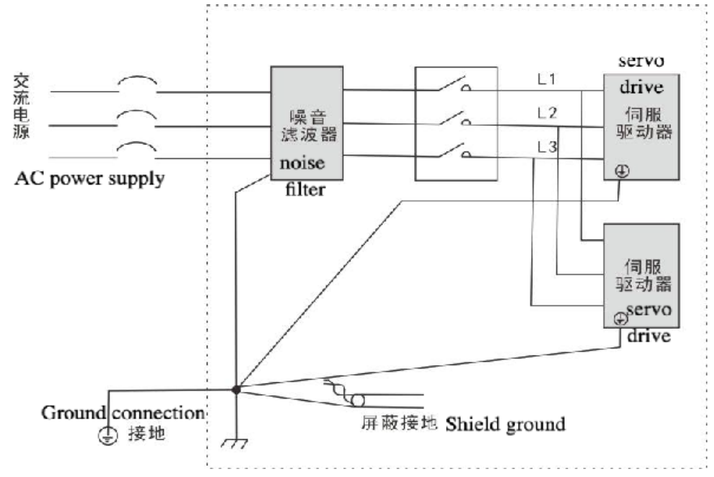


Figure 4.26 DL4S-1300—DL4S-2300 Noise Filter Ground Handling Schematic

Chapter 5 Operation Mode and Control Wiring Diagram

According to the command mode and operation characteristics of servo drives, they can be categorized into three operation modes: position control operation mode, speed control operation mode, 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.
- The torque control mode is to control the torque through the analog quantity giving, digital quantity giving and communication giving. It is mainly used in the winding and unwinding devices which have strict requirements on the force of the material, such as the winding device or fiber pulling equipment and other tension control occasions. The torque setting should be changed at any time according to the change of the winding radius to ensure that the force of the material will not change with the change of the winding radius.

5.1 Position Control Mode

5.1.1 Position Mode Description

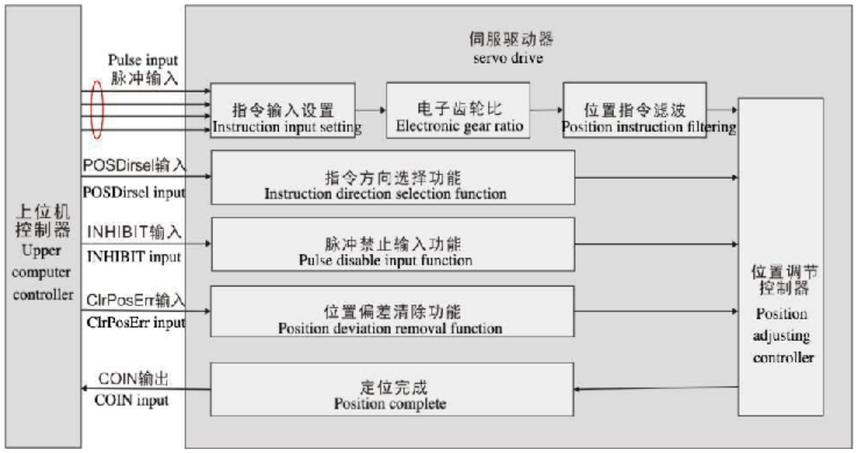


Figure 5.1 Position control mode diagram

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“ ”, which means the servo power supply and encoder wiring are correct.
2) Perform a servo JOG test run by pressing the key to confirm that the motor can operate normally.
3) Refer to Figure 5.2 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) The servo is enabled to control the rotation of the servo motor by sending position commands from the host computer. First, the motor is rotated at a low speed and the direction of rotation and the electronic gear ratio are verified to be normal, and then gain adjustment is performed.

5.1.2 Position Mode Wiring

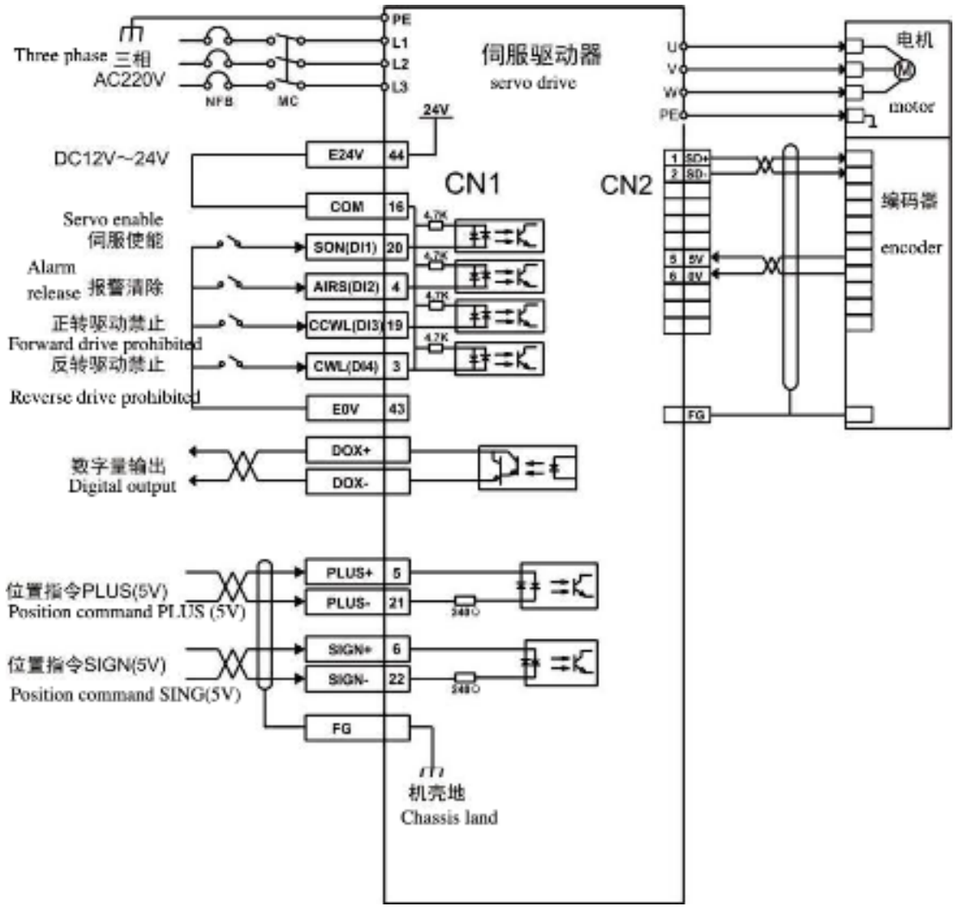


Figure 5.2 Position mode wiring diagram

NOTE

Notice:

- 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).
- DO output power supply needs to be prepared by the user. 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 to be adjusted in position control mode

- Gain and smoothing filter parameter adjustment

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA4	Control Mode Selection	0	0
PA9	Position Poportional Gain	1-1000	80
PA19	Position Command Smoothing Filter	0-1000×0.1ms	100
PA100	Command Filter Selection	0-1	0

- DI input related parameter adjustment

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA11	Number of command pulses for 1 motor revolution	0-30000	10000
PA12	Position command pulse electronic gear first molecule	1-32767	0
PA13	Position command pulse electronic gear denominator	1-32767	10000
PA14	Position command pulse input method	0-3	0

PA15	Position command pulse direction is reversed	0-1	0
PA59	Command pulse valid edge	0-1	0
PA77	Position command pulse electronic gear ratio second molecule	1-32767	0
PA78	Position command pulse electronic gear ratio third molecule	1-32767	0
PA79	Position Command PulseElectronic Gear Ratio Fourth Molecule	1-32767	0
PA80	Effective level of command direction signal	0-1	0
PA81	Command pulse PULS signal filtering	0-15	4
PA82	Command pulse SIGN signal filtering	0-15	4

- DI input related parameter adjustment

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA16	Positioning completion range	0-3000Impulse	130
PA17	Position out-of-range detection	0-30000×100Impulse	6000
PA18	Position overrun error invalid	0-1	0
PA83	CWL,CCWL Direction Prohibition Method	0-1	0
PA84	Positioning Completion Return Difference	0-32767	65
PA85	Positioning Proximity Range	0-32767	6500
PA86	Positioning Proximity Hysteresis	0-32767	650

- Adjustment of Input and Output Terminal Related Parameters

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA55	Input Terminal Effective Level Control Word	0000-1111	0000
PA57	Output Terminal Effective Level Control Word	0000-1111	0000
PA58	O input terminal debounce time constant	1-20ms	2
P3-0	Digital Input DI1 Function	0-99	1
P3-1	Digital Input DI2 Function	0-99	2
P3-2	Digital Input DI3 Function	0-99	3
P3-3	Digital Input DI4 Function	0-99	4
P3-15	Digital Input DI Forced Valid 1	00000000-11111111	00000000
P3-16	Digital Input DI Forced Valid 2	00000000-11111111	00000000
P3-17	Digital Input DI Forced Valid 3	00000000-11111111	00000000
P3-20	Digital Output DO1 Function	0-99	18(DL4S-1300—DL4S-2300:2)
P3-21	Digital Output DO2 Function	0-99	3
P3-22	Digital Output DO3 Function	0-99	5
P3-23	Digital Output DO4 Function	0-99	8

- Internal Position Pr Mode Position Command Description and Related Parameters

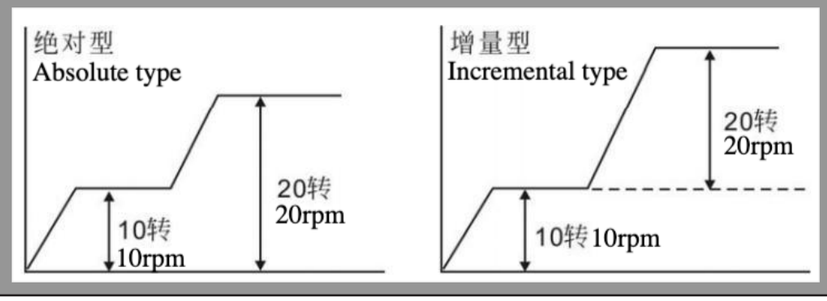
The Pr position commands are derived from the built-in position command registers using the parameters (P4-2, P4-3)-(P4-23, P4-24), and can be used as position commands by selecting one of the eight groups in conjunction with the external I/Os (CN1, POS0-POS2, and CTRG):

Position Command	POS2	POS1	POSO	CTRG	Counter Partparameter	Instructions	Movement Speed Registers
P1	0	0	0	↑	P4-2	Number of Laps(+/-30000)	P4-4 (V1)
					P4-3	Pulse (+/-max cnt)	
P2	0	0	1	↑	P4-5	Number of Laps(+/-30000)	P4-7 (V2)
					P4-6	Pluse (+/-max cnt)	
P3	0	1	0	↑	P4-8	Number of Laps(+/-30000)	P4-10 (V3)
					P4-9	Pluse (+/-max cnt)	
P4	0	1	1	↑	P4-11	Number of Laps(+/-30000)	P4-13 (V4)
					P4-12	Pluse (+/-max cnt)	
P5	1	0	0	↑	P4-14	Number of Laps(+/-30000)	P4-16 (V5)
					P4-15	Pluse (+/-max cnt)	
P6	1	0	1	↑	P4-17	Number of Laps(+/-30000)	P4-19 (V6)
					P4-18	Pluse (+/-max cnt)	
P7	1	1	0	↑	P4-20	Number of Laps(+/-30000)	P4-22 (V7)
					P4-21	Pluse (+/-max cnt)	
P8	1	1	1	↑	P4-23	Number of Laps(+/-30000)	P4-25 (V8)
					P4-24	Pluse (+/-max cnt)	

NOTE

◆ POS0-2 status: 0 for contact open, 1 for contact close. CTRG ↑ represents the moment when the contact goes from open (0) to open (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 the periodic operation by using the above table. For example, position command P1 =10 revolutions, P2 =20 revolutions, issue position command P1 first, and then issue position command P2. The difference between the two is as follows:



5.2 Speed Control Mode

5.2.1Speed Mode Description

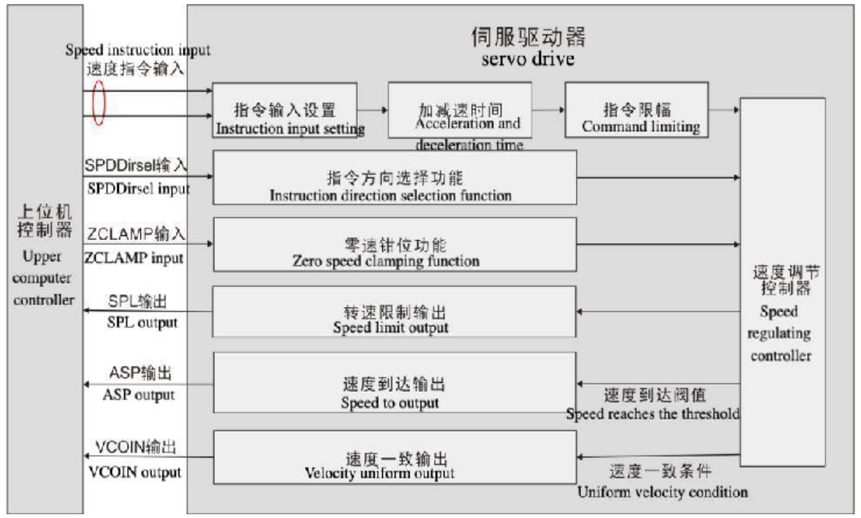


Figure 5.3 Speed control mode block diagram

The main steps for using Speed Mode are shown below:

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

5) The servo is enabled to control the rotation of the servo motor by sending position commands from the host computer. First, the motor is rotated at a low speed and the direction of rotation and the electronic gear ratio are verified to be normal, and then gain adjustment is performed.

5.2.2 Speed Mode Wiring

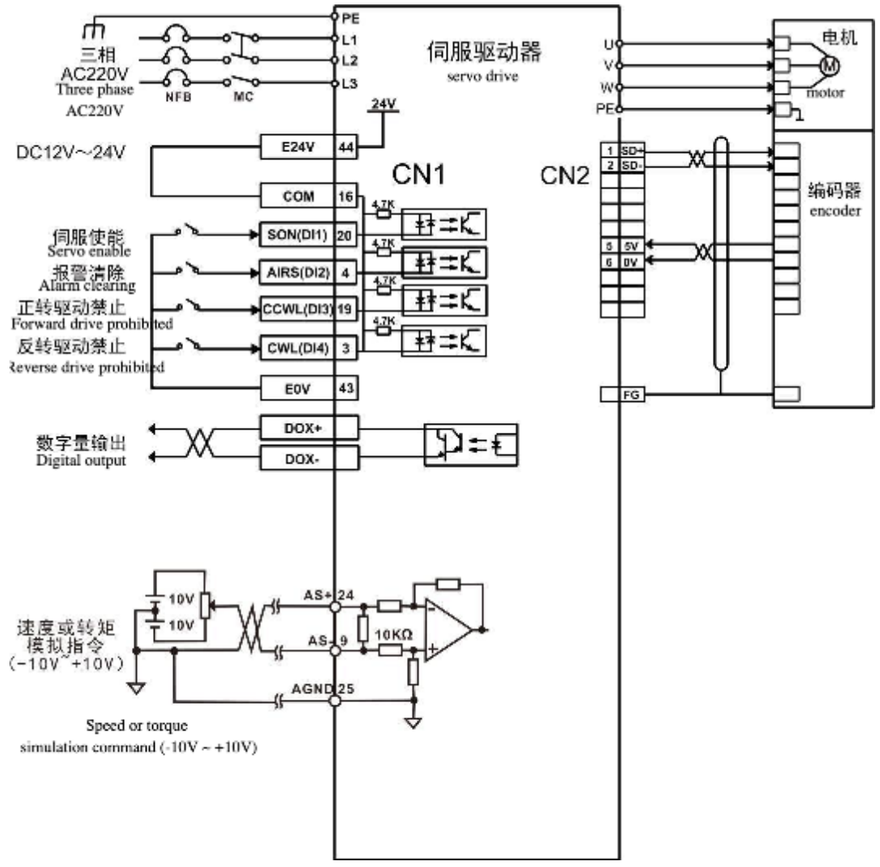


Figure 5.4 Speed mode wiring diagram

5.2.3 Parameters to be adjusted in speed control mode

- Parameters to be adjusted for the speed control method

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA4	Control mode selection	1	0
PA5	Speed proportional gain	5-2000Hz	150
PA6	Speed integral constant	1-1000ms	75
PA22	Internal and external speed command selection	0-5	0
PA24	Internal speed 1	-6000-6000r/min	100
PA25	Internal speed 2	-6000-6000r/min	500
PA26	Internal speed 3	-6000-6000r/min	1000
PA27	Internal speed 4	-6000-6000r/min	2000
PA28	Arrival speed	0-3000r/min	3000
PA40	Acceleration time constant	1-10000ms	100
PA41	Deceleration time constant	1-10000ms	100
PA42	S-type acceleration and deceleration time constant	0-1000ms	0
PA43	Analog speed command input gain	10-3000r/min/v	300
PA44	Analog speed command direction inversion	0-1	0
PA45	Analog speed command zero offset compensation	-5000-5000	0
PA46	Analog speed command filter	1-300Hz	300
PA75	Zero speed detection point	0-1000r/min	10
PA76	Speed consistent setting value	0-1000r/min	10
PA87	Arrival speed hysteresis	0-5000r/min	30
PA88	Arrival speed polarity	0-1	0
PA92	Zero speed detection hysteresis	0-1000r/min	5

5.3 Torque Control Mode

5.3.1 Torque Control Description

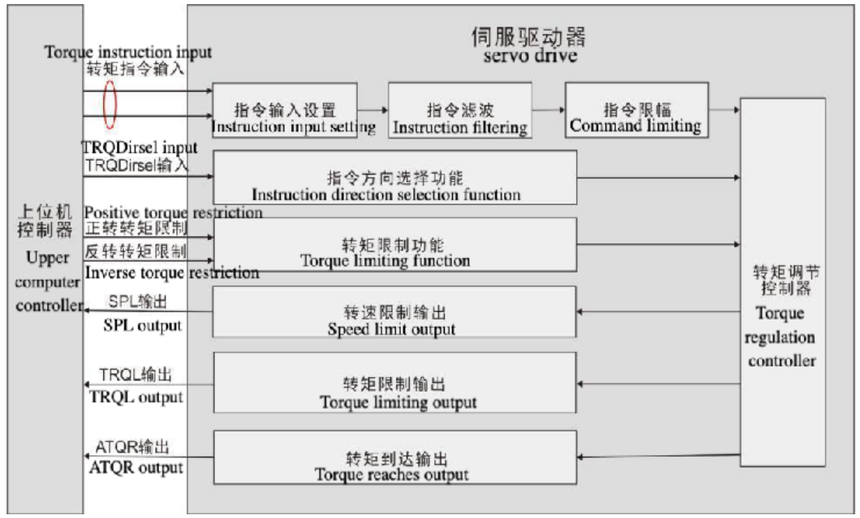


Figure 5.5 Speed control mode block diagram

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, and the servo panel displays "⌐ 0" after power on, which means that the servo power supply and encoder are correctly wired.
2) Perform a servo JOG test run by pressing the key to confirm that the motor can operate normally.
3) Refer to Figure 5.6 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) The servo is enabled to control the rotation of the servo motor by sending position commands from the host computer. First, the motor is rotated at a low speed and the direction of rotation and the electronic gear ratio are verified to be normal, and then gain adjustment is performed..

5.3.2 Torque Mode Wiring

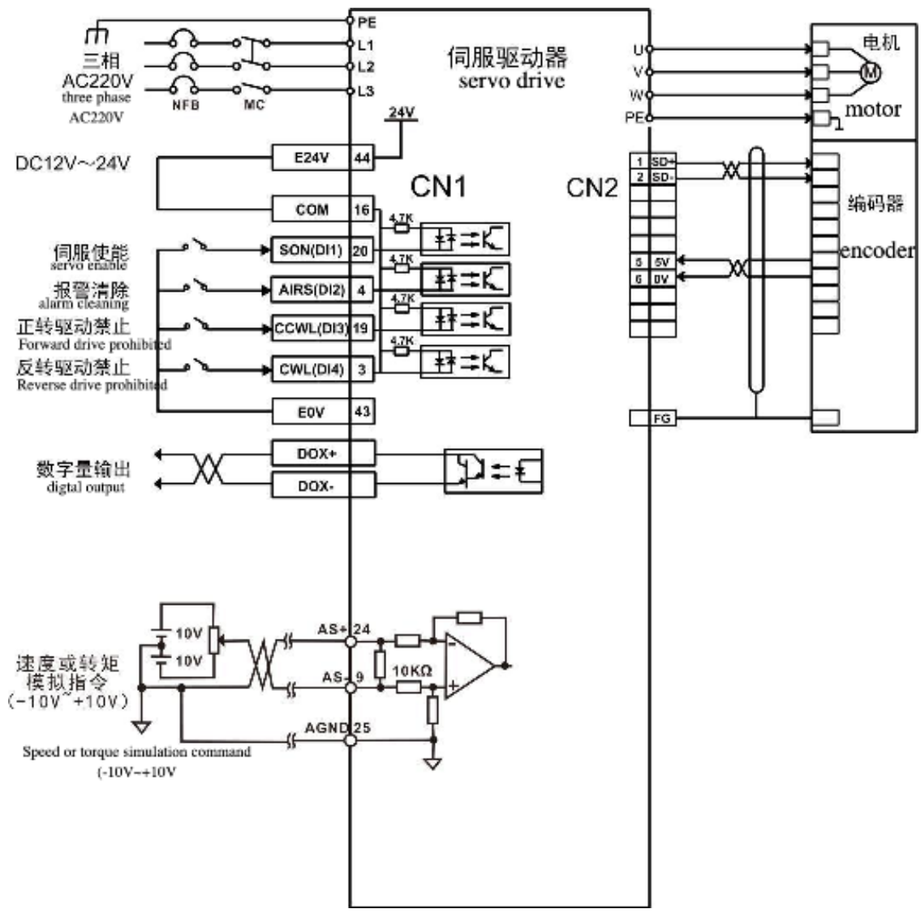


Figure 5.6 Torque mode wiring diagram

5.3.3 Parameters to be adjusted in speed control mode

- Torque control method requires parameter adjustment

Required Parameters	Parameter Description	Parameter Value	Factory Default
PA4	Control mode selection	2	0
PA29	Analog torque command input gain	Setup on demand	30
PA32	Internal and external torque command selection	0-2	0
PA33	Analog torque command input direction is reversed	0	0
PA39	Analog torque command zero offset compensation	0	0
PA50	Speed limit during torque control	Setup on demand	Rated speed
PA64	Internal torque 1	-300-300	0
PA65	Internal torque 2	-300-300	0
PA66	Internal torque 3	-300-300	0
PA67	Internal torque 4	-300-300	0
PA83	Prohibited methods	0-1	0
PA89	Arrival torque	-300%-300%	100
PA90	Arrival torque hysteresis	0%-300%	5
PA91	Arrival torque polarity	0-1	0

5.4 Origin return function and related parameter description

5.4.1 Related setting parameters

Required Parameters	Parameter Description	Parameter Value	Factory Default
P4-32	Origin detector type and search direction settings	0-5	0
P4-33	Short distance movement setting to reach the origin	0-2	0
P4-34	Origin trigger start mode	0-2	0
P4-35	Origin stop mode setting	0-1	0
P4-36	First stage high-speed origin return speed setting	1-2000 r/min	1000
P4-37	Second stage low speed origin return speed setting	1-500 r/min	50
P4-38	Origin return offset turns	+/-30000	0
P4-39	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 (P4-34)

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

P4-34=0: Turn off the origin return function. When P4-34 is set to 0, the origin return function cannot be started regardless of other setting values.

P4-34=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.

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

B. Home Detector Types and Finding Direction Settings (P4-32)

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.

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

P4-32=1: Reverse the direction to find the origin, and use the CWL limit input point as the rough reference point of 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 (P4-33=0) as the precise mechanical origin.

P4-32=2: Search for 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 (P4-33=0) or not to return to search. (P4-33=1) Z-phase pulse. When the Z-phase pulse is not used as the mechanical origin, the positive edge of ORGP can also be set as the mechanical origin (P4-33=2).

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

P4-32=4: Positive direction directly find the absolute position zero point of one revolution, this function is usually used for the motion control of servo motor only in one revolution range, in this case, there is no external detection switch.P4-32=5)

The reverse rotation direction directly searches for the single-turn absolute position zero point. 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 setting to reach the origin (P4-33)

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

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

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

D. Origin stop mode setting (P4-35)

P4-35=0: After the origin detection is completed, the motor decelerates and pulls back to the origin. After 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.

P4-35=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 Check Before Running

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 are insulated;
3) There are no conductive objects or flammable objects such as screws or metal sheets inside the driver, and there are no conductive foreign objects at the wiring ports;
4) 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 circuit and emergency stop alarm circuit to maintain access;
3) The external voltage reference of the servo drive is correct;

- Power up the servo drive without the controller sending a run command signal. Check and ensure:

1) The servo motor can rotate normally without vibration or excessive running sound;
2) If the parameters are set correctly, unexpected movements may occur depending on the mechanical characteristics, so do not over-set extreme parameters;
3) There is no abnormality in the bus voltage indicator and digital tube display.

Chapter 6 Operation and Display Interface

6.1 Drive Panel Description

6.1.1 Panel Composition

The panel consists of 5 LED digital tube displays and 4 keys, ▲、▼、◀、 SET which are used to display the system status, set parameters, etc. The operation is hierarchical, unfolding layer by layer from the main menu.

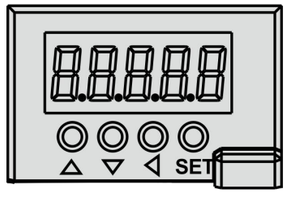


Figure 6.1 Drive Panel Display Interface

6.1.2 Key Description

Symbol	Name	Function
▲	Add key	Add serial number or value; long press has repeat effect
▼	Decrease key	Decrease serial number or value; long press has repeat effect
◀	Escape key	Menu exit; operation cancel
SET	Enter key	Operation Confirmation

6.2 Main Menu

The first level is the main menu with 8 modes of operation ▲、▼ key change modePress SET to enter level 2 and perform specific operations, press ◀ to return to the main menu from level 2.

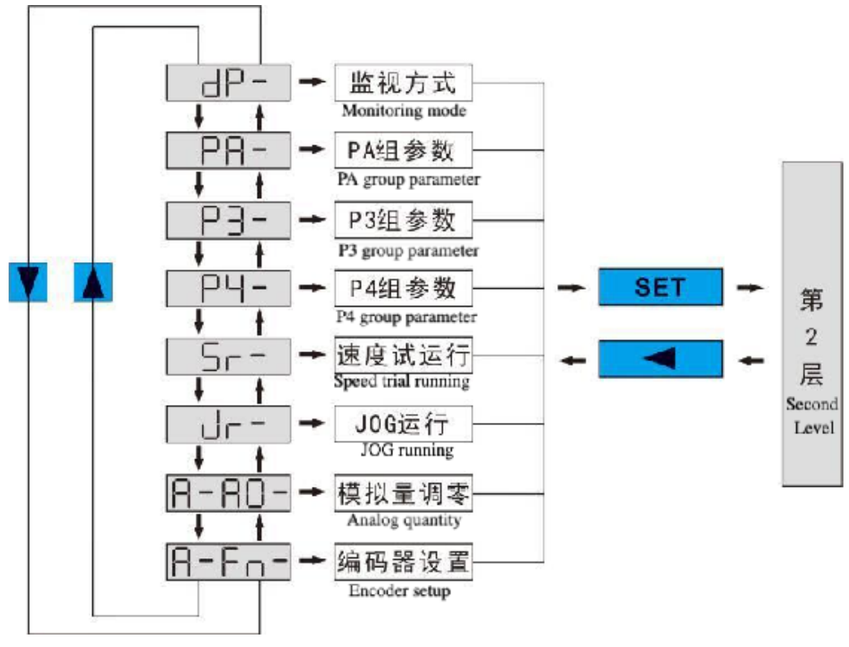


Figure 6.2 Main menu operation block diagram

6.3 Parameter Setting Process

Parameters are expressed as parameter segment + parameter number, the hundredth digit is the segment number, and the tenth and first digits are the parameter number. For example, if the parameter PA53, the segment number is "PA" and the parameter number is "53", the display will show "PA-53".

Select parameter setting " P-" under the main menu and press SET to enter the parameter setting mode. First use the ▲ and ▼ keys to select the parameter segment, after selecting it, press SET to enter the parameter number selection of the segment. Secondly, use the ▲ and ▼ keys to select the parameter number again, after selecting it, press SET to display the parameter value.

Use the ▲ and ▼ keys to modify the parameter values. Pressing the ▲ or ▼ key once, the parameter increases or decreases by 1. Pressing and holding ▲ or ▼ , the parameter can increase or decrease continuously. When the parameter value is modified, press the **SET** key, the decimal point of the rightmost LED digital tube will light up and flash twice, that is, the modification is completed, and the modified value will be reflected in the control immediately (some parameters need to be saved and re-powered before they can work)

6.4 Monitor Status Content

The first layer is used to select the mode of operation, there are 8 modes, use the ▲ and ▼keys to change the mode, press the **SET** key to enter the selected mode of the second layer, and press ◀ key to return from the second layer to the first layer.

In the first layer, select "dp--" and press the **SET** key to enter the monitoring mode. There are 23 display states, the user uses the ▲ and ▼ keys to select the required display mode, and then press the **SET** key to enter the specific display state.

Monitoring Mode	Controls	Monitoring example	Instructions
P-SPd		r 1000	Motor speed 1000r/min
P-PoS		04580	Current location 124580
P-PoS.		P. 12	
P-CPo		C4581	Location command 124581
P-CPo.		C. 12	
P-EPo		E 4	Position deviation 4 pulses
P-EPo.		E. 0	
P-tr9	SET	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	In speed mode, the corresponding analog input speed is 500r/min.
P- Ct		t 0.50	In torque mode the analog input is 50% of the corresponding torque.
P-APo		A3265	Rotor absolute position 3265.
P-APo.		A. 0	
P- In		n ıııı	Input terminal
P-oUt		oUt.ııı	Output terminal

P-UdC	SET	UC336	Bus voltage 336V
P-Err		Err 4	Alarm number four
P- rL		rL-on	Relay on condition
		rL.-oF	Relay off condition
		rL-Er	Relay alarm condition
P- rn		rn - on	The raw circuit is operating normally
		rn.-oF	The main circuit is not charged
		rn-CH	Main circuit charged but servo not enabled
		rn-Er	Main circuit alarm
P- US		U-on	The bus voltage is normal
		U-.LoU	The bus voltage is too low
		U-Err	Presence alarm
P- AS		43210	Motor absolute position 876543210
P- AS.		A.8765	

6.5 Analog Zeroing

After the operation, the driver automatically detects the analog zero bias and writes the zero bias value to the parameter PA39 (or PA45). This operation has already saved the zero-bias parameters to the EEPROM, so no further parameter writing is required.

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

6.6 Encoder Selection

Select "F-res" to reset the encoder and set the multi-turn information of the encoder to zero. By setting the parameter value of P3-36, the single-turn information can be cleared to achieve the purpose of setting the origin. Select "F-clr" to clear the alarm on the encoder. The alarm 53 caused by battery power failure can be cleared by this operation. Select an operation and hold down the **SET** key for more than 3 seconds. After donE is displayed, activate the operation. After completion, you can press ◀ key to return to the menu selection state.

6.7 The default parameters are restored

Use the Restore Default parameters (factory parameters) function when:

- Parameters are messed up and the system cannot work properly.

To restore the default parameters, perform the following steps:

1. Connect the motor to the driver. After power-on, the driver will automatically

read the motor parameters and automatically match the motor model.

2. Change the password PA0 to 385.

3. Go to Parameter management and perform the following operations:

All parameters are restored to their default values. The modified parameters are also restored to their factory default values. Press the ◀ key to return to the main menu, use the ▲ and ▼ keys to select "PA-" mode, press the **SET** key to enter the second layer operation interface, and then press the ▲ and ▼ keys to make PA=0, then press the **SET** key to enter the third layer interface, SET PA0 to the value 385, and press the **SET** key to save. Next, press the ◀ button to return to the "PA-" interface, and SET PA1 to DEF-, long press the Set key for 5 seconds, and wait for the LED indicator to blink several times to complete the default parameter saving. It works after being powered on again.

Chapter 7 Parameter Function Description

7.1 PA Group Parameters

NO.	Name	Function	Parameter Range	Factory Value
0	Password	1. The user code is 315. 2. Model code is 385.	0-9999	315
1	Model Code	This parameter is read-only and cannot be modified. The drive automatically recognizes the motor type number, no need to select.		
2	Software Version	This parameter is read-only and cannot be modified. The drive automatically recognizes the motor type number, no need to select.		
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 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 the 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;	0-25	0

3	Initial Display State	14: Display the upper 5 digits of the absolute position of the rotor in one revolution; 15: Display input terminal status 16: Display output terminal status 17: Display 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 upper 5 digits of the absolute value.	0-25	0
4	Control Mode Selection	This parameter allows you to set the control mode of the drive: 0:Position control mode; 1:Speed control mode; 2:torque control mode 3:position speed mixed control mode; 4:position torque mixed control mode; 5:Speed-torque hybrid control mode; 6:encoder zeroing mode.	0-6	0
5	Speed Proportional Gain	1. Set the proportional gain of the velocity loop regulator. 2. The higher the setting value, the higher the gain and the greater the stiffness. Parameter number value is determined according to the specific servo drive system model and load situation. The value of the parameter is determined according to the specific servo drive system model and load condition. In general, the larger the load inertia, the larger the setting value. 3. Under the condition that the system does not generate oscillation, set the value as large as possible.	5-2000 Hz	150

6	Velocity Constant of integration	1. Set the integration time constant of the speed loop regulator. 2. The smaller the value, the faster the integration speed and the more resistant the system is to deviations, i.e. the more rigid it is, but too small a value is prone to overshooting.	1-1000 ms	75
7	Torque Filter	1. Sets the torque command filter characteristics. 2. Used to suppress resonance generated by torque. 3. The smaller the value, the lower the cutoff frequency, and the more the motor generates vibration and noise will be less. If the load inertia is large, the setting can be reduced appropriately. The smaller the value, the lower the cutoff frequency, the lower the vibration and noise generated by the motor. Too small a value results in a slower response and may cause oscillation. 4. The larger the value, the higher the cut-off frequency and the faster the response. Higher torque response is required, the setting value can be increased appropriately.	20-500%	100
8	Speed Detection Filter Waveforms	1. Set the speed detection filter characteristics. 2. The smaller the value, the lower the cutoff frequency, and the noise generated by the motor the smaller. If the load inertia is large, you can reduce the setting value. If the value is too small, the response slows down and may cause oscillation. 3. The larger the value, the higher the cutoff frequency, the faster the speed feedback response.	20-500%	100

8	Speed Detection Filter Waveforms	The higher the value, the higher the cutoff frequency, the faster the speed feedback response. If you need higher speed response, you can increase the setting value appropriately. The larger the value, the higher the cutoff frequency, the faster the speed feedback response.	20-500%	100 (DL4S-1300-DL4S-2300: 200)
9	Position Proportional Gain	1. Set the proportional gain of the position loop regulator. 2. The higher the setting value, the higher the gain, the higher the stiffness, and the same frequency The larger the setting value, the higher the gain, the greater the stiffness, and the smaller the position hysteresis for the same frequency of command pulses. However, too large a value may may cause oscillation. 3. The parameter value according to the specific servo drive system model and load load conditions.	1-1000	80
10	Motor number of pulses per 1 turns output	AB 1 turns per set equal to the motor, encoder output pulse number	100-30000	10000
11	For each rotation of the motor 1 revolution of the motor is commanded number of pulses	1. Set the number of command pulses equivalent to each 1 revolution of the motor. 2. When this setting value is 0, PA-12 (position command pulse frequency division numerator) and PA-13 (position command pulse frequency division denominator) are valid.	0-30000	10000

<table>
<tr>
<td>12</td>
<td>Position Command Pulse Oscillating electronic gears First molecule</td>
<td>1. Set the frequency division of the position command pulse (electronic gear).
2. In the position control mode, the PA12 and PA13 parameters can be easily matched to various pulse sources in order toachieve the user's desired control resolution (i.e. angle/pulse).
3. P×G=N×131072.
P: number of pulses of input command;
G: electronic gear ratio; G= Crossover frequency numerator / crossover frequency denominator N: motor rotation circle; 131072
The number of pulses for 1 motor revolution is 131072 by default.
4. For example, if the input command pulse is 6400, the servo motor will rotate one revolution.
turn. G=(N×131072) G=(N×131072)/ P=(1×131072)/6400=512/25. The parameter PA12 is set to 512 and PA13 is set to 25.
5. The command pulse electronic gear molecule is determined by Gear1 and Gear2. The denominator is set by parameter PA13. The combination is as follows:
<table>
<tr><th colspan="2">DI signal{Note}</th><th rowspan="2">Command Pulse Electronic Gear Denominator</th></tr>
<tr><th>Gear 2</th><th>Gear 1</th></tr>
<tr><td>0</td><td>0</td><td>First molecule (Parameter PA12)</td></tr>
<tr><td>0</td><td>1</td><td>Second molecule (Parameter PA77)</td></tr>
<tr><td>1</td><td>0</td><td>Third molecule (Parameter PA 78)</td></tr>
<tr><td>1</td><td>1</td><td>Fourth molecule (Parameter PA79)</td></tr>
</table>
Note: 0 means OFF, 1 means ON.</td>
<td>0-32767</td>
<td>0</td>
</tr>
</table>

13	Position Command Pulse Electronics Gear Denominator	See parameter PA12.	1-32767	10000
14	Position Command Pulse Input Mode	1. Set the input form of position command pulse. 2. Set to one of the 3 input forms by parameterizing. 0: Pulse + direction 1: C C W pulse / C W pulse 2: A,B two-phase orthogonal pulse input; 3. Internal position input. Note: CCW is viewed from the axial direction of the servomotor, and counterclockwise Note: CCW is defined as forward direction when viewed from the axial direction of the servomotor and rotated in counterclockwise direction. CW is defined as the reverse direction if it is rotated in the clockwise direction from the servo motor's axial direction. CW is defined as anti-clockwise rotation when viewed from the servo motor's axial direction.	0-3	0
15	Command Pulse Direction Reversal	Set to: 0:Normal; 1:Position command pulse direction reversed.	0-1	0

16	Positioning Complete 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 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 PA84	0-30000 Pulse	130
17	Position Overshoot Range Detection	1. Setting the detection range of position over deviation alarms 2. In position control mode, when the position deviation counter's value exceeds the value of this parameter, the drive gives a position alarm.	0-30000×100 Pulse	6000
18	Poor location Error Invalid	Set to: 0:Position overrun alarm detection is effective 1:Position overrun alarm detection is invalid and stops detecting position overrun error.	0-1	0
19	Position Commands Smoothing Filter	1. Smoothing and filtering the command pulse in exponential form Acceleration and deceleration, the numerical value represents the time constant. 2. The filter will not lose the input pulse, but there will be a command delay. late phenomenon. 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

<table>
<tr><td>20</td><td>Driver Disabled Invalid Input</td><td>Set to:
0: CCW, CW input prohibition is valid. When CCW drive prohibit switch (FSTP) is ON, CCW drive is allowed; when CCW drive prohibit switch (FSTP) is OFF, CCW directional torque is kept at 0; CW is the same. If both CCW and CW drive prohibition are OFF, a drive prohibition input error alarm is generated;
1: Cancel CCW and CW input prohibition. The CCW and CW drives are allowed regardless of the CCW and CW drive inhibit switch status.
At the same time, if both CCW and CW drive inhibit are OFF, no drive inhibit input error alarm is generated.</td><td>0-1</td><td>1</td></tr>
<tr><td>21</td><td>JOG Running Speed</td><td>Sets the running speed of the JOG operation.</td><td>0- 6000 r/min</td><td>100</td></tr>
<tr><td>22</td><td>Speed Command Source</td><td>When speed control, set the source of speed command , parameter significance:
0: analog speed command is input from analog port AS+, AS-;
1: internal speed command, decided by SP1 , SP2 of DI input:
<table><tr><th colspan="2">DI signal{Note}</th><th rowspan="2">Speed Command</th></tr><tr><th>SP2</th><th>SP1</th></tr><tr><td>0</td><td>0</td><td>Internal Speed 1 (Parameter PA24)</td></tr><tr><td>0</td><td>1</td><td>Internal Speed 2 (Parameter PA25)</td></tr><tr><td>1</td><td>0</td><td>Internal Speed 3 (Parameter PA26)</td></tr><tr><td>1</td><td>1</td><td>Internal Speed 4 (Parameter PA27)</td></tr></table></td><td>0-5</td><td>0</td></tr>
</table>

<table>
<tr><td>22</td><td>Speed Command Source</td><td>2: Analog speed command + Internal speed command:
<table><tr><th colspan="2">DI signal{Note}</th><th rowspan="2">Speed Command</th></tr><tr><th>SP2</th><th>SP1</th></tr><tr><td>0</td><td>0</td><td>Analog Speed Command</td></tr><tr><td>0</td><td>1</td><td>Internal Speed 2 (Parameter PA25)</td></tr><tr><td>1</td><td>0</td><td>Internal Speed 3 (Parameter PA26)</td></tr><tr><td>1</td><td>1</td><td>Internal Speed 4 (Parameter PA27)</td></tr></table>Note: 0 means OFF, 1 means ON.
3: JOG speed command, needs to be set when performing jog (JOG) operation.
4: Keyboard speed command, needs to be set when performing keyboard speed adjustment (Sr) operation.
5: IO terminal controls jog operation.</td><td>0-5</td><td>0</td></tr>
<tr><td>23</td><td>Maximum Speed Limit</td><td>1. Independent of the direction of rotation.
2. If the setting value exceeds the rated speed, the actual maximum speed limit is the rated speed.</td><td>0-6000 r/min</td><td>5000</td></tr>
<tr><td>24</td><td>Internal Speed 1</td><td>1. Set internal speed 1.
2. Speed control mode (PA22=1),When SP1 OFF, SP2 OFF, internal speed 1 is selected as speed command.</td><td>-6000-6000 r/min</td><td>100</td></tr>
<tr><td>25</td><td>Internal Speed 2</td><td>1. Set internal speed 2.
2. In the speed control mode (PA22=1), when SP1 ON, SP2 OFF, internal speed 2 is selected as the speed command.</td><td>-6000-6000 r/min</td><td>500</td></tr>
<tr><td>26</td><td>Internal Speed 3</td><td>1. Set internal speed 3.
2. In the speed control mode (PA22=1), when SP1 OFF, SP2 ON, internal speed 4 is selected as the speed command.</td><td>-6000-6000 r/min</td><td>1000</td></tr>
<tr><td>27</td><td>Internal Speed 4</td><td>1. Set internal speed 4.
2. In the speed control mode (PA22=1), when SP1 ON, SP2 ON, internal speed 4 is selected as the speed command.</td><td>-6000-6000 r/min</td><td>2000</td></tr>
</table>

<table>
<tr><td>28</td><td>Arrival Speed</td><td>1. When the motor speed exceeds this parameter, the ASP (speed reached) of the digital output DO is ON, otherwise it is OFF.
2. The comparator has hysteresis function, which is set by parameter PA87.
3. With polarity setting function:
<table><tr><th>PA88</th><th>PA28</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 speed</td></tr></table></td><td>0-3000 r/min</td><td>3000</td></tr>
<tr><td>29</td><td>Analog Torque Command Input Gain</td><td>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.</td><td>10-100 (0.1v/100%)</td><td>30</td></tr>
<tr><td>30</td><td>User Torque Overload Alarm Value</td><td>1. Set the user torque overload value, which is the percentage of the rated torque, and the torque limit value is protected in both positive and negative directions. The torque limiting value is protected in both positive and negative directions, regardless of the direction.
2. In the case of PA31>9, when the motor torque > PA30, duration > PA31, the drive alarm, alarm number Err-29, motor stop. After the alarm is generated, the drive must be re-powered to clear the alarm.</td><td>1-300</td><td>300</td></tr>
</table>

<table>
<tr><td>31</td><td>User Torque Overload Alarm Detection Time</td><td>1. User torque overload detection time in milliseconds.
2. When set to zero, the user torque overload alarm does not work.</td><td>0-32767</td><td>0</td></tr>
<tr><td>32</td><td>Torque Command Source</td><td>During torque control, set the source of the torque command: 0: Analog torque command, input from the analog ports AS+ and AS-. 1: Internal torque command, determined by TRQ1 and TRQ2 of DI input:
<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 PA64)</td></tr><tr><td>0</td><td>1</td><td>Internal Torque 2 (Parameter PA65)</td></tr><tr><td>1</td><td>0</td><td>Internal Torque 3 (Parameter PA66)</td></tr><tr><td>1</td><td>1</td><td>Internal Torque 4 (Parameter PA67)</td></tr></table>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 PA65)</td></tr><tr><td>1</td><td>0</td><td>Internal Torque 3 (Parameter PA66)</td></tr><tr><td>1</td><td>1</td><td>Internal Torque 4 (Parameter PA67)</td></tr></table>Note: 0 means OFF, 1 means ON.</td><td>0-1</td><td>0</td></tr>
</table>

33	Analog Rotary Moment Command Input Input Direction Reversal	Reverse polarity for analog torque input.	0-1	0
34	Internal CCW Torque Limitation	1. The setting value is a percentage of the rated torque, e.g. if the setting is 2 times the rated torque, the setting value is 200. 2. This limit is valid at all times. 3. If the setting value exceeds the maximum allowable overload capacity of the system, the actual torque is limited to the maximum allowable overload capacity of the system.	0-300%	300
35	Internal CCW Torque Limitation	1. The setting value is a percentage of the rated torque, e.g. if the setting is 2 times the rated torque, the setting value is -200. 2. This limit is valid at all times 3. If the setting value exceeds the maximum allowable overload capacity of the system, the actual torque is limited to the maximum allowable overload capacity of the system. then the actual torque is limited to the maximum allowable overload capacity of the system.	-300-0%	-300
36	External CCW Torque Limit	1. The setting value is 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	1. Set the external torque limit value of the servo motor in the CW direction. 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 (CWL) 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.	-300-0%	-100
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 indicates the acceleration time of the motor from 0 to 1000 r/min. 1. Acceleration and deceleration characteristics are linear. 2. Only used for speed control and internal position control method, other Other control methods are invalid.	1-10000ms	100
41	Deceleration Time Constant	The setting value indicates the deceleration time of the motor from 1000-0r/min. 1. Acceleration and deceleration characteristics are linear. 2. Only used for speed control and internal position control mode, other control modes are invalid. Other control methods are invalid.	1-10000ms	100

42	S-type Acceleration and Deceleration Time Constants	To make the motor start and stop smoothly, set the S-type acceleration and deceleration curve part of the time.	0-1000ms	0
43	Analog Speed Command Input 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 Degree Command Party Negate	Reverse the polarity of the analog speed input. 1. When set to 0, when the analog speed command is positive, the speed direction is When set to 0, the speed direction is CCW when the analog speed command is positive. 2. When set to 1, the speed direction is CW when the analog speed command is positive. When set to 1, when the analog speed command is positive, the speed direction is CW.	0-1	0
45	Analog Speed Zero Bias 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 impact of signal noise. The smaller the setting, the slower the response speed, and the smaller the impact 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 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 work drop.	0-200× 10ms	0
48	Mechanical brake action setting when the motor is running	1. Define the delay time from the motor current 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 high-speed rotation to low speed and then activate the mechanical brake to avoid damage to the brake. 3. The actual action time is the time required for PA48 or the motor to decelerate to the PA49 value, whichever is the minimum.	0-200× 10ms	50（DL4S-1300—DL4S-2300：500）
49	Mechanical brake action speed 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 high-speed rotation to low speed and then activate the mechanical brake to avoid damage to the brake. 3. The actual action time is the time required for PA48 or the motor to decelerate to the PA49 value, whichever is the minimum.	0-3000 r/min	100
50	Speed Limitation During Torque Control	1. When torque control is used, the motor running speed is limited to this parameter. 2. It prevents over-speed phenomenon in light load.	0-5000 r/min	3000

<table>
<tr><td>53</td><td>Servo Force Enable</td><td>Set as:
0: The enable signal is controlled by the SON of the DI input;
1: Software forced enablement</td><td>0-1</td><td>0</td></tr>
<tr><td>54</td><td>Servo Enable Delay Off Time</td><td>Defines the delay in cutting off the motor current after the servo enable signal is turned off for a time.</td><td>0-30000ms</td><td>0</td></tr>
<tr><td>55</td><td>Input Terminal Effective Level Control Word</td><td>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 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:
DL4S-0050—DL4S-1000<table><tr><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr><tr><td colspan="4">0: High level is valid; 1: Active low level.</td></tr></table>DL4S-1300—DL4S-2300<table><tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>DI8</td><td>DI7</td><td>DI6</td><td>DI5</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr><tr><td colspan="8">0: High level is valid; 1: Active low level.</td></tr></table></td><td>0000-1111
（DL4S-1300—DL4S-2300：00000000-1111111）</td><td>0000</td></tr>
</table>

<table>
<tr><td>57</td><td>Output Terminal Effective Level Control Word</td><td>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 numbers are as follows:
DL4S-0050—DL4S-1000<table><tr><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>DO4</td><td>DO3</td><td>DO2</td><td>DO1</td></tr><tr><td colspan="4">0: High level is valid; 1: Active low level.</td></tr></table>DL4S-1300—DL4S-2300<table><tr><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr><tr><td>DO6</td><td>DO5</td><td>DO4</td><td>DO3</td><td>DO2</td><td>DO1</td></tr><tr><td colspan="6">0: High level is valid; 1: Active low level.</td></tr></table></td><td>00000-11111
(DL4S-1300—DL4S-2300：000000-111111)</td><td>0</td></tr>
<tr><td>58</td><td>IO Input Terminal Debounce Time Constant</td><td>1. The time to de-jitter filter the input terminals.
2. The smaller the value, the faster the terminal input response.
3. The larger the value, the better the interference immunity of the terminal input, but the slower the response. response becomes slower.</td><td>1-20ms</td><td>2</td></tr>
<tr><td>59</td><td>Command Pulse Valid Edge</td><td>Set to:
0:Pulse rising edge valid;
1:Pulse falling edge valid.</td><td>0-1</td><td>0</td></tr>
<tr><td>60</td><td>Soft Reset</td><td>0:Soft reset is not valid;
1:Soft reset valid, system will reboot.</td><td>0-1</td><td>0</td></tr>
</table>

61	System Alarm Clear	Set as: 0: System alarm clearing is invalid; 1: System alarm clearing is valid.	0-1	0
62	Encoder Selection	**DL4S-0050—DL4S-1000** 4: Single-turn absolute encoder; 5: Multi-turn absolute encoder. **DL4S-1300—DL4S-2300** 0: Incremental encoder; 1: wire-saving encoder; 4: Single-turn absolute encoders; 5: multi-turn absolute encoder. Note: To switch from absolute to incremental (wire-saving) encoder, set PA61 to 1 and restart the power supply. The reverse is also true	**DL4S0050—DL4S-1000**：4-5 **DL4S1300—DL4S-2300**：0，1，4，5	By the motor Determined
63	Load Inertia Ratio	1. Set the load inertia ratio of the rotational inertia of the corresponding motor. 2. The set value is:=((load inertia + rotational inertia)/rotational inertia) x 100.	1-500	100
64	Internal Torque1	In the torque control mode (PA4=2), when TRQ1 OFF TRQ2 OFF, internal torque 1 is selected as the torque command.	-300-300	0
65	Internal Torque2	In the torque control mode (PA4=2), when TRQ1 ON TRQ2 OFF, internal torque 2 is selected as the torque command.	-300-300	0
66	Internal Torque3	In the torque control mode (PA4=2), when TRQ1 OFF TRQ2 ON, internal torque 3 is selected as the torque command.	-300-300	0

67	Internal Torque4	In the torque control mode (PA4=2), when TRQ1 ON TRQ2 ON, internal torque 3 is selected as the torque command.	-300-300	0
71	MODBUS Slave Address	MODBUS communication slave address value.	1-254	1
72	MODBUS Communication Baud 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); 2:8,0,1(MODBUS,RTU) 3:8,N,1(MODBUS,RTU) This parameter determines the communication protocol. The number 8 indicates the data to be transmitted. bit is 8 bits; the letters N, E, O stand for parity: N: indicates that this bit is not used; E: indicates 1 even bit; O: indicates 1 odd bit. The number 1 or 2 indicates that the communication bit is 1 or 2 bits.	0-3	0
74	Communication Error Handling	When the communication signal is wrong, choose: 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 digital output DO ZSP (zero speed) is ON, otherwise it is OFF. 2. When ZCLAMP of digital input DI is ON, the speed indicator When the command value is lower than this value, the speed command value is forced to zero.	0-1000 r/min	10

76	Speed Consistent Setting Value	When the difference between the actual speed and the commanded speed is less than this setting, UCO2N (speed consistency) of the digital output DO is ON, otherwise OFF.	0-1000 r/min	10
77	Position Command Pulses Electronic Gear Ratios Second Molecule	See parameter PA12 for details.	0-32767	0
78	Position Command Pulses Electronic Gear Ratios Third Molecule	See parameter PA12 for details.	0-32767	0
79	Position Command Pulse Electronic Gear Ratio Fourth Molecule	See parameter PA12 for details.	0-32767	0
80	Command Direction Signal Effective level	Set as: 0:High level positive direction 1:Low level positive direction.	0-1	0
81	Command Pulse PULS Signal Filtering	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 maximum pulse input frequency will be reduced accordingly.	0-15	4

81	Command Pulse PULS Signal Filtering	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
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	1
83	CWL,CCWL Directionally Prohibited Way	1. When the machine hits the mechanical limit switch, CWL is triggered. When CCWL is restricted, this parameter is used to select the prohibition method. Parameter meaning: 0: Limit the torque in this direction to 0; 1: Disable pulse input in this direction.	0-1	0

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 digital output DO COIN (positioning completed) ON, otherwise OFF. 3. The comparator has hysteresis function, which is set by parameter PA85.	0-32767 pulse	65
85	Positioning Proximity Range	1. Set the range of positioning proximity pulses under position control. 2. When the number of remaining pulses in the position deviation counter is less than or equal to the set value of this parameter, the digital output DO's When the number of remaining pulses in the position deviation counter is less than or equal to the value set in this parameter, the digital output DO will be ON for NEAR, otherwise OFF. 3. The comparator has a return difference function, set by parameter PA86. 4. When the positioning is about to be completed, the host computer accepts the NEAR signal for the next step. NEAR signal to prepare for the next step. General parameter The value should be larger than the positioning completion range.	0-32767 pulse	6500
86	Positioning Proximity Hysteresis	See the description of parameter PA85 for details.	0-32767 pulse	650

<table>
<tr>
<td>87</td>
<td>Arrival Speed Hysteresis</td>
<td>1. When the motor speed exceeds this parameter, the ASP (speed arrival) of the digital output DO is ON, otherwise it is OFF.
2. The comparator has hysteresis function.
3. With polarity setting function:
<table>
<tr><th>PA88</th><th>PA28</th><th>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 speed</td></tr>
</table>
</td>
<td>0-5000 r/min</td>
<td>30</td>
</tr>
<tr>
<td>88</td>
<td>Reach Velocity Polarity</td>
<td>Refer to the description of parameter PA87.</td>
<td>0-1</td>
<td>0</td>
</tr>
<tr>
<td>89</td>
<td>Arrival Torque</td>
<td>1. When the motor torque exceeds this parameter, the digital output DO's ATRQ (torque reached) ON, otherwise OFF.
2. the comparator has a return difference function, set by parameter PA90.
3. Polarity setting function:
<table>
<tr><th>PA91</th><th>PA89</th><th>Comparator</th></tr>
<tr><td>0</td><td>>0</td><td>Torque regardless of direction</td></tr>
<tr><td rowspan="2">1</td><td>>0</td><td>Positive torque detection only</td></tr>
<tr><td><0</td><td>Reverse torque detection only</td></tr>
</table>
</td>
<td>-300%-
300%</td>
<td>100</td>
</tr>
</table>

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

92	Zero Speed Detection 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. 2. The comparator has hysteresis function.	0-1000 r/min	5
94	Electromagnetic Brake Opening Delay Time	1. Set the delay time for electromagnetic brake opening. 2. 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 represents the number of pole pairs of the motor. Please modify it with caution, otherwise incorrect settings may cause overspeed.	1-360	5
97	Motor zero Position Offset Angle	The encoder zero position is offset from the motor zero position at an angle that the motor is determines.	0-3600	1800
99	Maximum duty cycle when braking	Maximum duty cycle setting when braking.	5-90	50

100	Position Ring Filter Selection	Set as: 0: Digital moving average filter; 1: Exponential smoothing filter.	0-1	0
101	Position Loop Feedforward Gain	The feedforward reduces the position tracking error during position control. When set to 100, the position tracking error is always 0 for any frequency of command pulse. The position tracking error is always 0 for any frequency of command pulse.	0-100	0
102	Position loop feed-forward filtering Waveform Time Constant	The position loop feed-forward quantity is filtered to increase the stability of the feed-forward control quantity.	20-500	100
103	Z signal output Output pulse width degree	Z Signal Width.	1-200	50
104	RS Output Function Selection	Set as: 0: 485 communication function is available; 1: No 485 communication function, add a programmable output port that output differential signal (default is Z signal)	0-1	0

7.2 P3 Multifunction Terminal Series Parameters

7.2.1 P3 Group Series Parameter List

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

Parameter	Name	Range	Factory Default
P3-0	Digital Input DI1 Function	0-99	1
P3-1	Digital Input DI2 Function	0-99	2
P3-2	Digital Input DI3 Function	0-99	3
P3-3	Digital Input DI4 Function	0-99	4
P3-4	Digital Input DI5 Function	0-99	0
P3-5	Digital Input DI6 Function	0-99	0
P3-13	Setting the lower 16 bits of the current position value coordinate	-32768-32767	0
P3-14	Setting the higher 16 bits of the current position value coordinate	-32768-32767	0
P3-15	Digital Input DI is Forced to be Valid 1	00000000-11111111	00000000
P3-16	Digital Input DI is Forced to be Valid 2	00000000-11111111	00000000
P3-17	Digital Input DI is Forced to be Valid 3	00000000-11111111	00000000
P3-18	Digital Input DI is Forced to be Valid 4	00000000-11111111	00000000
P3-19	Digital Input DI is Forced to be Valid 5	00000000-11111111	00000000

P3-20	Digital Output DO1 Function	0-99	18(**DL4S-1300—DL4S-2300**:2)
P3-21	Digital Output DO2 Function	0-99	3
P3-22	Digital Output DO3 Function	0-99	5
P3-23	Digital Output DO4 Function	0-99	8
P3-24	Digital Output DO5 Function	0-99	18
P3-30	Virtual Input Terminal Control	0-2	0
P3-31	Virtual Input Terminal Status Values	00000000-11111111	00000000
P3-32	Motor Position, Commanded Position, Position Difference, Display of absolute position of a single revolution	0: Motor resolution display increment; 1: Motor resolution displays absolute position; 2: The resolution display increment of the host computer (PA11); 3: The host computer resolution displays the absolute position.	0
P3-33	Virtual Output Terminal Status Values	0000-1111	0000
P3-34	Reset to zero encoder multiturn data	0-1	0
P3-35	Clearing Encoder Fault Alarms	0-1	0

P3-36	The current position is the zero point of the single-turn position (valid when P3-34 is set to 1)	0-1	0
P3-37	0:Single lap + multilap position overall 64 bit data 1:Split into single-turn position and multi-turn position	0-1	0
P3-38	Virtual IO input DI1 Function	0-99	0
P3-39	Virtual IO input DI2 Function	0-99	0
P3-40	Virtual IO input DI3 Function	0-99	0
P3-41	Virtual IO input DI4 Function	0-99	0
P3-42	Virtual IO input DI5 Function	0-99	0
P3-43	Virtual IO input DI6 Function	0-99	0
P3-44	Virtual IO input DI7 Function	0-99	0
P3-45	Virtual IO input DI8 Function	0-99	0

Notice:
1. When P3-30=0, the IO input is determined by DI1~DI4. The number of input IOs is 4, corresponding to parameters P3-0~P3-3;
2. When P3-30=1, the IO input is determined by the bit corresponding to virtual IOP3-31. The number of input IOs is 8, and the corresponding parameters P3-38~P3-45;
3. When P3-30=2, the IO input is determined by DI1~DI4 and P3-31. The number of input IOs is 12, corresponding parameters P3-0~P3-3 and P3-38~P3-45.
4. For parameter No. P3-24, when PA104=1, this port can be set as a differential output port.

7.2.2 DI Function List

Input terminals (4 terminals correspond to P3 group parameters P3-0, P3-1, P3-2, P3-3, respectively) defined values.

Define value	Sign	Function	Function Analysis
0	NULL	No Function	The input state has no effect on the system.
1	SON	Servo Enable	Servo enable input terminal. OFF:Servo driver is not available, motor does not pass current; ON:Servo driver is enabled, motor passes current.
2	ARST	Alarm Clear	Alarm Clear Input Terminal: There is an alarm is, if that alarm is allowed to clear, the input rising edge (OFF to ON momentarily) clears the alarm. Note: Only some alarms are allowed to clear.
3	CCWL	Forward Drive Prohibited	1. CCW drive prohibit input terminals: OFF: Forward (CCW) rotation is prohibited; ON: Positive (CCW) rotation is allowed. 2. For mechanical limit travel protection, function controlled by parameter PA-20. Note that the default value of PA-20 ignores this function, if you need to enable this function, you need to modify PA-20. To enable this function, it is necessary to modify PA-20. (1) When PA-20 is 0, the function of input prohibition is effective, and whether CCW is prohibited or not is controlled by PA-83. CCW is controlled by PA-83; (2) When PA-20 is 1, the function of input prohibition is invalid, and whether CCW is prohibited or not is not controlled by PA-83. or not prohibited is not controlled by PA-83.

3	CCWL	Forward Drive Prohibited	3. When the prohibited function is valid (PA-20 is 0). (1) When PA-83 is 0, the forward torque limit is 0, and there is no restriction on the forward pulse input; (2) When PA-83 is 1, the input prohibit function is invalid, whether CCW is prohibited or not is not controlled by PA-83.
4	CWL	Reverse Drive Prohibited	1. CW drive prohibit input terminals: OFF: Forward (CW) rotation is prohibited; ON: Positive (CW) rotation is allowed. 2. For mechanical limit travel protection, function controlled by parameter PA-20. Note that the default value of PA-20 is to ignore this function, if you need to enable this function, you need to modify PA-20. (1) If PA-20 is 0, the function of input prohibition is effective, whether CW is prohibited or not is controlled by PA-83; (2) When PA-20 is 1, the function of input prohibition is invalid, and whether CW is prohibited or not is not controlled by PA-83. 3. When the prohibit function is valid (PA-20 is 0): (1) When PA-83 is 0, the reverse torque limit is 0 and the reverse pulse input is not limited; (2) When PA-83 is 1, reverse pulse input is prohibited.
5	TCCW	Positive Torque Limit	OFF:CCW direction torque is not limited by PA-36 parameter; ON:CCW directional torque is limited by the PA-36 parameter. NOTE: Regardless of whether TCCW is valid or invalid, the CCW directional torque is still limited by the parameter PA-34 limitation.

6	TCW	Reverse Torque Limit	OFF:CW direction torque is not limited by PA-37 parameters; ON:CW direction torque is limited by the PA-37 parameter. NOTE: Regardless of whether TCW is active or inactive, the CW direction torque is still limited by the parameter PA-35 limitation.
7	ZCLAMP	Zero Speed Reed Position	The zero speed box position function is on (speed forced to zero) when the following conditions are met. Condition 1: Speed control mode (PA4=1), when external speed is selected (PA22=0). Condition 2: ZCLAMP ON. Condition 3: The speed command is lower than parameter PA-75. When any of the above conditions is not satisfied, normal speed control is executed.
8	CZERO	Zero Instruction	Under speed or torque control, the speed or torque commands are respectively: OFF:Normal command; ON:zero command.
9	CINV	Negate the Instruction	Under speed or torque control, the speed or torque commands are respectively OFF:Normal command; ON:command reversal.
10	SP1	Speed Selection 1	In speed control mode (PA4=1), when selecting internal speeds (PA22=1), SP1 and SP2 are combined to select different internal speeds: SP2=OFF SP1=OF: internal speed 1 (parameter PA-24) SP2=OFF SP1=ON: internal speed 2 (parameter PA-25) SP2=ON SP1=OFF: internal speed 3 (parameter PA-26) SP2=ON SP1=ON:Internal speed 4 (parameter PA-27)
11	SP2	Speed Selection 2	

13	TRQ1	Torque Selection 1	In torque control mode (PA4=2), when internal torque is selected (PA32=1), the combination of TRQ1 and TRQ2 selects different internal torque: TRQ2=OFFTRQ1=OFF: internal torque 1 (parameter PA-64) TRQ2=OFFTRQ1=ON: internal torque 2 (parameter PA-65) TRQ2=ON TRQ1=OFF: Internal torque 3 (parameter PA-66) TRQ2=ON TRQ1=ON:Internal torque 4 (parameter PA-67)
14	TRQ2	Torque Selection 2	
16	CMODE	Composite Mode Control Mode Setting	When PA-4 is set to 3,4,5, it is in mixed control mode and can be control mode can be switched through this input terminal: (1)When PA-4 is 3, CMODE OFF, is position mode; CMODEON, is speed mode; (2) When PA-4 is 4, CMODE OFF is position mode; CMODEON is torque mode. (3) When PA-4 is 5, CMODE OFF,is speed mode; CMODEON,is torque mode.
18	GEAR1	Electronic Gear Selection 1	When PA-11 is 0, the combination of GEAR1 with GEAR2 is used to select different molecules with the same electronic gear ratio: GEAR2=OFF GEAR1=OFF: Molecule 1 (parameter PA-12) GEAR2=OFF GEAR1=ON: molecule 2 (parameter PA-77) GEAR2=ON GEAR1=OFF: molecule 3 (parameter PA-78) GEAR2=ON GEAR1=ON: molecule 4 (parameter PA-79)
19	GEAR2	Electronic Gear Selection 2	
20	CLR	Position Deviation Removal	Position deviation counter clear input terminal in position control mode.
21	INH	Pulse Input Inhibit	Position command pulse inhibit terminal in position control mode: OFF:Command pulse input valid; ON:Command pulse input disabled

22	JOGP	Forward Inching	In speed mode, with PA22=5, this signal is turned on and the motor moves in the positive direction of inching, speed is set by PA21. Note: This signal is turned on at the same time as reverse inching, and the inching function is invalid.
23	JOGN	Reverse Inching	In speed mode and PA22=5; this signal is turned on and the motor moves in reverse Inching in the opposite direction, the speed is set by PA21. Note: If this signal is turned on at the same time as forward inching, the inching function is invalid.
27	HOLD	Internal Position Control Command to Stop	In internal position register mode, when this signal is turned on, the motor will stop running (can only be used when internal position mode PA-14=3).
28	CTRG	Internal Bit Insertion Command Trigger	In internal position register mode, after selecting the internal position register control command (POSO-2), this signal triggers and the motor operates according to the internal position register command. The next trigger of the internal position register command is accepted only after the digital output of the zero speed signal (ZSPD=1) before the next trigger internal position command is accepted.

<table>
<tr><td>29</td><td>POSO</td><td>Internal Location Command Selection 0</td><td rowspan="3">Correspondence of internal position selection
<table>
<tr><th>Position Command</th><th>POS2</th><th>POS1</th><th>POSO</th><th>CTRG</th><th>Parameters</th></tr>
<tr><td>P1</td><td>0</td><td>0</td><td>0</td><td>↑</td><td>P4-2
P4-3</td></tr>
<tr><td>P2</td><td>0</td><td>0</td><td>1</td><td>↑</td><td>P4-5
P4-6</td></tr>
<tr><td>P3</td><td>0</td><td>1</td><td>0</td><td>↑</td><td>P4-8
P4-9</td></tr>
<tr><td>P4</td><td>0</td><td>1</td><td>1</td><td>↑</td><td>P4-11
P4-12</td></tr>
<tr><td>P5</td><td>1</td><td>0</td><td>0</td><td>↑</td><td>P4-14
P4-15</td></tr>
<tr><td>P6</td><td>1</td><td>0</td><td>1</td><td>↑</td><td>P4-17
P4-18</td></tr>
<tr><td>P7</td><td>1</td><td>1</td><td>0</td><td>↑</td><td>P4-20
P4-21</td></tr>
<tr><td>P8</td><td>1</td><td>1</td><td>1</td><td>↑</td><td>P4-23
P4-24</td></tr>
</table></td></tr>
<tr><td>30</td><td>POS1</td><td>Internal Location Command Selection 1</td></tr>
<tr><td>31</td><td>POS2</td><td>Internal Location Command Selection 3</td></tr>
<tr><td>33</td><td>SHOM</td><td>Primordial Regression</td><td>In the internal position register mode, the home position needs to be searched, and this signal is turned on This signal is turned on to activate the home position search function (refer to the setting of P4-34).</td></tr>
<tr><td>34</td><td>ORGP</td><td>Return to Origin</td><td>In the internal position register mode, when searching for the home position, the servo treats the position of this point as the home position when this signal is turned on (refer to the parameter P4-32 parameter P4-32).</td></tr>
</table>

37	SLADR0	Modbus slave number select 0	**DL4S-1300—DL4S-2300:** Modbus slave number selection correspondence
38	SLADR1	Modbus slave number select 1	
39	SLADR2	Modbus slave number select 2	
40	SLADR3	Modbus slave number select 1	

SLADR3	SLADR2	SLADR1	SLADR0	slave number
0	0	0	0	0(broadcast)
0	0	0	1	
0	0	1	0	2
…	…	…	…	…
1	1	|	0	14
1	1	1	1	15

7.2.3 DO Function List

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

Define value	Sign	Function	Function Analyse
1	ON	Always Valid	Force the output to be ON.
2	RDY	Servo is 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	Alarm	OFF: There is an alarm; ON: No alarm.
4	ZSP	Zero Speed	During speed and torque control, OFF: Motor speed is higher than parameter PA-75 (Regardless of direction); ON: Motor speed is lower than parameter PA-75 (Regardless of direction).
5	COIN	Positioning Completed	During position control, OFF: Position deviation is greater than parameter PA-16; ON: Position deviation is less than parameter PA-16.
6	ASP	Arrive at Speed	During speed and torque control, OFF: Motor speed is lower than parameter PA-28; ON: Motor speed is higher than parameter PA-28. With polarity setting function, please refer to the description of parameter PA-28.
7	ATRQ	Torque Arrival	OFF: The motor torque is lower than parameter PA-89; ON: The motor torque is higher than parameter PA-89. With polarity setting function, please refer to the description of parameter PA-89.

8	BRK	Electromagnetic Brake	OFF :Electromagnetic brake braking; ON :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	Proximity of Positioning	For position control OFF :Position deviation greater than parameter PA-85. ON :Position deviation less than parameter PA-85.
11	TRQL	Torque Limited	OFF :Motor torque has not reached the limit value; ON :Motor torque has reached the limiting value. The torque limiting method is via parameters PA-34, PA-35, PA-36, PA-37.
12	SPL	Speed Limited	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 via parameter PA-50.
13	VCOIN	Consistent Speed	OFF : The absolute value of the difference between the actual speed and the commanded speed is greater than PA76; ON : The absolute value of the difference between the actual speed and the commanded speed is less than PA76.
15	HOME	Return to Origin Completed	OFF : No signal is output when home return is not completed; ON : Signal is output when home 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 time set by P4-1.

18	ZOUT	Z Signal Output	OFF: When the Z signal is invalid, no signal is output; ON: When the Z signal is valid, the signal is output.

7.2.4 DI Mandatory Effective

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

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

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

(2) The corresponding function of P3-16 is represented by 8-bit binary:

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

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

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

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

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

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

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

Parameter Meaning:

Any one of the 5 parameters	Corresponding Function	Functional Results
0	Not Planned	OFF(Invalid)
	Planned	Determined by the signal
1	Not Planned or Planned	ON (forced to be effective)

NOTE

◆ Planned means that the parameter has been selected by the input terminal function in P3-0P3-3, and unplanned is the opposite.

7.3 P4 Group Internal Position Command Series Parameters

NO.	Name	Function	Parameter Range	Factory Value
P4-0	Internal Position Command Command Control Mode	0:Absolute position instruction for PA62 =5 multiturn encoder mode; 1:Incremental position instruction; 2:Absolute position command for PA62 =4 single-turn encoder mode.	0-2	0
P4-1	Internal Location Command Order Completion Digital Output Delay	1. When the internal position command is completed or the internal position command is stopped, after the delay time set by P4-1, the DO signal of internal position command completion (CMDOK) is output. 2. When the P4-1 delay time is set to 0, and the DO signal zero speed detection (ZSPD) is set to 1, the internal position command of the trigger signal will be accepted again. 3. When the P4-1 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.	0-200ms	0
P4-2	Position Lap Setting of Internal Position Command 1	Set the position circle number of the internal position of the first segment.	-30000—30000	0

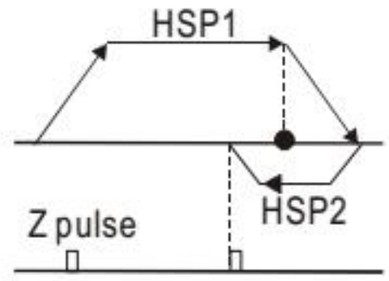
P4-3	Setting the Number of Pulses in the Position Circle of Internal Position Command 1	1. Set the number of position pulses at the internal position of the first segment. 2. Internal position command 1 = the first-stage internal position circle setting value + the first-stage internal position pulse number setting value. (Max is the set number of pulses for one revolution of the motor, please refer to the settings of PA-11 PA-12 PA-13).	+/-max .cnt/rev	0
P4-4	Internal position command control 1 travel speed setting.	Setting the internal position command controls the speed of movement of 1.	0-5000 r/min	1000
P4-5	Internal Position Indicator Position of Order 2 Number of Turns Setting	Set the number of position turns for the inner position of segment 2.	-30000— 30000	0
P4-6	Internal position Bit of instruction 2 Pulses in the position circle Number of pulses in the position circle of internal position instruction 2 is set.	1. Set the number of position pulses for the 2nd segment internal position. 2. Internal position command 2 = Setting value of the number of turns of the 2nd segment internal position + Setting value of the number of pulses of the 2nd segment internal position.	+/-max .cnt/rev	0

P4-7	Internal position command control 2 travel speed setting.	Set the movement speed of internal position command control 2.	0-5000 r/min	1000
P4-8	Internal Location Indicator Position of order 3 Number of turns setting	Sets the number of position turns for the 3rd segment internal position.	-30000— 30000	0
P4-9	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 = Setting value of the number of internal position turns for the 3rd segment + Setting value of the number of internal position pulses for the 3rd segment.	+/-max .cnt/rev	0
P4-10	Internal Position Indication The command controls 3's travel speed Setting	Set the movement speed of internal position command control 3.	0-5000 r/min	1000
P4-11	Position circle setting of internal position command 4	Set the number of position turns for the internal position of segment 4.	-30000— 30000	0
P4-12	Setting the number of pulses in the position circle of internal position command 4	1. Set the number of position pulses for the 4th segment internal position. 2. Internal position command 4 = Setting value of the number of turns of the 4th segment internal position + Setting value of the number of pulses of the 4th segment internal position.	+/-max .cnt/rev	0

P4-13	Internal position command the command controls 4's travel speed setting	Setting the internal position command controls the speed of movement of 4.	0-5000 r/min	1000
P4-14	Position circle setting of internal position command 5	Set the position circle number of the inner position of the 5th segment.	-30000— 30000	0
P4-15	Setting the number of pulses in the position circle of internal position command 5	1. Set the number of position pulses for the 5th segment internal position. 2. Internal position command 5 = Set value of the number of internal position turns for segment 5 + Set value of the number of internal position pulses for segment 5.	+/-max .cnt/rev	0
P4-16	Internal positional instructions the command controls 5's travel speed setting	Set the movement speed of internal position command control 5.	0-5000 r/min	1000
P4-17	Internal location Indicator position of order 6 number of turns setting	Sets the number of bitwise turns for the internal position of segment 6.	-30000— 30000	0
P4-18	Setting the number of pulses in the position circle of internal position command 6	1. Set the number of position pulses for the 6th segment internal position. 2. Internal position command 6 = Set value of the number of internal position turns for segment 6 + Set value of the number of internal position pulses for segment 6.	+/-max .cnt/rev	0

P4-19	Internal position command the command controls 6's travel speed setting	Sets the speed of movement of the internal position command control 6.	0-5000 r/min	1000
P4-20	Internal position indicator position of order 7 number of turns setting	Set the number of position turns for the internal position of segment 7.	-30000— 30000	0
P4-21	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
P4-22	Movement speed setting of internal position command control 7	Set the movement speed of internal position command control 7.	0-5000 r/min	1000
P4-23	Position circle setting of internal position command 8	Set the number of position turns for the internal position of segment 8.	-30000— 30000	0
P4-24	Setting the number of pulses in the position circle of internal position command 8	1. Set the position pulse number of the 8th segment internal position. 2. Internal position command 8 = 8th segment internal position circle setting value + 8th segment internal position pulse number setting value.	+/-max .cnt/rev	0

P4-25	Movement speed setting of internal position command control 8	Set the movement speed of internal position command control 8.	0-5000 r/min	1000
P4-32	Origin detector type and search direction setting	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: Return to the origin 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 to origin. 5: Reverse and directly find the absolute position zero point of a single circle as the return origin.	0-5	0
P4-33	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 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) as the mechanical origin, decelerate and stop.	0-2	0
P4-34	Origin trigger start mode	0: Turn off the origin return function; 1: When the power is turned on, the origin return function is automatically executed; 2: The origin return function is triggered by the input contact of the origin search function (SHOM).	0-2	0

P4-35	Origin stop mode setting	0: After the origin detection is completed, the motor decelerates and pulls back to the origin; 1: After the origin detection is completed, the motor decelerates and stops in the forward direction.	0-1	0
P4-36	First section high-speed origin return speed setting (HSPD1)	Set the first high-speed origin return speed. 	1-2000 r/min	1000
P4-37	Second stage low-speed origin return speed setting (HSPD2)	Set the second low-speed origin return speed.	1-500 r/min	50
P4-38	Origin return offset turns (HOF1)	Set the number of offset turns for origin return.	-30000— 30000	0
P4-39	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 HOF1 x10000+HOF2 as the new origin.	+/-max .cnt/rev	0

Chapter 8 Fault Codes

Fault Symbol	Fault Name	Fault Content
–	Normal	
1	Overspeed	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 Disable Exception	CCW/CW drive prohibition input is both OFF
8	Position Deviation Counter Overflow	The absolute value of the position deviation count value exceeds 230
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
22	Parameter storage does not match encoder parameter storage.	The value of the PA62 parameter was modified, resulting in a change in the default supported encoder types.
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.
31	Encoder UVW signal error	Encoder UVW signal error or encoder mismatch.
32	Encoder UVW signal illegal encoding.	UVW signal has full high level, full low level, or encoder mismatch.
33	UVW signal fault.	No high impedance state in power-up sequence or encoder mismatch.
34	UVW signal is unstable, fluctuating.	UVW signal is poor.
36	When connecting a provincial-line worker encoder, the illegal state is too long.	When connecting a provincial-line worker encoder, the encoder's illegal state is too prolonged.
38	Reading and Writing Encoder EEPROM Communication Failed	The encoder cable is not connected properly or the encoder interface circuit is faulty.
39	Data CRC Check Error	The motor encoder has not written data yet, all are 0.
40	Not Supported Model	The drive does not support this motor model
41	Need to Switch Motor Model	The current motor is inconsistent with the selected model of the driver.
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 establishes communication, 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, an error has occurred in the stored information 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.

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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.
55	CRC check failed continuously for 5 times.	The encoder data received by the driver has more than 5 consecutive CRC check errors.
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 9 Alarm Handling Methods

Alarm Code	Alarm Name	Running Status	Reason	Treatment
1	Overspeed	Appears when control power is turned on.	1. Control circuit board failure. 2. Encoder failure.	1. Replace the servo driver. 2. Replace the servo motor.
		Occurs while the motor is running	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.
		Occurs when the motor is first started	Load capacity is too large.	1. Reduce the load. 2. Replace the driver and motor with higher power.
			1. Encoder zero point error. 2. The UVW lead of the motor is incorrectly connected. 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	Main Circuit Overvoltage	Occurs when control power is turned on	Circuit board failure.	Replace the servo drive.
		Occurs when mains power is switched on	1. The power supply voltage is too high 2. The power supply voltage waveform is abnormal.	Check the power supply.
		Occurs while the motor is running	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 start and stop. 2. Increase the acceleration and deceleration time constant. 3. Reduce the torque limit value. 4. Reduce load inertia. 5. Replace with a higher power driver and motor.
3	Main Circuit Undervoltage	Occurs when mains power is switched on	1. Circuit board failure. 2. The power fuse is damaged. 3. The soft start circuit is faulty. 4. The rectifier is damaged.	Replace the servo drive.
			1. The power supply voltage is low. 2. Temporary power outage for more than 20ms.	Check the power supply.
		Occurs while the motor is running	1. The power supply capacity is not enough. 2. Instantaneous power failure.	Check the power supply.
			Radiator overheated.	Check the load condition.

4	Location out of tolerance	Occurs when control power is turned on	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. The encoder zero point changes. 2. Encoder failure.	1. Readjust the encoder zero point. 2. Replace the servo motor.
		Occurs while the motor is running	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 driver and motor with higher power.
			The command pulse frequency is too high.	Reduce frequency.
			Encoder zero point changes.	Readjust the encoder zero point.
5	Drive Overheated	Occurs while the drive is running	1. Circuit board failure. 2. The drive temperature is too high.	1. Reduce the drive temperature. 2. Replace the servo driver.
6	Speed Amplification Saturation Failure	Occurs while the motor is running	1. The load is too large 2. The motor is mechanically stuck.	1. Reduce load. 2. Replace the driver and motor with higher power. 3. Check the load mechanical part.
7	Driver Prohibited Exception		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 part 2. Check the command pulse 3. Check whether the motor rotates according to the command pulse.
11	IPM Module Failure	Occurs when control power is turned on	Circuit board failure.	Replace the servo drive.
		Occurs while the motor is running	1. The power supply voltage is low. 2. Overheating	1. Check the drive. 2. Power on again. 3. Replace the drive.
			Short circuit between driver UVW.	Check the wiring.
			Poor grounding.	Proper grounding.
			The motor insulation is damaged.	Replace the motor.
			Interference.	1. Add line filter. 2. Stay away from sources of interference.
13	Overload	Occurs when control power is turned on	Circuit board failure.	Replace the servo drive.
		Occurs while the motor is running	Operation exceeding rated torque.	1. Check the load. 2. Reduce the frequency of starts and stops. 3. Reduce the torque limit value. 4. Replace with a higher power driver and motor.
			Keep the brake off.	Check the holding brake.
			The motor oscillates unstable.	1.Adjust the 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	The brake delay is not opened		The PA94 parameter value is set too high, the control pulse is coming, and the brake has not been opened yet.	Reduce the value of parameter PA94
20	EEPROM Error		The chip or circuit board is damaged.	1. Replace the servo driver. 2. After repair, the driver model must be reset (refer to PA10), 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. The parameters of PA30 and PA31 are unreasonable. 2. Unexpected large load occurs.	1. Modify parameters 2. Maintenance of machinery.
38	Read and write encoder EEPROM communication failed		1. The encoder cable is not connected properly. 2. Encoder interface circuit failure	Check the wiring.
39	Data CRC check error		The motor encoder has not written data yet, all are 0.	Write the motor parameters of the corresponding model into the encoder.
40	Not supported model		The drive does not support this motor model.	Use matching motor.
41	Need to switch the motor model		The current motor is inconsistent with the selected model of the driver.	Manually switch the model to the current model.
42	AC input voltage too low	Run when powered down	1. Normal. 2. The external AC voltage input is too low.	Check AC220V input.

47	The main circuit voltage is too high when powering on		1. The external AC voltage input is too high. 2. Main circuit failure.	1. Check AC220V input. 2. 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 was established, an interruption occurred and the connection was 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		Data received through MODBUS communication. CRC validation error occurred 3 times in a row.	Replace the drive.
56	MOD BUS frame too long error		1. The communication protocol does not match. 2. Be disturbed.	1. Confirm the frame length. 2. Add a line filter and stay away from interference.

57	MOD BUS communication format abnormality		1. Improper communication parameter settings. 2. The communication address or value is incorrect.	Replace the drive.
58	Single lap position value error		The single-turn position offset value stored by the drive exceeds the encoder resolution.	Power on again and start.
59	Encoder reports CF error		The encoder continuously reports CF field errors and the encoder needs to be reset.	Reset the encoder.

When connecting a provincial-line worker encoder, the encoder's illegal state is too prolonged.

HKTRobot
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Shenzhen Hengketong Robot Co.,Ltd

Sales Center: 1702, Building 4, Phase 2, Tian'an Yungu Industrial Park,
Gangtou Community, Bantian Street, Longgang District, Shenzhen

R&D Center: Room 501, 5th Floor, Building 1, Guanghui Science and technology Park,
Minqing Road, Longhua Street, Longhua District, Shenzhen

Zip code: 518129

Tel: Ms Liu: 133 1295 3695 (Whastapp)
Ms Wang: 188 2652 6042 (Whastapp)

Email: ivy@hkt-robot.com
Jessiewang@hkt-robot.com

https://www.agvdrivewheel.com