杰美康机电
JUST MOTION CONTROL

JAND series AC servo driver User manual

JAND-1002
JAND-2002
JAND-4002
JAND-7502
JAND-15002

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Preface

Version	Writer	Approved
V1.2	R&D	R&D

Contents

Chapter 1 Safety Precautions

In order to prevent harm to personal and property safety, please be sure to observe the following precautions, and the following marks are specially marked for distinction:

 Danger	Indicates a high risk of death or serious injury
 Notice	Indicates that there is a high possibility of minor injury or property damage
	Indicates prohibited items

1.1 Precautions for receiving and installing

 Danger：1、Please use it with the driver and motor according to the specified method, otherwise it will cause equipment damage or fire.

2、It is forbidden to use it in places with severe water vapor, flammable gas, corrosive gas, etc., otherwise it will cause electric shock, fire, equipment damage, etc.

1.2 Wiring Precautions

 Danger：1、Do not connect the driver power supply to the U, V, W motor output terminals, otherwise the driver will be damaged, which may cause personal injury or fire.

2、Please confirm that the connecting wires of the power supply and motor output terminals are locked tightly, otherwise sparks may be caused and fire may result.

3、Please choose the power cord and motor power extension cord correctly to avoid fire caused by insufficient current capacity of the wire.

4、Please confirm that the driver shell and the motor are grounded. Poor grounding may cause electric shock.


Notice ： 1. Please do not bind the motor power line and signal line together or pass through the same pipeline to prevent interference to the signal.

2. Please use multi-strand twisted and shielded wires for signal wires and encoder feedback extension wires to enhance anti-interference ability.

3. After the driver is powered off, there is still high voltage inside, please do not touch the power terminal within 5 minutes, and confirm that the discharge indicator light is off before operating.

4. Before powering on, please confirm whether the wiring is connected correctly.

1.3 Precautions for operation and operation


Danger ： 1. Before installing the equipment, please run it without load to avoid accidents.

2. Do not allow untrained personnel to operate to prevent equipment damage and personnel injury caused by misoperation.

3. During normal operation, please do not touch the radiator and its interior of the driver with your hands to prevent high temperature burns or electric shock.


Notice：1. Please adjust the driver parameters first, and then test for a long time to prevent bad use of the driver and equipment.

2. Please confirm that the switches such as equipment startup, emergency stop, and shutdown are valid before operating the equipment.

3. Please do not switch the power on and off frequently.

1.4 Precautions for maintenance and inspection


： 1. During operation, it is forbidden to touch the inside of the driver and motor to prevent electric shock.

2. Within 5 minutes after the power is turned off, do not touch the power supply and power terminals to prevent electric shock.

3.Do not change the connecting wire while the power is on, in case of electric shock or personal injury

4. It must be operated and maintained by trained professionals.

5. Do not disassemble and repair except for our company personnel.

Chapter 2 Product Introduction

2.1 Servo driver

2.1.1 Overview

The JAND series universal servo driver is a high-performance AC servo unit developed by JMC. The servo driver in this series adopts advanced motor control dedicated DSP chips, large-scale programmable gate arrays (FPGAs), and IPM power modules, which have the characteristics of small size, high integration, stable performance, and reliable protection. With rich digital and analog I/O interfaces, it can be used in conjunction with various upper computer devices and supports MODBUS communication protocol for convenient networking. By optimizing the PID control algorithm, full digital control of position, speed, and torque accuracy is achieved, which has the advantages of high accuracy and fast response. Simultaneously supporting 17 bit and 20 bit high-precision absolute encoder motors to meet different performance requirements for customers. Widely used in automation fields such as CNC machine tools, printing and packaging machinery, textile machinery, robots, and automated production lines.

2.1.2 Main Features

1. Using DSP+FPGA dual chip platform and optimized Current loop design, the driver has the characteristics of high dynamic response, extremely short setting time, stable operation and small vibration when stopping.
2. Equipped with an automatic gain adjustment module, users can choose the rigidity level according to their needs.
3. Built-in FIR filter and multiple sets of notch filters can automatically identify and suppress mechanical vibration.
4. The built-in disturbance torque observer provides the driver with strong resistance to external disturbances.

5. There are multiple control modes to choose from, including position control, speed control, and torque control, and various control modes can be switched.
6. The position pulse input frequency reaches 4MHz and supports multiple position command modes such as pulse+direction, orthogonal pulse, double pulse, etc.
7. Equipped with RS485 interface, supporting MODBUS communication, and combined with a multi turn absolute value encoder with memory function, it can be flexibly applied to industries such as robotic arms.
8. There are programmable 8-way Input and 5-way OUTPUT ports, allowing users to customize input and output through parameter settings, making applications flexible.
9. Supports 17 bit and 23 bit high-precision absolute value encoders.
10. It has complete protection functions such as overvoltage, undervoltage, overspeed, overload, large position deviation, encoder error, and can remember 8 sets of historical fault information.
11. With a rich range of monitoring projects, users can choose the desired monitoring project to monitor the operation status during use.
12. The driver can communicate with a PC through the RS232 interface, achieving simple and fast debugging of the servo drive system.

2.1.3 Driver specifications

1. Electrical specifications

a) Single phase 220V level servo driver

Model JAND * * 2-20B	200	400	750	1500
Single phase continuous input current Arms	2.3	4.6	8.7	11.6
Continuous output current Arms	2.1	2.8	5.5	10
Maximum output current Arms	5.8	9.6	16.9	20
Power specifications	Single phase AC180-240V, 50/60Hz			

Brake processing function	External braking resistor	Brake resistor built-in

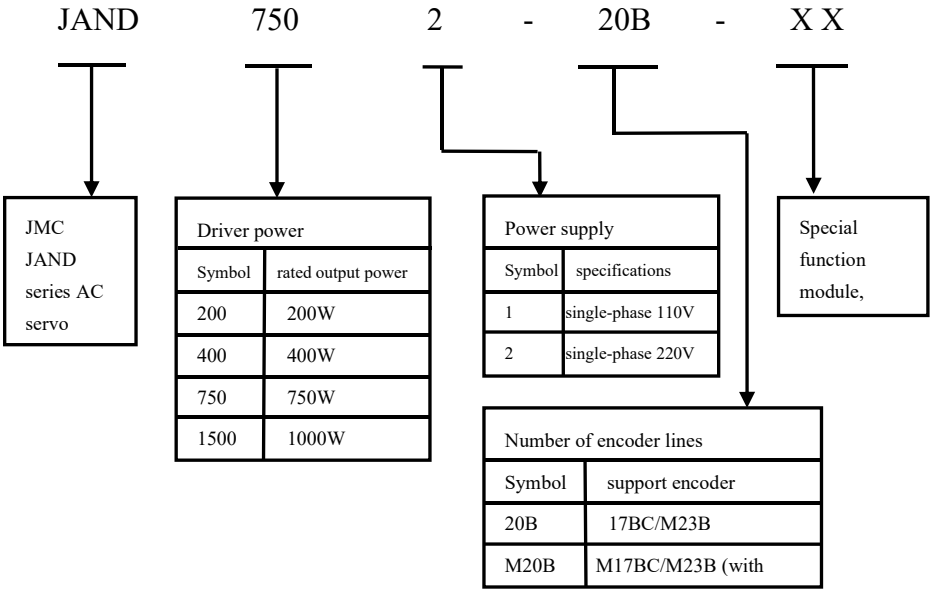
2. Basic specifications

Project		Describe
Control method		Single phase full wave rectification IGBT PWM Control Sine Wave Current Drive Method
Feedback		Absolute value encoder (17B/M23B)
Conditions of use	Temperature	Working temperature: 0-55 ℃ Storage temperature: -25-85 ℃
	humidity Temperature	Work: 10%~90%
	Altitude	When<1000m or above 1000m, it should be derated according to GB/T 3859.2-93
	Protection level	Protection level: IP10, cleanliness: 2 No corrosive or flammable gases No oil or water splashing Environments with less dust, salt, and metal powder
performance	Speed adjustment range	1: 5000
	Steady speed accuracy	± 0.01%: external load variation 0-100% ± 0.01%: Power input variation ± 10% (220V) ± 0.1%: ambient temperature ± 25 ℃ (25 ℃)
	Speed response frequency	1200Hz
	Torque control accuracy	± 2%
Input and output signals	Encoder frequency division pulse output	A-phase, B-phase, C-phase: linear drive output Frequency division pulse number: can be set arbitrarily
	Input signal	Points: 8 Functions: servo ON, alarm clearing, forward overtravel signal input, reverse overtravel signal input, control mode switching, P action command input, external torque limit on forward rotation side, external torque

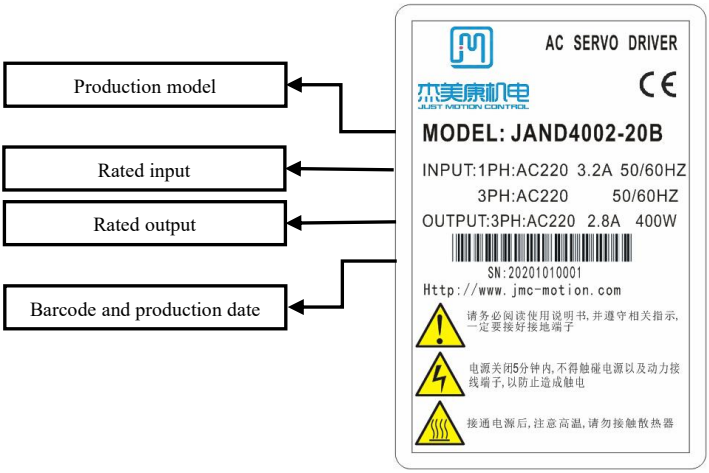
		limit on reverse side, gain switching input, zero fixed input, command pulse prohibition input, encoder absolute value data requirement input, internal set speed switching input 1, internal set speed switching input 2, internal set speed switching input 3 Position command reset input, magnetic pole detection input, command pulse input rate switching input
	output signal	Points: 5 Function: alarm output, bandbrake open output, servo ready output, positioning complete output, positioning close output, speed consistent output, motor zero speed output, torque limit detection output, speed limit detection output, warning output, command pulse input rate switching output
Display function		High voltage power indicator light, 6-position 8-segment LED
Communication function	RS485	Support MODBUS protocol. Axis address: set through parameters
	RS232	Connect to PC for debugging and trial use
Regeneration treatment		Built in regenerative resistor or external regenerative resistor
Protection function		Overvoltage, undervoltage, overcurrent, overload, etc

2.1.4 Servo drive nameplate and model description

1. Model Description:



2. Nameplate content description



2.2 Servo motor

2.2.1 Overview

JASM series servo motors are high speed and high-precision servo motors developed by JMC to meet the requirements of modern automatic control; The servo motor of this series can control the speed and position accuracy very accurately, and can convert the voltage signal into torque and speed to drive the control object. The rotor speed of this series of servo motors is controlled by input signals and can react quickly. In automatic control systems, it is used as an executing element and has characteristics such as small electrical and mechanical time constants, high linearity, and starting voltage. It can convert the received electrical signals into angular

displacement or angular velocity output on the motor shaft, and can provide real-time feedback signals to the servo driver for adjustment, achieving high-precision control.

2.2.2 Main Features

1. High-energy magnetic force
2. Short term 300% overload capacity
3. Flange size (mm): 40, 60, 80, 110, 130
4. Power: 0.1-3KW optional
5. Low noise, low heat generation, high precision, high speed, etc

2.2.3 Servo motor nameplate and model description

1. Model Description

80 JASM 5 07 2 30 K - 17B - XX

Flange size (mm)
60、80、110、130

JASM AC series servo motor

pole pairs	
4	Four (default)
5	Five pairs

Rated output power	
symbol	Rated power
02	200W
04	400W
07	750W
08	850W
10	1000W
15	1500W

Power supply	
1	110V
2	220V

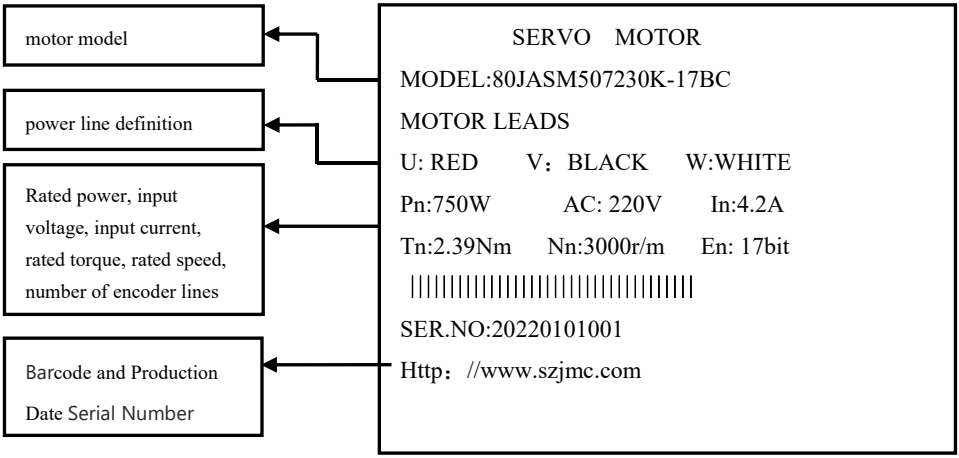
Motor rated speed	
15	1500 RPM
20	2000 RPM
30	3000 RPM

Motor shaft type	
K	keyway
F	flat shaft
S	shaft
G	Gearbox
P	special

Encoder lines
17BC/M17BC
M23B

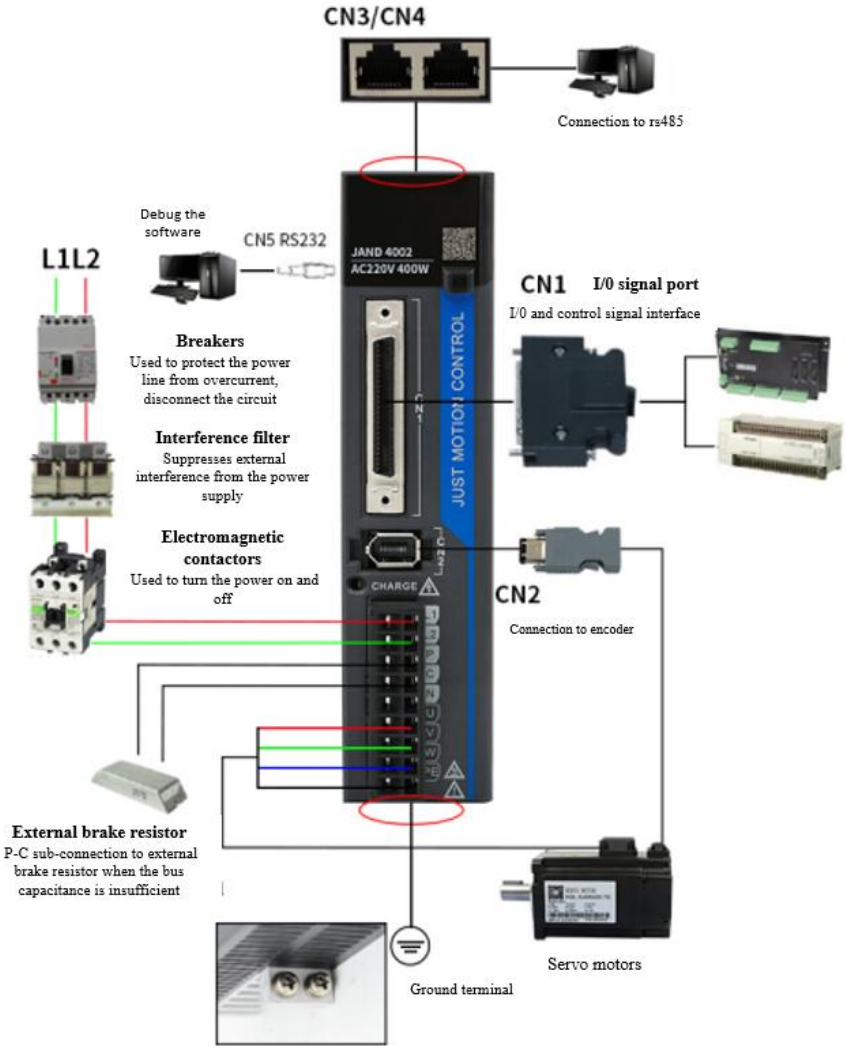
Special function module, the default is the standard type

2. Nameplate content description



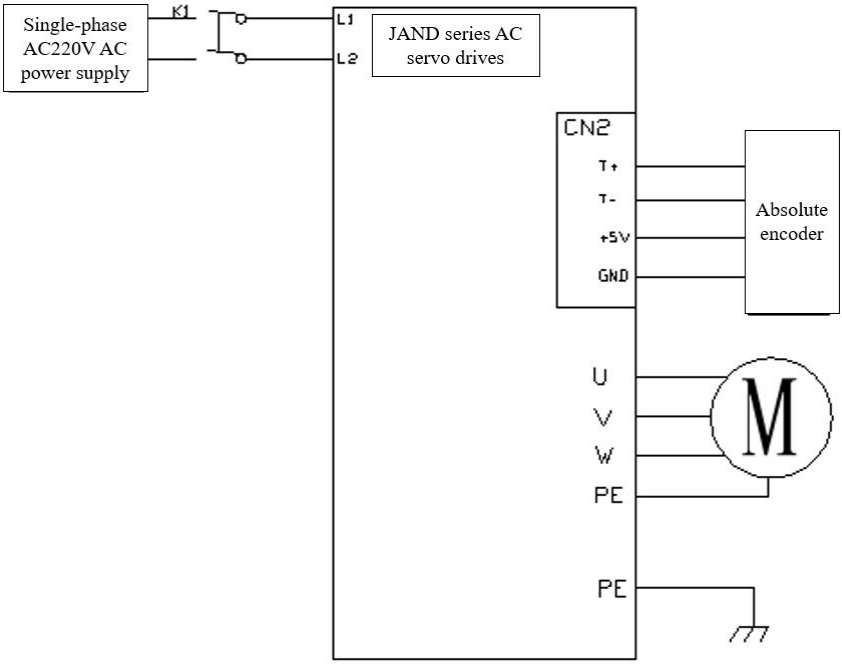
2.3 Main circuit wiring of the servo control system

2.3.1 Servo Control System Wiring Diagram



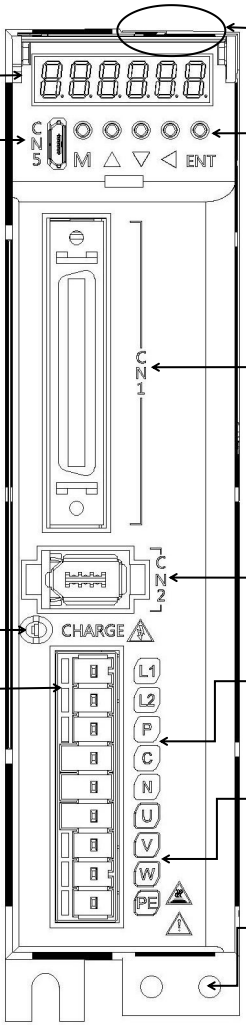
The servo driver is directly connected to the industrial power supply and does not use power isolation such as transformers. To prevent cross electric shock accidents in the servo system, please use fuses or wiring circuit breakers on the input power supply. Due to the lack of a built-in grounding protection circuit in the servo drive, in order to form a safer system, please use a leakage circuit breaker that combines overload and short circuit protection or a dedicated leakage circuit breaker for supporting ground wire protection.

2.3.2 Main power circuit connection



Chapter 3 Port Description and Wiring

3.1 Distribution of servo driver ports



Panel LED display

Display servo driver status, alarm number, parameters, etc

PC debugging port (CN5)

RS232 communication

CHARGE indicator light

If the indicator light is on, it indicates that there is high voltage inside the drive. Do not touch the

Main circuit and control power ports (L1, L2)

Single phase 220VAC power

485 communication port

Panel operation buttons

Set parameter usage

Output signal terminal

Encoder connection

Regenerative resistor connection port

When using an external resistor, the external resistor

Power line port

According to the power line U, V, W, PE standards

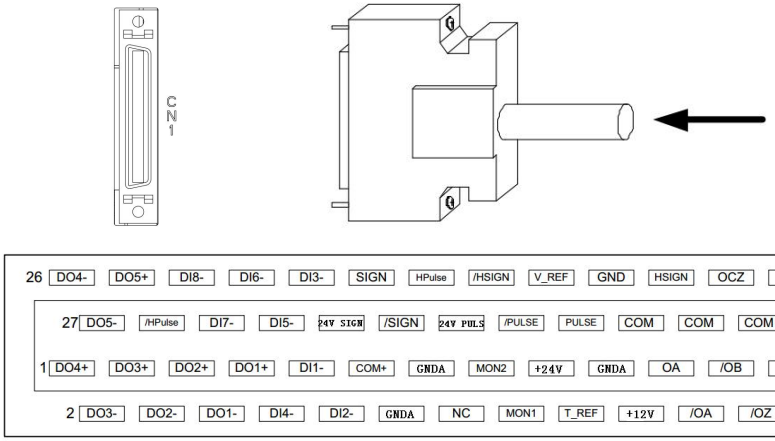
Grounding protection screw

To prevent electric shock, please be sure to connect it

3.2 Description of servo driver CN1 control port

3.2.1 CN1 Control Port Definition

Interface between upper control and driver, used for upper computer control of driver and driver feedback output



CN1 Definition of each pin of the terminal:

Pin number	标号	Definition	Explanation
1	DO4+	Digital output positive	Custom output port
2	DO3-	Digital output negative	Custom output port
3	DO3+	Digital output positive	Custom output port
4	DO2-	Digital output negative	Custom output port
5	DO2+	Digital output positive	Custom output port
6	DO1-	Digital output negative	Custom output port
7	DO1+	Digital output positive	Custom output port
8	DI4-	Digital input negative	Custom input port
9	DI1-	Digital input negative	Custom input port
10	DI2-	Digital input negative	Custom input port
11	COM+	Common Input	High level 24V active
12	GNDA	Simulated ground	
13	GNDA	Simulated ground	
14	NC	No effect	

15	MON2	Analog data monitoring output 2	This feature is not currently supported
16	MON1	Analog data monitoring output 1	This feature is not currently supported
17	+24V	+24V output (for external I/O)	Maximum allowable output current: 150mA
18	T_REF	Torque analog control positive	
19	GNDA	Simulated ground	
20	+12V	+12V output (for analog commands)	Maximum allowable output current: 50 mA
21	OA+	Encoder A-phase positive output	
22	OA-	Encoder A-phase negative output	
23	OB-	Encoder B phase negative output	
24	OZ-	Encoder Z-phase negative output	
25	OB+	Encoder B-phase positive output	
26	DO4-	Digital output negative	Custom output port
27	DO5-	Digital output negative	Custom output port
28	DO5+	Digital output positive	Custom output port
29	HPUL-	High speed pulse negative	
30	DI8-	Digital input negative	Custom input port
31	DI7-	Digital input negative	Custom input port
32	DI6-	Digital input negative	Custom input port
33	DI5-	Digital input negative	Custom input port
34	DI3-	Digital input negative	Custom input port
35	24V SIGN+	24V direction positive	High level 24V active
36	SIGN+	Direction positive	High level 5V effective
37	SIGN-	Direction negative	Low level 0V effective
38	HPUL+	High speed pulse correction	
39	24V PULS+	24V pulse correction	High level 24V active
40	HSIGN-	Negative in high-speed direction	
41	PULS-	Pulse negative	Low level 0V effective
42	V_REF	Speed analog control positive	
43	PULS+	Pulse Chongzheng	High level 5V effective
44	GND	Digitally	
45	COM	+24V output ground	
46	HSIGN+	High speed direction positive	
47	COM	+24V output ground	

48	EYES	Encoder Z-phase open collector output	
49	COM	+24V output ground	
50	OZ+	Encoder Z-phase positive output	

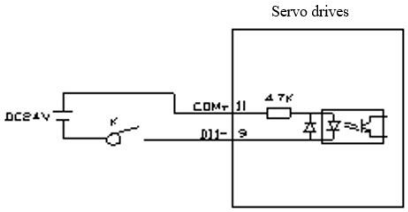
Note：

1. When wiring the CN1 terminal, 24V PULS+shares PULS - with PULS+, and 24V SIGN+shares SIGN - with SIGN+. The difference is only one 24V high-level input and one 5V high-level input.

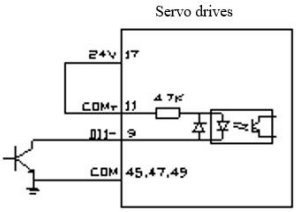
2. Please refer to the customized function settings for digital input (DI) and output (DO) ports **Chapter 8 Parameter Description** To set.

3.2.2 CN1 control port connection instructions

Digital input DI (DI1-DI8) can be connected with switches, relays and Open collector transistor circuits. You can use the power supply provided internally by the drive, or it can be powered by an external power supply. (Please refer to Chapter 8.2.7 P06-xx I/O Parameter Description for the function settings of the input I/O port.)

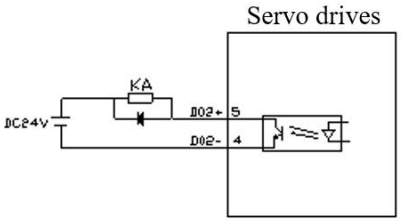


Using external power input

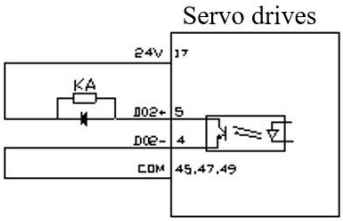


Using internal power input

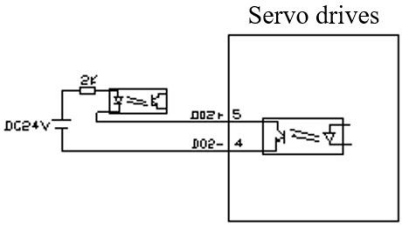
Digital output The DO (DO1-DO5) output can be connected to relays, optocouplers, etc. You can use the power supply provided internally by the drive or an external power supply. When using an internal power supply, the internal 24V power supply of the drive can only provide 150mA current. When the load is greater than 150mA, please be sure to use an external power supply with a voltage range of**5-24V**. (Please refer to Chapter 8.2.7 P06-xx I/O Parameter Description for the function settings of the output I/O port.)



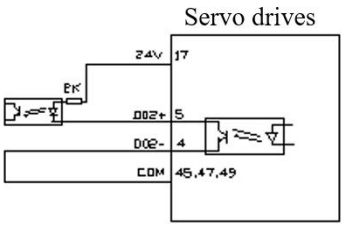
(Relay) Using external power supply



(Relay) Using internal power supply

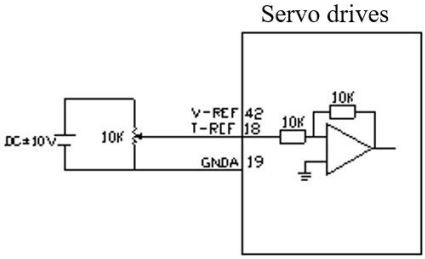


(Optocoupler) Using external power supply

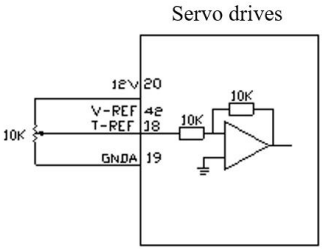


(Optocoupler) Using internal power supply

Speed and torque control analog quantity control input effective voltage range（**-10V~10V**）The command value corresponding to this voltage range can be set by the following parameters: P06-40 speed simulation command input gain, P06-43 torque simulation command input gain. Please refer to the detailed parameter description for specific setting methods.

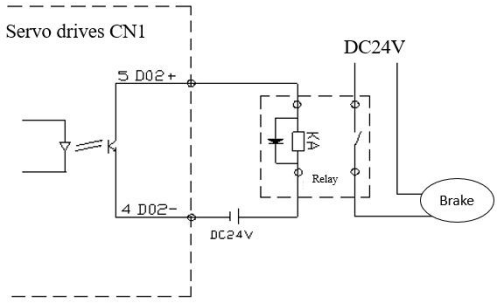


The analog quantity signal of the external power supply



The internal 12V power supply, and the speed/torque is adjusted through the Potentiometer

3.2.3 Brake Control Connection Diagram

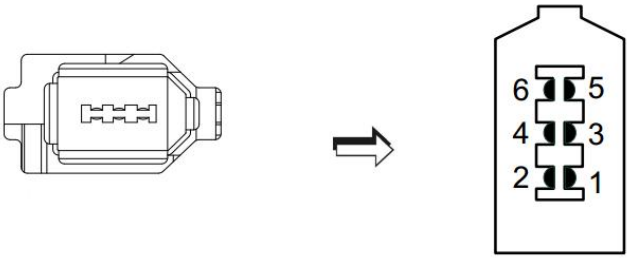


Note: 1.The factory brake function of the driver is controlled by DO2 (5, 4 pins) in CN1 to control the relay, and the relay switch controls the brake coil.

2. It is recommended to use a separate power supply for the brake coil

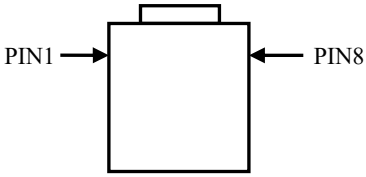
3.3 Driver CN2 encoder port description

3.3.1 1394-6P Encoder Connector Description



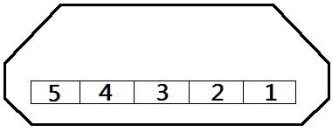
Pin number	mark	definition	remark
1	+5V	Output 5V power supply	
2	GND	Output power ground	
3	NC	No connect	
4	NC	No connect	
5	T+	Bus encoder T+	Bus driven dedicated
6	T-	Bus encoder T-	Bus driven dedicated

3.4 Driver CN3/CN4 Port Description



pin#	mark	Definition
PIN1	CANH	CNAH for bus servo only
PIN2	CANL	CNAL for bus servo only
PIN3	CGND	CGND for bus servo only
PIN4	reserve	reserve
PIN5	reserve	reserve
PIN6	GND	ground
PIN7	485-	485-
PIN8	485+	485+

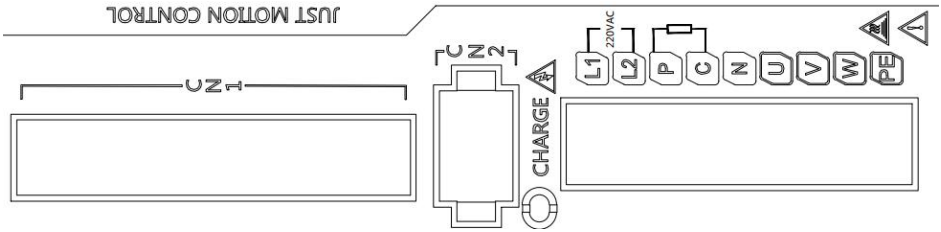
3.5 Drive CN5 Port Description



Facing the CN5 port head-on

Foot position number	mark	Definition Description
1	3.3V	RS232 power supply 3.3V
2	TX232	RS232 reception
3	RX232	RS232 transmission
4	obligate	Prohibit connection
5	GND	RS232 ground

3.6 Instructions for 200W/400W power supply and motor power line ports



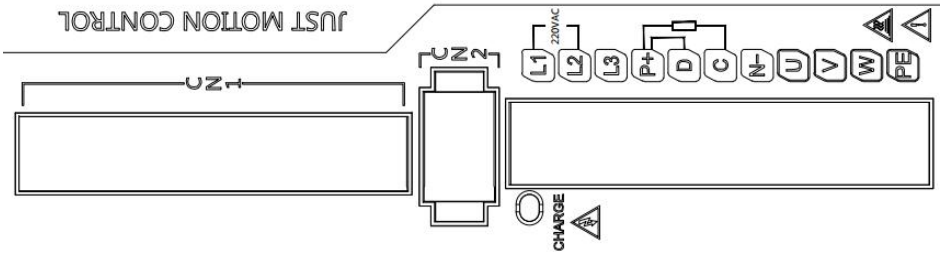
mark	mark	Description
L1、L2	Main circuit power supply and control circuit power input terminal	Connected to single-phase 220V AC power
U、V、W	Motor power line connection end	Connecting the motor power line
P、C、N	Regenerative resistor connection terminal	When using an external regenerative resistor, connect the resistor to ports P and C
PE/grounding screw	Driver protective ground screw	Ground wire for power supply and motor
Power indicator light	Driver power indication	Display whether there is high voltage inside the driver

Notice：

1. Please make sure to connect an electromagnetic contactor between the power supply and the main circuit power supply of the servo drive, so that in the event of a servo drive failure, the power supply can be cut off to prevent excessive current from causing a fire.
2. 0.4kw and below drivers do not have built-in regenerative resistors, which will occur when the feedback energy exceeds the capacitor's absorption capacity AL.402Overvoltage alarm,

at this time, it is necessary to connect an external regenerative resistor and set P00-30, P00-31, and P00-32 to corresponding values. Please refer to the details for more information8.2 Parameter Analysis Description。

3.7 Description of 750/1500W power supply and motor power line ports



mark	Definition	Description
L1、L2、L3(750W)	Main circuit power supply and control circuit power input terminal	L1 and L2 ports are connected to single-phase 220V AC power, and L3 is an empty leg
L1、L2、L3(1500W)		Choose single or three-phase 220V AC power according to the load situation
U、V、W	Motor power line connection end	Connecting the motor power line
P+、D、C、N-	Regenerative resistor connection terminal	Short circuit P+and D using a built-in regenerative resistor When using an external regenerative resistor, connect

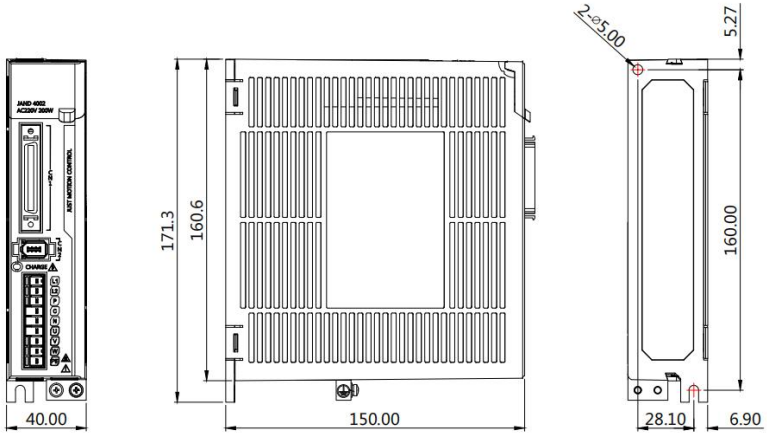
		the resistor to ports P and C
PE/grounding screw	Driver protective ground screw	Ground wire for power supply and motor
Power indicator light	Driver power indication	Display whether there is high voltage inside the driver

Notice：

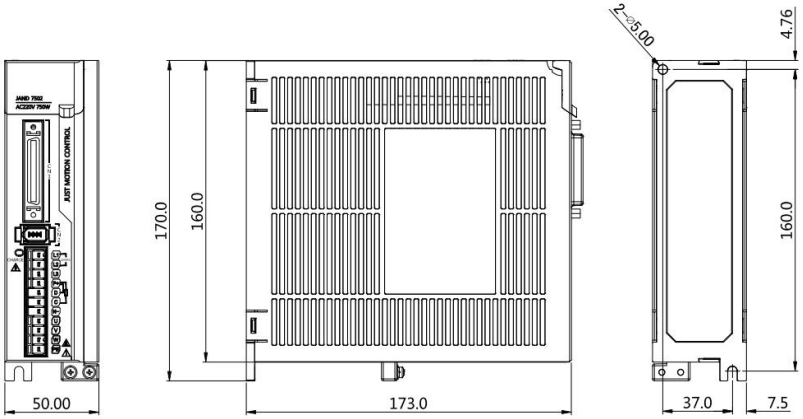
1. Please make sure to connect an electromagnetic contactor between the power supply and the main circuit power supply of the servo drive, so that in the event of a servo drive failure, the power supply can be cut off to prevent excessive current from causing a fire.
2. The 0.75kw driver has a built-in regenerative resistor. Please short circuit P+and D when using it. When the feedback energy exceeds the absorption capacity of the built-in regenerative resistor, it will occur **AL.402**Overvoltage alarm, in which case an external regenerative resistor needs to be connected. Before connecting the resistor, remove the P+and D short wires, and then connect both ends of the resistor to the P+and C terminals. Set the parameters P00-30, P00-31, and P00-32 to the corresponding values, as detailed in**8.2 Parameter Analysis Description**。

Chapter 4 Installation Instructions

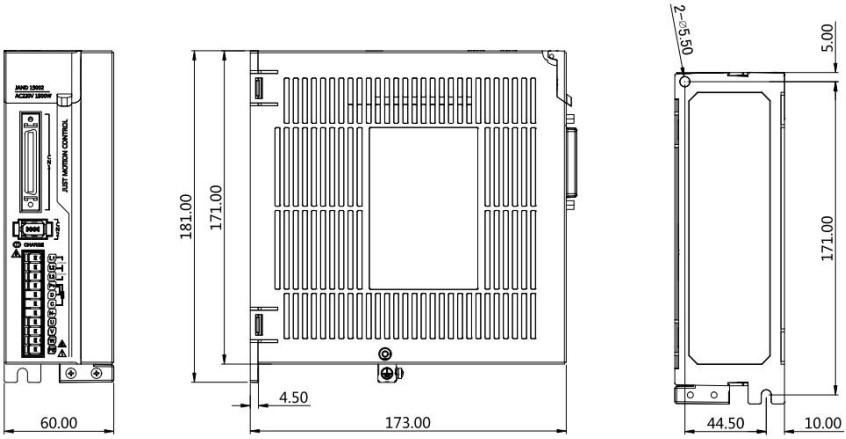
4.1 Installation dimensions



400WAC servo driver with power up to and including (unit: mm)



750WAC servo driver (unit: mm)



1500WAC servo driver (unit: mm)

Attention:

1. The normal installation direction of the servo driver must be vertical and upright, with the top facing upwards to facilitate heat dissipation.

2. When installing the drive, ensure good ventilation of the equipment. When multiple drives are used in parallel within the cabinet, ensure that the distance between them is not less than 5CM.

3. To ensure safe use, please ensure that the grounding protection terminal of the driver is well connected to the equipment protection ground!

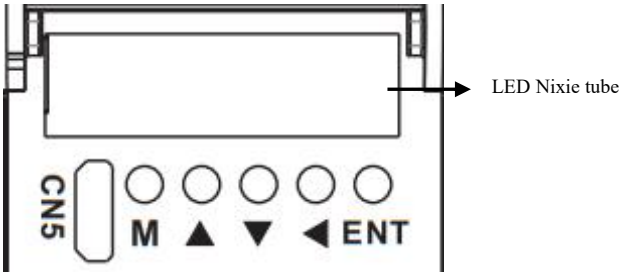
4.2 Installation and usage environment

The installation and use environment directly affects the normal operation and service life of the product, so the following conditions must be met:

1. Working environment temperature: 0-55 ℃; Working environment humidity: below 10% -90% (without condensation).
2. Storage environment: -20 ℃~+85 ℃; Storage environment humidity: below 90% (without condensation).
3. Vibration: below 0.5G.
4. Prevent rainwater dripping or damp environments.
5. Avoid exposure to sunlight.
6. Prevent oil mist and salt erosion.
7. Prevent corrosive liquids, gases, etc.
8. Prevent dust, cotton wool, and metal filings from invading.
9. Stay away from radioactive substances and combustibles.
10. Space should be reserved around the placement of drives in the cabinet for easy loading, unloading, and maintenance.
11. Pay attention to the air flow inside the cabinet, and if necessary, install an external fan to enhance the air flow and reduce the ambient temperature of the drive to facilitate heat dissipation; Long term working temperature below 55 ℃.
12. Try to avoid vibration sources nearby and install shock absorbers such as vibration absorbers or anti vibration rubber gaskets.
13. If there is an electromagnetic interference source nearby and the power supply and control circuit of the driver are susceptible to interference, resulting in misoperation, a noise filter can be added or various effective anti-interference measures can be taken to ensure the normal operation of the driver (the noise filter will increase leakage current, and an isolation transformer needs to be installed at the input end of the driver power supply).

Chapter 5 Panel Display Description and Settings

5.1 Introduction to the Functions of Each Part of the Panel



JAND series AC servo panel adopts six digit LED tube to display status; 5-digit key input command, specific key functions are as follows:

Panel button label	Definition	Description
M	M button	Function switching and cancellation exit
▲	UP button	Display change and numerical increase function
▼	Down button	Display changes, numerical reduction function
◀	Left button	Shift function Used to switch high/low display in parameter mode
ENT	ENT button	Confirm or save functions

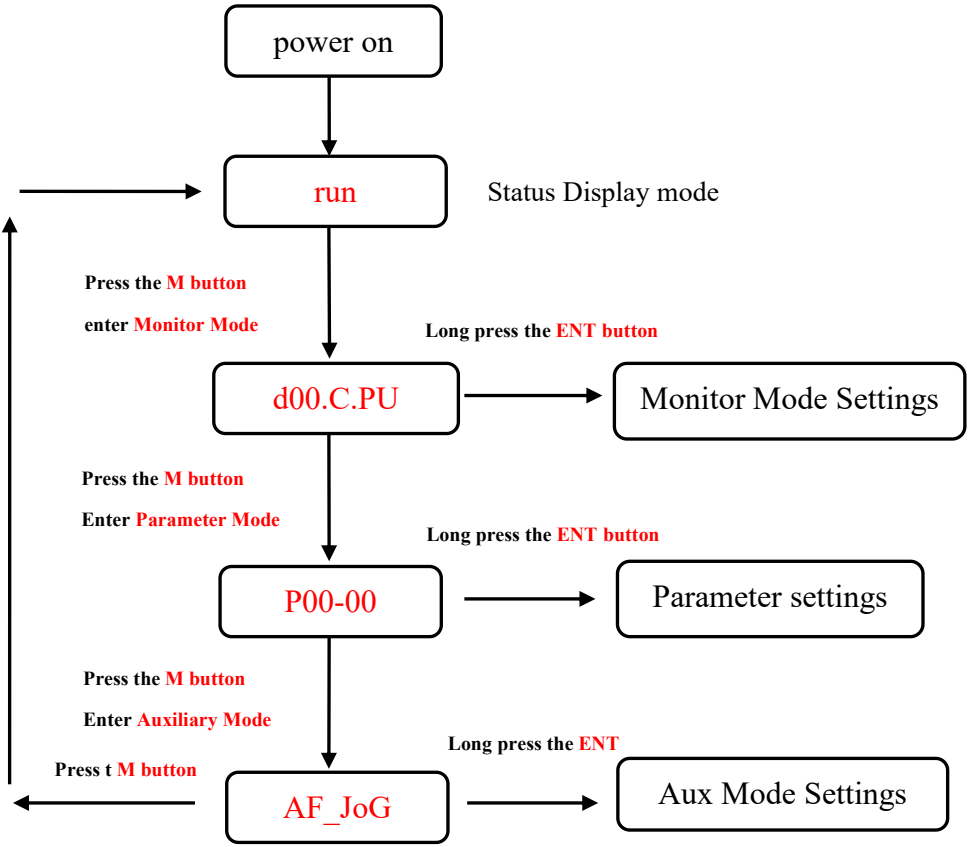
Remarks:

ENT button Long press and hold for 3 seconds to confirm or save the function.

In the monitoring and parameter interface, long press and hold UP/DOWN button Can be flipped quickly.

5.2 Switching process of operation mode

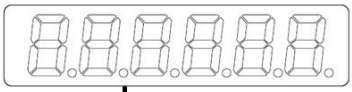
The JAND series AC servo has four functional modes, namely status display mode, monitoring mode, parameter setting mode, and auxiliary mode. The switching process between them is as follows:



Note: Press **ENT button** After entering the mode setting, you can press the **M button** Exit mode selection

5.3 Status display

The display discrimination is as follows:



Meaning of status display bit data:

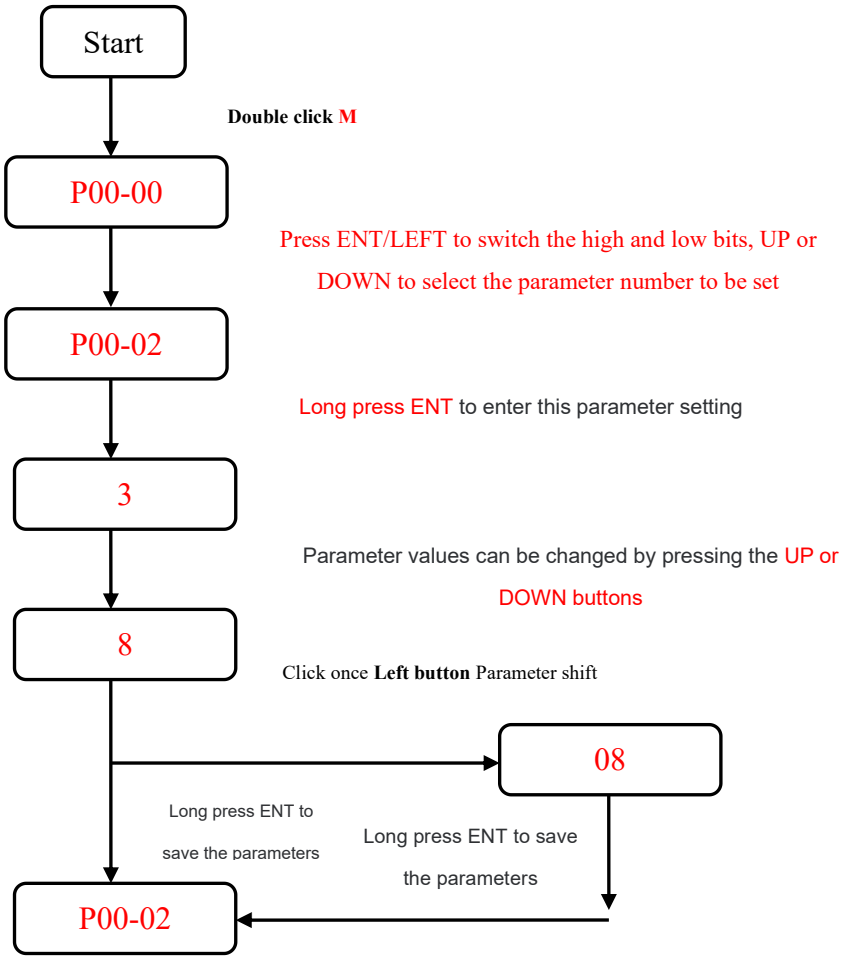
Display	Meaning	Display	Meaning
	Control circuit power on display		Main circuit power supply ready display
	When controlling speed and torque: speed consistent display When controlling the position: positioning completion display		Rotation detection display
	Base blocking display Servo OFF status lights up, ON status turns off		During speed and torque control: speed command input During position control: displayed in command pulse input

Meaning of abbreviated symbols for status display:

Display	Meaning
	Servo not ready (power supply not powered on)
	Servo ready (servo motor not powered on)
	Servo enabled state (servo motor energized state)
	**Forward overtravel signal input** The port is in a valid state, and the motor forward rotation command is invalid
	**Reverse overtravel signal input** The port is in a valid state, and the motor reverse command is invalid
	Servo related operations completed correctly

	The servo is in an enabled state and cannot be operated. It must be turned off before operation can proceed
	Invalid value entered, servo will not perform current operation
	The relevant parameters of the servo are in a locked state and can only be operated after unlocking
	Servo fault display, fault definition, please refer to Chapter 9

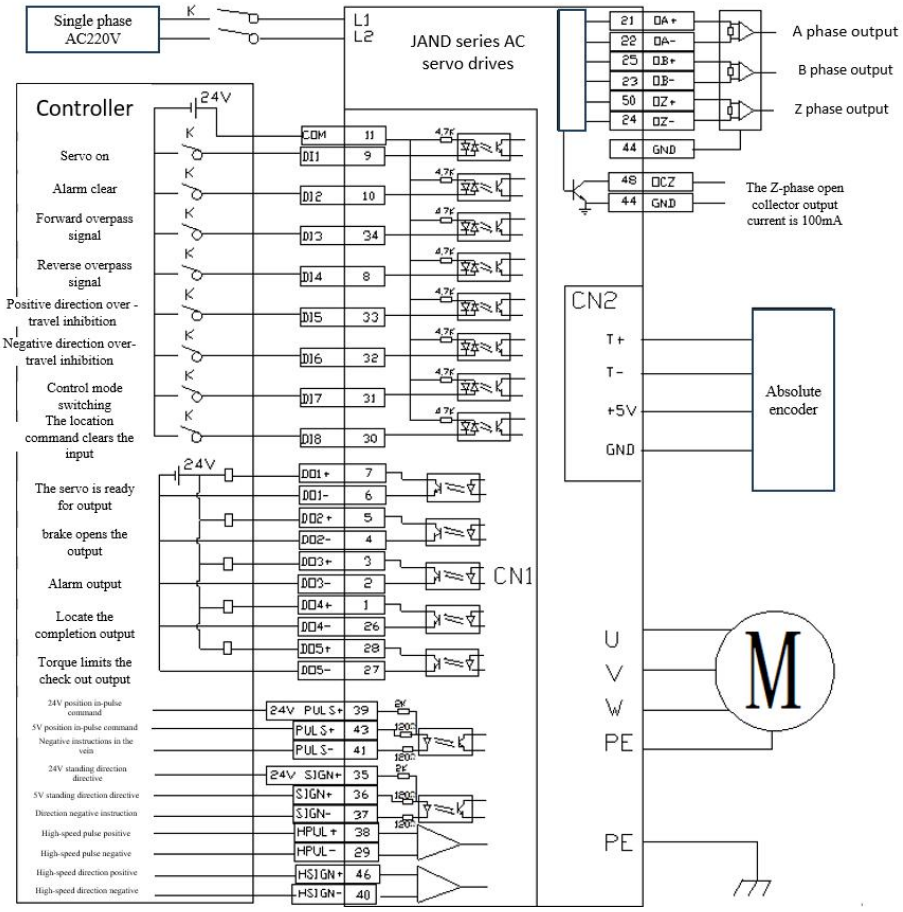
5.4 Parameter Setting Writing and Saving Method


Start
Double click M
P00-00
Press ENT/LEFT to switch the high and low bits, UP or DOWN to select the parameter number to be set
P00-02
Long press ENT to enter this parameter setting
3
Parameter values can be changed by pressing the UP or DOWN buttons
8
Click once Left button Parameter shift
08
Long press ENT to save the parameters
Long press ENT to save the parameters
P00-02

Chapter 6 Control Methods and Settings

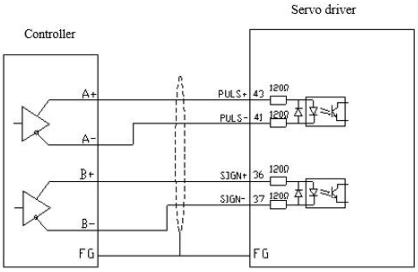
6.1 Position control

6.1.1 Position control wiring diagram

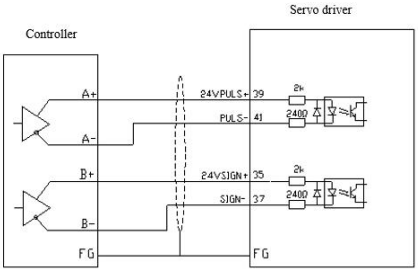


6.1.2 Position Control Wiring Diagram

Controller end direction+pulse input method description: The direction+pulse input is divided into 5V and 24V signal input methods. The use of twisted pair connection can improve anti-interference ability. In general, microcontroller controller systems often use this position control wiring method. This type of control method has a maximum input pulse frequency of 500KHz

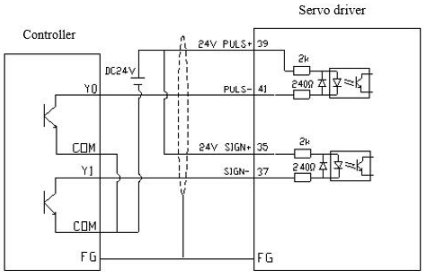


5V pulse+directional differential input mode

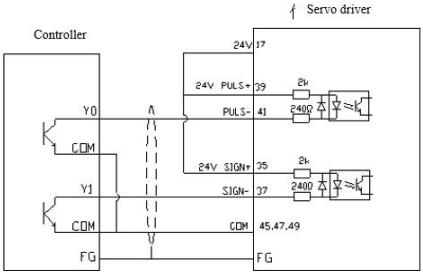


24V pulse+directional differential input mode

Description of Open collector input mode at the controller end: The single end input mode can use the power supply provided inside the driver or external power supply. However, dual power inputs cannot be used to avoid damaging the drive. In general, PLC controller systems often use this position control wiring method



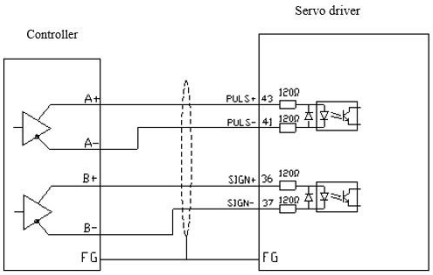
Open collector uses external power supply



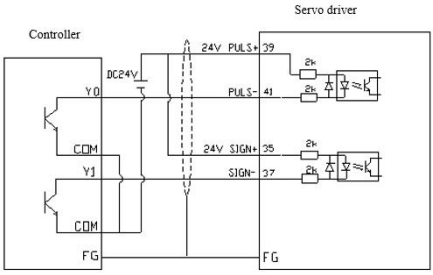
Open collector uses internal power supply

Notice： When inputting high-speed pulse ports, the high level must be between 3.3-5V

Pulse command input can be divided into differential signal input and Open collector input. The maximum frequency of differential signal input reception is 500K, and the maximum frequency of Open collector input reception is 200K.



Differential signal input



Open collector input

6.1.3 Description of Position Control Mode Parameters

1. Motor and driver control parameters

Para code	Name	Range	Default	Description
P01-01	Control mode setting	0-6	0	0: Position mode 1: Speed mode 2: Torque mode 3: Speed, torque 4: Position, speed 5: Position, torque 6: Reserved
P03-00	Location Command Source	0-1	0	0: Pulse instruction 1: Number given
P03-01	Command pulse mode	0-3	1	0: Orthogonal pulse instruction 1: Direction+pulse command 2 or 3: Double pulse instruction

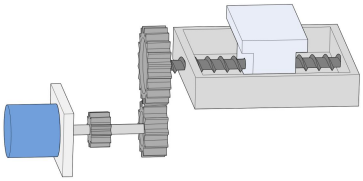
P03-02	Command pulse input terminal	0-1	0	0: Low speed pulse 1: High-speed pulse
P03-03	Instruction pulse inversion	0-1	0	Set the initial direction of motor rotation
P03-09	Number of command pulses for one revolution of the motor	0-65535	10000	Set according to user needs For details, please refer to**8.2 Parameter Description**
P03-10	Molecules of electronic gear 1	1-65535	1	Set according to user needs For details, please refer to**8.2 Parameter Description**
P03-11	Denominator of electronic gear 1	1-65535	1	
P03-15	Excessive position deviation setting	0-65535	30000	Set according to user needs
P03-25	Absolute value motor rotates one revolution to output pulse count	0-60000	2500	Set according to user needs

2. Gain parameter

Please refer to **Chapter 7**In**Parameter adjustment** Make adjustments

6.1.4 Example of electronic gear ratio calculation

1、Ball screw drive



Eg:

(1) Mechanical parameters: reduction ratio R is 2/1, and lead screw is 10mm

(2) Absolute encoder position ring resolution per revolution: 17bit=131072

(3) Load displacement corresponding to 1 position command (command unit) required: 0.001mm

则：

According to (1) and (3), the position command (command unit) value required for 1 revolution of the lead screw (10mm movement of the workbench) is:

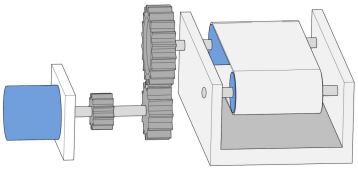
$$\frac{10}{0.001}=10000$$

The electronic gear ratio is: (B is the numerator, A is the denominator)

$$\frac{B}{A}=\frac{131072}{10000}\times\frac{2}{1}=\frac{16384}{625}$$

Finally, parameter P03-10 is set to 16384, and P03-11 is set to 625

2、Belt pulley drive



Eg:

(1) Mechanical parameters: reduction ratio R: 5/1, pulley diameter: 0.2m (pulley circumference: 0.628m)

(2) Absolute encoder position ring resolution per revolution: 17bit=131072

(3) Load displacement corresponding to 1 position command (command unit): 0.000005m

则：

According to (1) and (3), the position command (command unit) value required for the pulley (load) to rotate for 1 revolution is:

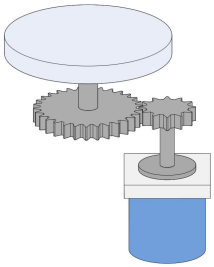
$$\frac{0.628}{0.000005}=125600$$

The electronic gear ratio is: (B is the numerator, A is the denominator)

$$\frac{B}{A}=\frac{131072}{125600}\times\frac{5}{1}=\frac{4096}{785}$$

Finally, parameter P03-10 is set to 4096, and P03-11 is set to 785

3、Rotating load



Eg:

(1) Mechanical parameters: reduction ratio R is 10/1, and the rotation angle of the load shaft is 360 ° after one revolution

(2) Absolute encoder position ring resolution per revolution: 17bit=131072

(3) Load displacement corresponding to 1 position instruction (instruction unit): 0.01 °

则：

According to (1) and (3), the position command (command unit) value required for 1 turn of load rotation is:

$$\frac{360}{0.01}=36000$$

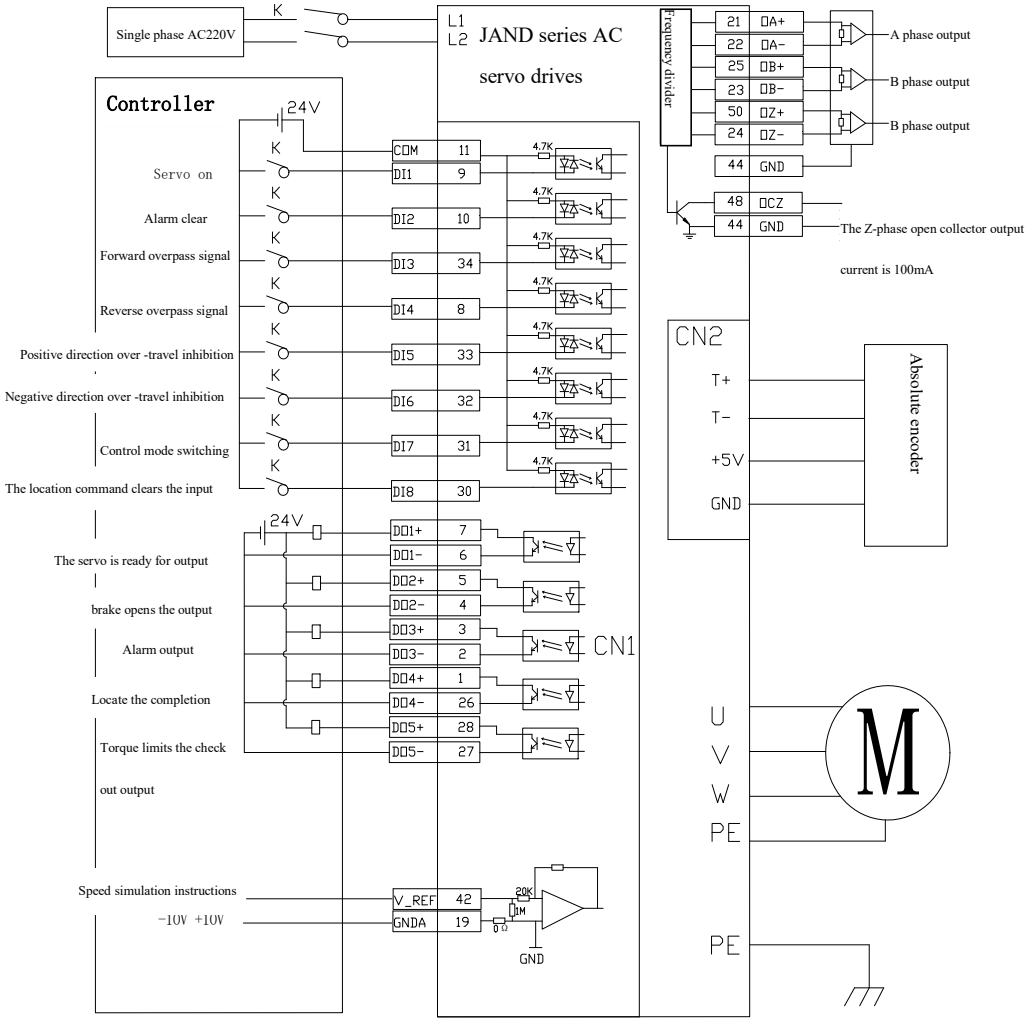
The electronic gear ratio is: (B is the numerator, A is the denominator)

$$\frac{B}{A}=\frac{131072}{36000}\times\frac{10}{1}=\frac{8192}{225}$$

Finally, parameter P03-10 is set to 8192, and P03-11 is set to 225

6.2 Speed control

6.2.1 Speed Control Wiring Diagram



6.2.2 Description of Speed Control Mode Parameters

1. Motor and driver control parameters

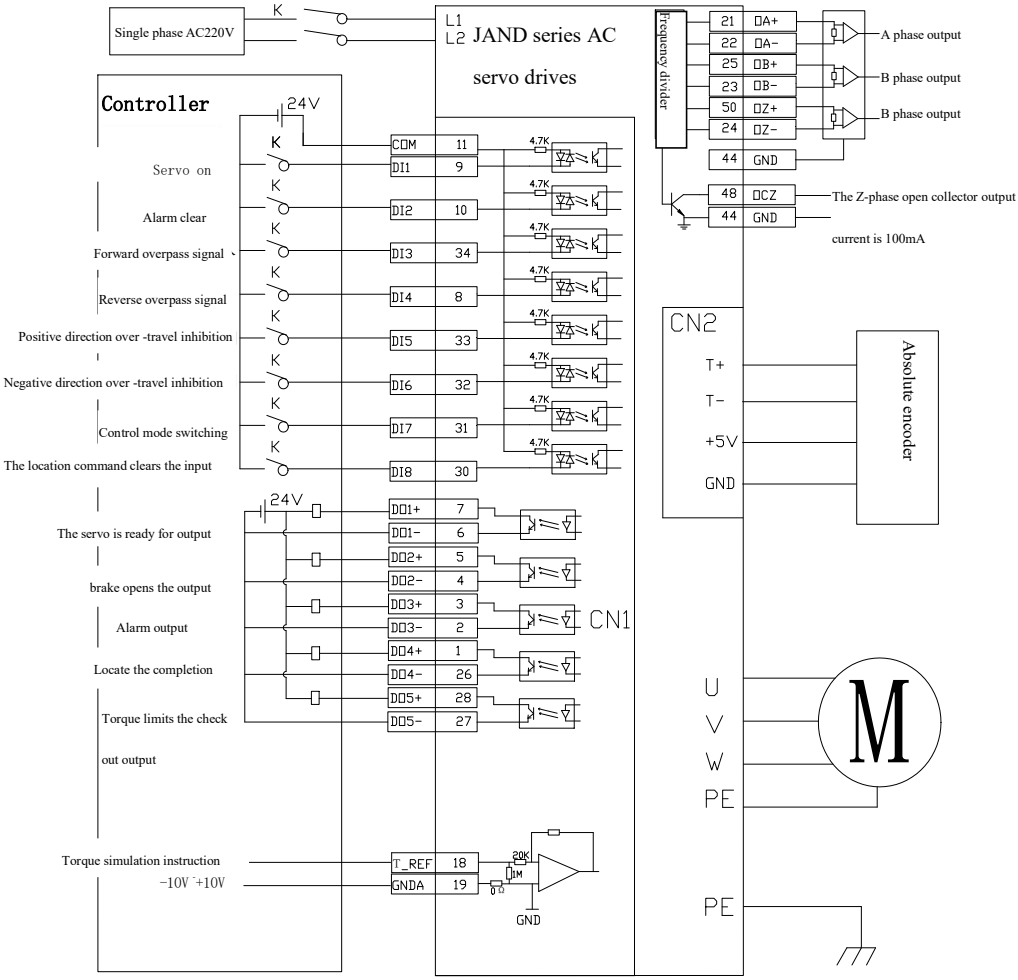
Para code	Name	Range	Default	Description
P01-01	Control mode setting	0-6	1	0: Position mode 1: Speed mode 2: Torque mode 3: Speed, torque 4: Position, speed 5: Position, torque 6: Reserved
P04-00	Speed command source	0-3	0	0: External simulation instruction 1: Digital instruction (parameter setting) 2: Digital instructions (communication) 3: Internal multiple sets of instructions
P04-01	Speed command analog quantity inversion	0-1	0	Set the initial direction of motor rotation
P04-02	Digital speed given value	-6000-6000	0	When P04-00 is set to 1, P04-02 is the speed setting value
P04-06	Forward speed limit	0-6000		Limit forward speed
P04-07	Reverse speed limit	-6000-0		Limit reverse speed
P06-40	Speed analog command input gain	10-2000	300	Set according to user needs For details, please refer to**8.2 Parameter Description**

2. Gain parameter

Please refer to **Chapter 7** In **Parameter adjustment** Make adjustments

6.3 Torque Control

6.3.1 Torque Control Wiring Diagram



6.3.2 Parameter Description of Torque Control Mode

1. Motor and driver control parameters

Para code	Name	Range	Default	Description
P01-01	Control mode setting	0-6	2	0: Position mode 1: Speed mode 2: Torque mode 3: Speed, torque 4: Position, speed 5: Position, torque 6: Reserved
P05-00	Torque command source	0-3	0	0: External simulation command (speed limit amplitude set by P05-02) 1: Digital command (speed limit amplitude set by P05-02) 2: External simulation command (speed limit amplitude determined by speed simulation command) 3: Digital command (speed limit amplitude determined by speed analog command)
P05-01	Reverse of torque command analog quantity	0-1	0	Set the initial direction of motor rotation
P05-02	Torque mode speed limit given value	0-6000	1000	Set the maximum speed of the motor in torque mode. Valid when P05-00 is 0,1
P05-05	Torque limiting setting source	0-2	0	Source for adjusting torque limit
P05-10	Internal forward torque limit amplitude	0-300.0	200.0	Limit forward torque value
P05-11	Internal reverse	-300.0-0	-200.0	Limit reverse torque value

	torque limit amplitude			
P06-43	Torque simulation command input gain	0-100	10	Set according to user needs For details, please refer to**8.2 Parameter Description**

2. Gain parameters related to torque control commands

Please refer to**Chapter 7**In**Parameter adjustment**Make adjustments

Chapter 7 Trial Operation and Parameter Adjustment

7.1 Running test

7.1.1 Pre-run testing

In order to avoid damage to the servo driver or mechanism, please remove all loads of the servo motor before operation, carefully check whether the following precautions are normal, and then power on for no-load test; After the no-load test is normal, the load of the servo motor can be connected for the next step of testing.

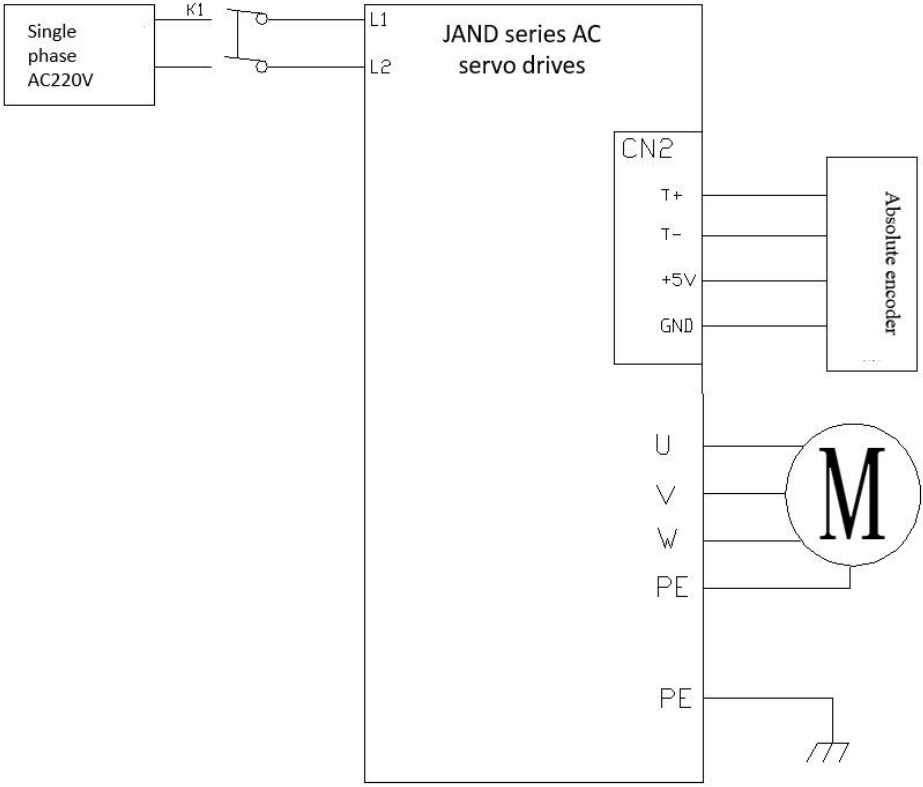
Precautions:

Detection before power on	1、 Check the servo drive for obvious visual damage 2、 Please implement insulation treatment for the connection part of the wiring terminal 3、 Check if there are any foreign objects inside the drive 4、 Servo drivers, motors, and external regenerative resistors must not be placed on combustible objects 5、 To avoid the failure of the electromagnetic brake, please check whether the power circuit can work normally by immediately stopping and cutting off the power supply 6、 Confirm whether the external power supply voltage of the servo driver meets the requirements 7、 Confirm whether the power lines, encoder lines, and signal lines of the motors U, V, and W are connected correctly (according to the motor label and instructions)

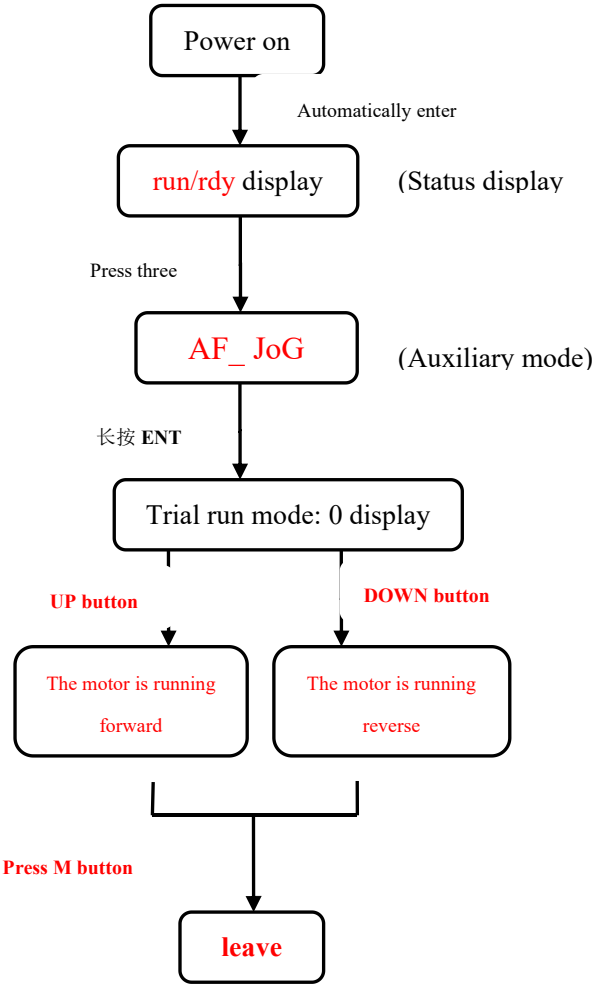
Detection during power on	1、 Do you hear the sound of relay action when the servo driver is powered on 2、 Whether the servo driver power indicator and LED display are normal 3、 Confirm whether the parameter settings are correct, and unexpected actions may occur depending on the mechanical characteristics Do not make excessive and extreme adjustments to parameters 4、 Is the servo motor self-locking 5、 If there is vibration or excessive sound in the servo motor during operation, please contact the manufacturer

7.1.2 No-load trial run test

1. JoG mode no-load trial run test, users do not need to connect additional wiring. For safety reasons, before JoG no-load speed test, please fix the motor base to prevent danger caused by reaction forces caused by changes in motor speed. The following is a simple wiring diagram in JoG mode:



2. Select JoG mode for trial operation according to the following flowchart

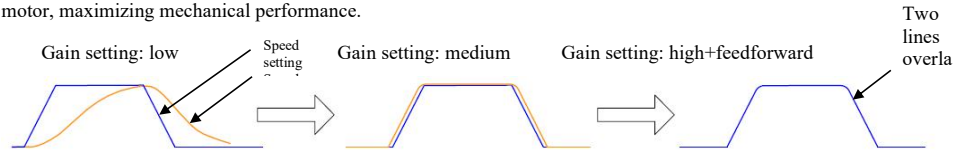


Note：Long press and hold in trial operation mode **ENT button** Enter the speed editing menu. Adopt **Up button**，**Down button and Left button** To edit speed, press and hold after editing **ENT button**, re-enter Jog mode. Press again **Up button**，**Down button** The motor will run at the new speed

The set speed will not be saved after exiting Jog mode. Please refer to**8.4 Auxiliary functions**

7.2 Parameter adjustment

After selecting the appropriate control mode according to the equipment requirements, it is necessary to make reasonable adjustments to the servo gain parameters. Enable the servo driver to quickly and accurately drive the motor, maximizing mechanical performance.



Position loop gain: 80.0Hz Position loop gain: 160.0Hz Position loop gain: 160.0Hz

Speed loop proportional gain: 40.0Hz Speed loop proportional gain: 60.0Hz Speed loop proportional gain: 60.0Hz

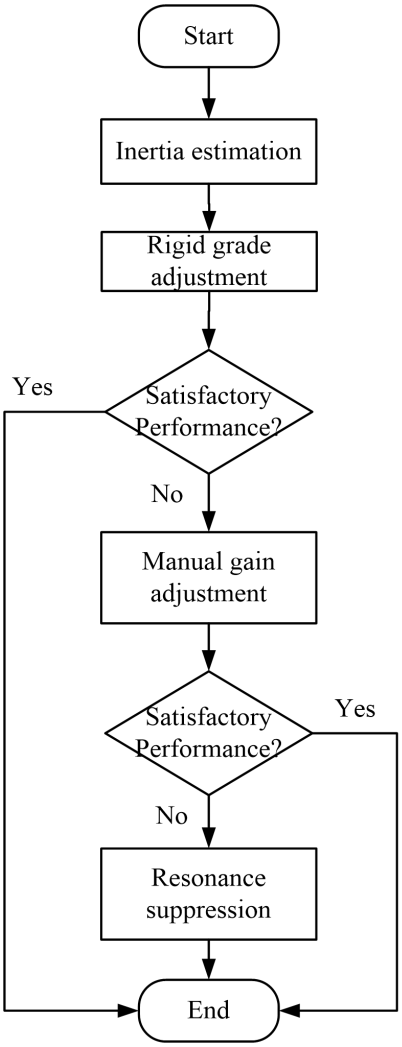
Speed loop integration time constant: 10.0ms Speed loop integration time constant: 10.0ms Speed loop integration time constant: 10.0ms

Speed feedforward gain: 0 Speed feedforward gain: 0 Speed feedforward gain: 50.0%

Load inertia ratio: 1.00 Load inertia ratio: 1.00 Load inertia ratio: 1.00

The servo gain is adjusted through multiple loop parameters (position loop, speed loop, filter, etc.), which will affect each other. Therefore, the gain setting needs to be balanced and adjusted according to certain rules for parameter settings.

The process of gain adjustment can be carried out according to the following figure:



Calculate the device inertia ratio for input to P01-04
Or perform auxiiary function F19_JL measurements

Setting P01-02 to 1 or 2
According to the requirements,increase the p01-03 parameter value step , and when the operation noise occurs, reduce the parameter value of 2 levels

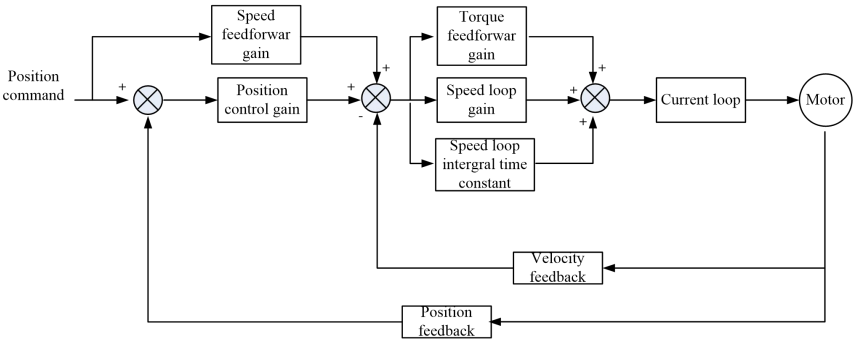
Setting P01-02 to 0, enter manual gain Adjustment mode

7.3 Manual Gain Adjustment

7.3.1 Basic parameters

When the automatic gain adjustment cannot achieve the expected effect, manual fine tuning of the gain can be performed to optimize the effect.

The servo system consists of three control loops, and the basic control block diagram is as follows:



Gain adjustment needs to follow the order of the inner loop first and then the outer loop. First, set the load moment of inertia ratio P01-04, then adjust the speed loop gain, and finally adjust the position loop gain.

Speed loop gain: Increase the setting value as much as possible without vibration and noise, which can improve the speed following performance and speed up the positioning time.

Speed loop integral time constant: The smaller the setting value, the faster the integral speed and the stronger the integral effect. If it is too small, vibration and noise will easily occur.

para code	Name	Range	set up	illustrate
P01-02	Real time automatic adjustment mode	0-3	1	0: Manually adjust the rigidity. 1: Standard mode automatically adjusts rigidity. In this mode, parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, and P08-20 will be automatically set based on the stiffness level set in P01-03. Manually

				adjusting these parameters will not have any effect. The following parameters are set by the user: P02-03 (speed feedforward gain), P02-04 (speed feedforward smoothing constant). 2: The positioning mode automatically adjusts the rigidity. In this mode, parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, and P08-20 will be automatically set based on the rigidity level set by P01-03. Manually adjusting these parameters will not have any effect. The following parameters will be fixed values and cannot be changed: P02-03 (Speed feedforward gain): 30.0% P02-04 (Speed feedforward smoothing constant): 0.50 3: Automatic adjustment of rigidity 2. In this mode, parameters P02-00, P02-01, P02-10, P02-11, and P02-13 will be automatically set based on the rigidity level set in P01-03. The following parameters are set by the user: P02-03 (speed feedforward gain), P02-14 (speed Constant of integration 2), P08-20 (torque command filter constant 1), P08-21 (torque command filter constant 2)
P01-03	Real time automatic adjustment of rigid settings	0-31	13	There are 32 built-in gain parameters that take effect when P01-02 is set to 1, 2, and 3. It can be directly called according to the actual situation, and the larger the set value, the stronger the rigidity.
P02-00	Position control gain 1	0-3000.0	80.0	The larger the set value, the higher the gain, the greater the rigidity, and the smaller the position hysteresis. However, if

				the value is too high, the system will oscillate and overshoot. Try to increase the value as much as possible without oscillation. ▸ For gain at rest.
P02-01	Position control gain 2	0-3000.0	80.0	The larger the set value, the higher the gain, the greater the rigidity, and the smaller the position hysteresis. However, if the value is too high, the system will oscillate and overshoot. Try to increase the value as much as possible without oscillation. ▸ Gain during motion.
P02-03	Speed feedforward gain	0-100.0	30.0	The feedforward gain of the speed loop, the larger the parameter value, the smaller the system position tracking error, and the faster the response. However, if the feedforward gain is too large, it will make the position loop of the system unstable and prone to overshoot and oscillation.
P02-04	Speed feedforward smoothing constant	0-64.00	0	This parameter is used to set the feedforward filtering time constant of the speed loop. The larger the value, the greater the filtering effect, but at the same time, the phase lag increases.
P02-10	Speed proportional gain 1	1-2000.0	40.0	The larger the setting value, the greater the gain and rigidity. The parameter values are set according to the motor and load conditions. Try to increase the value as much as possible without oscillation. ▸ For gain at rest.
P02-11	Velocity Constant of integration 1	0.1-1000.0	10.0	The integration time constant of the speed regulator, the smaller the set value, the faster the integration speed, and the greater the stiffness. If it is too small, it is prone to vibration and noise.

				Try to reduce this parameter value as much as possible without system oscillation. This parameter is for steady-state response.
P02-12	Pseudo differential feedforward control coefficient 1	0-100.0	100.0	When set to 100.0%, the speed loop adopts PI control, resulting in fast dynamic response; When set to 0, the speed loop integration has a significant effect and can filter low-frequency interference, but the dynamic response is slow. By adjusting this coefficient, the speed loop can have good dynamic response and increase its resistance to low-frequency interference.
P02-13	Speed proportional gain 2	1-2000.0	45.0	The larger the setting value, the greater the gain and rigidity. The parameter values are set according to the motor and load conditions. Try to increase the value as much as possible without oscillation. ▸ Gain during motion.
P02-14	Velocity Constant of integration 2	0.1-1000.0	1000.0	The integration time constant of the speed regulator, the smaller the set value, the faster the integration speed, and the greater the stiffness. If it is too small, it is prone to vibration and noise. Try to reduce this parameter value as much as possible without system oscillation. This parameter is for steady-state response.
P02-15	Pseudo differential feedforward control coefficient 2	0-100.0	100.0	When set to 100.0%, the speed loop adopts PI control, resulting in fast dynamic response; When set to 0, the speed loop integration has a significant effect and can filter low-frequency interference, but the dynamic response is slow. By adjusting this coefficient, the speed loop can have good dynamic response and increase its resistance to low-frequency interference.

7.3.2 Gain switching

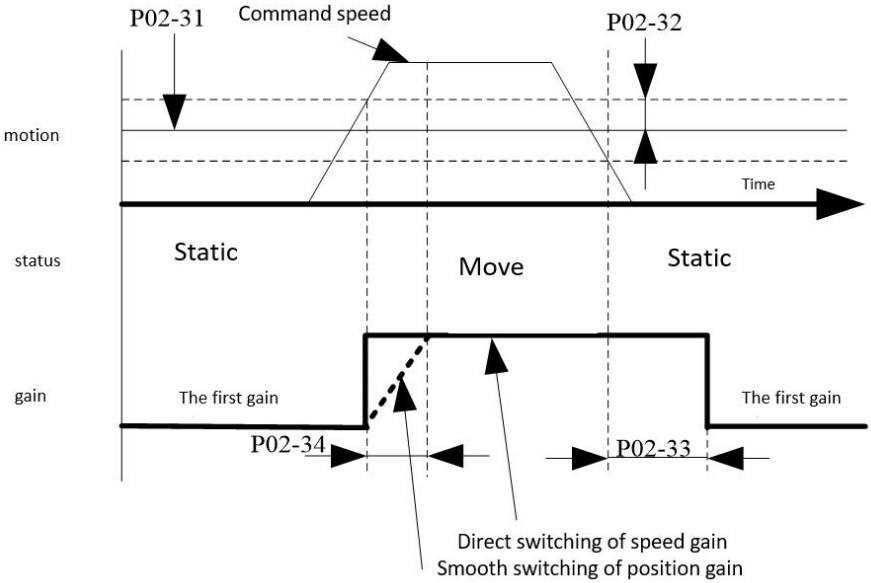
The gain switching function can be triggered by the internal state of the servo or external DI port, and is only effective in position control and speed control modes. By using gain switching, the following effects can be achieved:

Switch to a lower gain when the motor is stationary (servo enabled) to suppress vibration;

Switch to a higher gain when the motor is stationary (servo enabled) to shorten the positioning time;

Switch to higher gain during motor operation to achieve better command following performance;

Switch different gain settings with external signals based on usage.



Related parameters

para code	name	Range	factory setting	unit	effect time
P02-30	Gain switching mode	0-10	7	---	Effective immediatel y

P02-31	Gain switching level	0-20000	800	---	Effective immediately
P02-32	Gain switching hysteresis	0-20000	100	---	Effective immediately
P02-33	Gain switching delay	0-1000.0	10.0	1ms	Effective immediately
P02-34	Position gain switching time	0-1000.0	10.0	1ms	Effective immediately

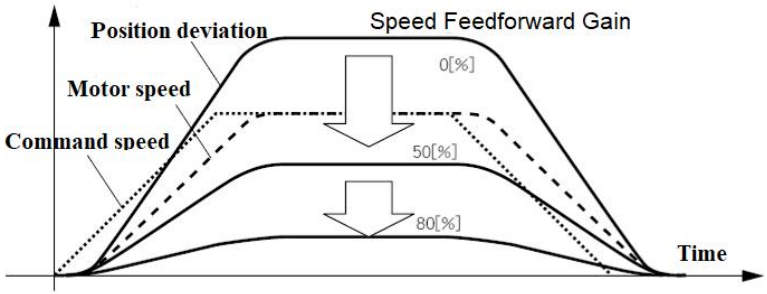
7.3.3 Feedforward function

Speed feedforward: During position control, the required speed control command is calculated from the position command and added to the output of the position regulator to reduce position deviation and improve the response of position control.

Torque feedforward: Calculate the required torque command from the speed control command and add it to the output of the speed regulator to improve the response of the speed control.

A. Speed feedforward usage operation

When the speed feedforward smoothing constant is set to 50 (0.5ms), gradually increase the speed feedforward gain to meet the system requirements. However, excessive speed feedforward gain can cause position overshoot, which can actually prolong the tuning time.



B. Torque feedforward usage operation

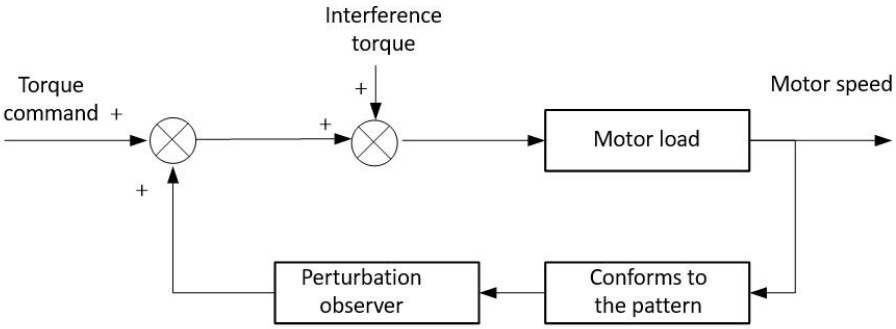
When the torque feedforward smoothing constant is set to 50 (0.5ms), gradually increase the torque feedforward gain to meet the system requirements.

Related parameters

para code	name	Range	factory setting	unit	effect time
P02-03	Speed feedforward gain	0-100.0	30.0	1.0%	Effective immediately
P02-04	Speed feedforward smoothing constant	0-64.00	0.5	1ms	Effective immediately
P02-19	Torque feedforward gain	0-30000	0	1.0%	Effective immediately
P02-20	Torque feedforward smoothing constant	0-64.00	0.8	1ms	Effective immediately

7.3.4 Disturbance Observer

The interference torque value can be inferred using a disturbance observer and compensated on the torque command to reduce the impact of interference torque and reduce vibration. This observation function is effective in both position mode and speed mode.



Usage:

a) Set P08-26 (filtering constant) to a larger value, and then gradually increase P08-25 (compensation gain). At this point, the action sound may become louder; After confirming that the current compensation gain is effective, gradually reduce P08-26.

b) Increasing the gain can improve the effect of disturbance torque suppression, but the action sound becomes louder.

c) After reducing the filter time constant, it can be inferred that there is less delay in disturbance torque, and it can improve the effectiveness of suppressing disturbance effects, but the action sound will become louder.

d) Please find a setting with good balance.

Related parameters

para code	name	Range	factory setting	unit	effect time
P08-25	Disturbance torque compensation gain	0-100.0	0	%	Effective immediately
P08-26	Disturbance torque filtering time	0-25.00	0.8	1ms	Effective

	constant				immediately

7.3.5 Suppression of Machine Resonance

If the servo system is too rigid and responds too quickly, it may cause resonance in the mechanical system, which can be improved by reducing the gain of the control circuit. Resonance suppression can also be achieved by using low-pass filters and notch filters without reducing the gain.

1. Resonance frequency detection

The resonance frequency of the mechanical system can be observed through monitoring items d26.1. Fr and d28.2. Fr

2. Torque command low-pass filter (P08-20)

Low pass filters can be used in situations where the vibration frequency will shift, and can have good results when used in high-frequency vibration. By setting the filter time constant to attenuate resonance near the resonance frequency. However, the low-pass filter will make the system phase lag, reduce the bandwidth, and the reduction of Phase margin is easy to cause loop oscillation. Therefore, it can only be applied in high-frequency vibration situations.

Filter cutoff frequency (Hz)=1/(2 * pi * p08-20 (ms) * 0.001)

para code	name	Range	factory setting	unit	effect time
P08-20	Torque command filtering constant	0-25.00	0.8	1ms	Effective immediately

3. Notch filter

The notch filter is used when the resonance frequency of the system is fixed. The notch filter can suppress mechanical resonance by reducing the gain at a specific frequency. After setting the notch filter correctly, vibration can be effectively suppressed, and further increasing the servo gain can be attempted. The servo is equipped with 4 sets of notch filters. When P08-11 is set to 0, 4 sets of notch filters can be activated simultaneously and parameters can be manually input.

A. Adaptive notch filter mode

By using the adaptive notch filter function module, the servo system will automatically recognize the current resonance frequency and configure notch filter parameters. Usage steps:

a) Set P08-11 to 1 or 2 based on the number of resonance points. When resonance occurs, you can first set P08-11 to 1 and turn on an adaptive notch filter. After adjusting the gain, if a new resonance occurs, then set P08-11 to 2 and turn on two adaptive notch filters.

b) During servo operation, the parameters of the third and fourth groups of notch filters will be automatically updated and the corresponding function code will be automatically stored every 30 minutes. After storage, the notch filter parameters will also be maintained after power failure.

c) If resonance is suppressed, it indicates that the adaptive notch filter has achieved an effect. After waiting for the servo to run stably for a period of time, set P08-11 to 0, and the notch filter parameters will be fixed to the last updated value. This operation can prevent the trap parameters from being updated to incorrect values due to misoperation during servo operation, which can exacerbate the vibration situation.

d) If the vibration cannot be eliminated for a long time, please turn off the servo enable in a timely manner.

If the resonance frequency points exceed 2, the adaptive notch filter cannot meet the demand, and manual notch filters can be used simultaneously.

Related parameters

para code	name	illustrate
P08-11	Adaptive notch filter Mode selection	Setting range: 0-4 0: The parameters of the third and fourth notch filters are no longer automatically updated and are saved as the current values. But manual input is allowed 1: 1 adaptive notch filter is effective, and the parameters of the third notch filter are automatically updated and cannot be manually inputted 2: Two adaptive notch filters are effective, and the parameters of the third and

		fourth notch filters are automatically updated and cannot be manually inputted 3: Only detect resonance frequency 4: Clear the parameters of the third and fourth notch filters and restore them to the factory settings
P08-13	Adaptive notch filter vibration detection threshold	Setting range: 0-7 This parameter sets the vibration detection sensitivity of the adaptive notch filter, and the smaller the parameter value, the more sensitive the detection sensitivity is

B. Manually setting trap parameters

a) The resonance frequency of the mechanical system can be observed through monitoring items d26.1. Fr and d28.2. Fr.

b) Input the resonance frequency observed in the previous step into the parameters of the notch filter, and simultaneously input the width level and depth level of the group of notch filters.

c) If the vibration is suppressed, it indicates that the notch filter is working. You can continue to increase the gain and repeat the previous 2 steps when new vibrations appear.

d) If the vibration cannot be eliminated for a long time, please turn off the servo enable in a timely manner.

C. Notch width level

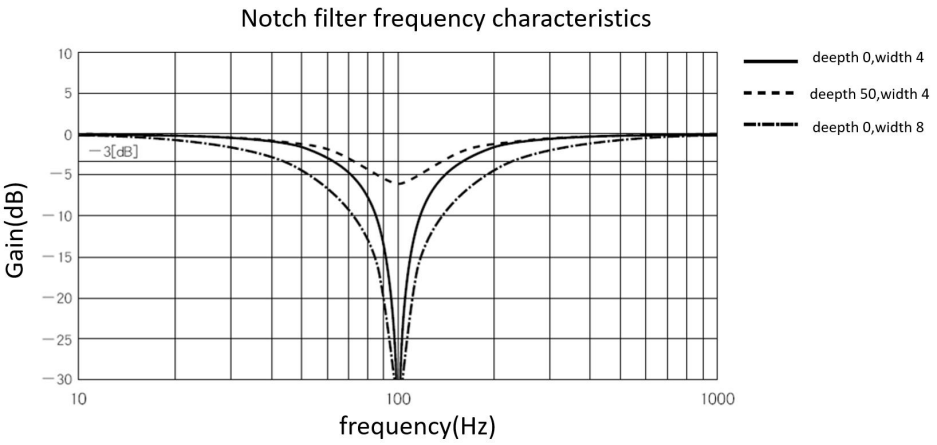
$$\text{Notch width rating} = \frac{\text{Notch width}}{\text{Notch center frequency}}$$

The notch width represents the frequency bandwidth with an amplitude attenuation rate of -3dB relative to the notch center frequency

D. Notch depth level

$$\text{Notch depth level} = \frac{\text{Output value}}{\text{Input value}}$$

When the depth level of the notch filter is 0, the input is completely suppressed at the center frequency; When the depth level is 100, the input can pass completely at the center frequency.



Related parameters

para code	name	illustrate
P08-30	Notch Filter 1 frequency	Setting range: 300-5000, unit: Hz Center frequency of notch filter 1 When set to 5000, the notch filter is invalid
P08-31	Notch Filter 1 width	Setting range: 0-20 Notch width level of notch filter 1 Is the ratio of width to center frequency
P08-32	Notch Filter 1 depth	Setting range: 0-99 Notch depth level of notch filter 1 The ratio relationship between the input and output of the center frequency of the notch filter The larger this parameter, the smaller the notch depth, and the weaker the effect

Trap related parameters

para code	name	Range	factory setting	unit	effect time
P08-11	Adaptive notch filter mode selection	0-4	0	---	Effective

					immediatel y
P08-13	Adaptive notch filter vibration detection threshold	1-7	4	---	Effective immediatel y
P08-31	Notch Filter 1 Width	0-20	2	---	Effective immediatel y
P08-32	Notch Filter 1 Depth	0-99	0	---	Effective immediatel y
P08-33	Notch filter 2 frequency	300-5000	5000	HZ	Effective immediatel y
P08-34	Notch filter 2 width	0-20	2	---	Effective immediatel y
P08-35	Notch Filter 2 Depth	0-99	0	---	Effective immediatel y
P08-36	Notch filter 3 frequency	300-5000	5000	HZ	Effective immediatel y
P08-37	Notch filter 3 width	0-20	2	---	Effective immediatel y
P08-38	Notch Filter 3 Depth	0-99	0	---	Effective immediatel y
P08-39	Notch filter 4 frequency	300-5000	5000	HZ	Effective immediatel

					y
P08-40	Notch filter 4 width	0-20	2	---	Effective immediatel y
P08-41	Notch Filter 4 Depth	0-99	0	---	Effective immediatel y

Chapter 8 Parameters and Functions

8.1 Parameter List

P00-xx represents motor and driver parameters

P01-xx main control parameters

P02-xx represents gain class parameters

P03-xx represents the position parameter

P04-xx represents the speed parameter

P05-xx represents torque parameter

P06-xx represents I/O parameters

P08-xx represents advanced functional parameters

Type	para code	name	Range	factory setting	unit	effect time	para code
Motor and driver parameters	P00-00	Motor number	0-65535	2000		Shutdown setting	Power on again
	P00-01	Rated speed of motor	1-6000	---	rpm	Shutdown setting	Power on again
	P00-02	Rated torque of motor	0.01-655.35	---	N.M	Shutdown setting	Power on again
	P00-03	Motor rated current	0.01-655.35	---	A	Shutdown setting	Power on again
	P00-04	Motor Moment of inertia	0.01-655.35	---	kg.cm2	Shutdown setting	Power on again
	P00-05	Number of motor poles	1-31	---	pole-pairs	Shutdown setting	Power on again
	P00-07	Encoder selection	0-3	---	---	Shutdown setting	Power on again
	P00-08	Provincial incremental encoder	0-1	---	---	Shutdown setting	Power on again
	P00-09	Absolute value encoder type	0-2	---	---	Shutdown setting	Power on again
	P00-10	Number of incremental encoder lines	0-65535	---		Shutdown setting	Power on again
	P00-11	Incremental encoder Z pulse electrical angle	0-65535	---		Shutdown setting	Power on again
	P00-12	Initial angle of rotor 1	0-360	---	1°	Shutdown setting	Power on again
	P00-13	Initial angle of rotor 2	0-360	---	1°	Shutdown setting	Power on again
	P00-14	Initial angle of rotor 3	0-360	---	1°	Shutdown	Power on

						setting	again
Motor and driver parame ters	P00-15	Initial angle of rotor 4	0-360	---	1°	Shutdown setting	Power on again
	P00-16	Initial angle of rotor 5	0-360	---	1°	Shutdown setting	Power on again
	P00-17	Initial angle of rotor 6	0-360	---	1°	Shutdown setting	Power on again
	P00-18	Motor code display	0-200	---		Display	Display
	P00-20	Power on interface display settings	0-100	100	---	Run Settings	Power on again
	P00-21	RS232 communication Baud	0-3	2	---	Run Settings	Power on again
	P00-23	Slave address	0-255	1	---	Run Settings	Power on again
	P00-24	Modbus communication Baud	0-7	2	---	Run Settings	Power on again
	P00-25	Verification method	0-3	0	---	Run Settings	Power on again
	P00-26	Modbus communication response delay	0-100	0	1ms	Run Settings	Power on again
	P00-28	Torque control Modbus communication compatibility settings	0-2	1	---	Run Settings	Power on again
	P00-29	Modbus absolute encoder feedback format	0-1	0	---	Run Settings	Power on again
	P00-30	Braking resistor setting	0-2	---	---	Run Settings	Power on again
	P00-31	External braking resistor power	0-65535	---	10W	Run Settings	Effective immediate ly
	P00-32	External braking	0-1000	---	1 ohm	Run	Power on

		resistance value				Settings	again
	P00-33	Regenerative open circuit and short circuit detection enable	0-1	0	---	Run Settings	Power on again
	P00-40	Over temperature protection settings	0-3	1	---	Shutdown setting	Power on again
	P00-41	Control power failure protection settings	0-1	1	---	Run Settings	Power on again
	P00-46	Speed inconsistency alarm detection time setting	0-65535	0	1ms	Run Settings	Effective immediately
Main control parameters	P01-01	Control mode setting	0-6	0	---	Shutdown setting	Effective immediately
	P01-02	Real time automatic adjustment mode	0-3	1	---	Run Settings	Effective immediately
	P01-03	Real time automatic adjustment of rigid settings	0-31	13	---	Run Settings	Effective immediately
	P01-04	Moment of inertia ratio	0-100.00	3	1 倍	Run Settings	Effective immediately
	P01-10	Control mode after overtravel	0-1	1	---	Run Settings	Effective immediately
	P01-20	Dynamic brake delay	0-250	50	1ms	Run Settings	Effective immediately
Main control	P01-21	Prohibit dynamic brakes when the main power	0-1	1	---	Run Settings	Effective immediate

parame ters		supply is turned off					ly
	P01-22	Prohibit dynamic brake when servo is OFF	0-1	1	---	Run Settings	Effective immediate ly
	P01-23	Prohibit dynamic brakes during alarm	0-1	1	---	Run Settings	Effective immediate ly
	P01-24	Prohibit dynamic brake during overtravel	0-1	1	---	Run Settings	Effective immediate ly
	P01-30	Holding brake command - servo OFF delay time (holding brake opening delay)	0-255	100	1ms	Run Settings	Effective immediate ly
	P01-31	Speed limit value of holding brake command output	0-3000	100	1rpm	Run Settings	Effective immediate ly
	P01-32	Servo OFF holding brake command waiting time	0-255	100	1ms	Run Settings	Effective immediate ly
	P01-35	Z signal width setting	0-10000	0	0.1ms	Run Settings	Effective immediate ly
	P01-40	Loss of control detection enable	0-1	0	---	Run Settings	Effective immediate ly
	P02-00	Position control gain 1	0-3000.0	48.0	1/S	Run Settings	Effective immediate ly
	P02-01	Position control gain 2	0-3000.0	57.0	1/S	Run Settings	Effective immediate

							ly
Gain class parameters	P02-03	Speed feedforward gain	0-100.0	30.0	1.0%	Run Settings	Effective immediately
	P02-04	Speed feedforward smoothing constant	0-64.00	0.5	1ms	Run Settings	Effective immediately
	P02-10	Speed proportional gain 1	1.0-2000.0	27.0	1Hz	Run Settings	Effective immediately
	P02-11	Velocity Constant of integration 1	0.1-1000.0	10.0	1ms	Run Settings	Effective immediately
	P02-12	Pseudo differential feedforward control coefficient 1	0-100.0	100.0	1.0%	Run Settings	Effective immediately
	P02-13	Speed proportional gain 2	1.0-2000.0	27.0	1Hz	Run Settings	Effective immediately
	P02-14	Velocity Constant of integration 2	0.1-1000.0	1000.0	1ms	Run Settings	Effective immediately
	P02-15	Pseudo differential feedforward control coefficient 2	0-100.0	100.0	1.0%	Run Settings	Effective immediately
	P02-16	Speed integration error limit amplitude	0-32767	25000	---	Shutdown setting	Effective immediately
	P02-19	Torque feedforward gain	0-30000	0	1.0%	Run Settings	Effective immediately

	P02-20	Torque feedforward smoothing constant	0-64.00	0.8	1ms	Run Settings	Effective immediately
	P02-30	Gain switching mode	0-10	7	---	Run Settings	Effective immediately
	P02-31	Gain switching level	0-20000	800	---	Run Settings	Effective immediately
	P02-32	Gain switching hysteresis	0-20000	100	---	Run Settings	Effective immediately
	P02-33	Gain switching delay	0-1000.0	10.0	1ms	Run Settings	Effective immediately
	P02-34	Position gain switching time	0-1000.0	10.0	1ms	Run Settings	Effective immediately
	P02-40	Mode switch selection	0-4	0	---	Run Settings	Effective immediately
	P02-41	Mode switch level	0-20000	10000	---	Run Settings	Effective immediately
	P02-50	Torque command addition value	-100.0-100.0	0	1.0%	Run Settings	Effective immediately
	P02-51	Forward torque compensation	0-100.0	0	1.0%	Run Settings	Effective immediately
	P02-52	Reverse torque	-100.0-0	0	1.0%	Run	Effective

		compensation				Settings	immediately
	P02-59	Gain matching mode	0-1	0	---	Run Settings	Effective immediately
Positional parameters	P03-00	Location Command Source	0-1	0	---	Shutdown setting	Effective immediately
	P03-01	Command pulse mode	0-3	1	---	Shutdown setting	Effective immediately
	P03-02	Command pulse input terminal	0-1	0	---	Shutdown setting	Effective immediately
	P03-03	Instruction pulse inversion	0-1	0	---	Run Settings	Effective immediately
	P03-04	Position pulse filtering	0-500	0	---	Run Settings	Effective immediately
	P03-05	Positioning completion judgment conditions	0-2	1	---	Run Settings	Effective immediately
	P03-06	Positioning completion scope	0-65535	100	Encoder unit	Run Settings	Effective immediately
	P03-07	Position feedback format	0-1	0	---	Shutdown setting	Effective immediately
	P03-09	Number of command pulses for one revolution	0-65535	10000	Pulse	Run Settings	Power on again

		of the motor					
	P03-10	Molecules of electronic gear 1	1-65535	1	---	Run Settings	Power on again
	P03-11	Denominator of electronic gear 1	1-65535	1	---	Run Settings	Power on again
	P03-12	Molecular height 16 bits of electronic gear 1	0-32767	0	---	Run Settings	Power on again
	P03-13	Molecules of electronic gear 2	1-65535	1	---	Run Settings	Power on again
	P03-14	Denominator of electronic gear 2	1-65535	1	---	Run Settings	Power on again
Positional parameters	P03-15	Excessive position deviation setting	0-65535	30000	Instruction unit * 10	Run Settings	Effective immediately
	P03-16	Position instruction smoothing filtering time constant	0-1000.0	0	1ms	Run Settings	Effective immediately
	P03-20	Position loop feedback source	0-3	0	---	Run Settings	Effective immediately
	P03-22	Incremental encoder output pulse division ratio numerator	1-65535	1	---	Run Settings	Effective immediately
	P03-23	Incremental encoder output pulse division ratio denominator	1-65535	1	---	Run Settings	Effective immediately
	P03-25	Absolute value motor rotates one revolution to output pulse count	0-60000	2500	---	Run Settings	Effective immediately
	P03-30	Reverse phase of Linear encoder	0-1	0	---	Shutdown setting	Effective immediate

							ly
	P03-31	Polarity of Z pulse of Linear encoder	0-1	1	---	Shutdown setting	Effective immediately
	P03-40	Output pulse source	0-3	1	---	Shutdown setting	Effective immediately
	P03-41	AB signal output inverted	0-1	0	---	Shutdown setting	Effective immediately
	P03-42	Output Z pulse polarity	0-1	1	---	Shutdown setting	Effective immediately
	P03-43	Pulse signal edge selection	0-1	0	---	Run Settings	Effective immediately
	P03-45	Digital Position Instruction Caching Method	0-1	0	---	Shutdown setting	Effective immediately
	P03-46	Maximum motor speed during digital position command operation	0-6000	1000	---	Run Settings	Effective immediately
	P03-58	Origin setting high order (circle value)	0-65536		---	显示	显示
	P03-59	Low position of origin setting (single turn value)	0-65536		---	显示	显示
	P03-60	Origin regression enable control	0-6	0	---	Run Settings	Effective immediately
	P03-61	Origin regression mode	0-9	0	---	Run Settings	Effective immediate

							ly
	P03-65	Speed when searching for the origin switch_ high speed	0-1000	100	---	Run Settings	Effective immediately
	P03-66	Speed when searching for the origin switch_ low speed	0-200	10	---	Run Settings	Effective immediately
	P03-67	Search for acceleration and deceleration time of the origin switch	0-5000	0	---	Run Settings	Effective immediately
	P03-68	Maximum time limit for searching for origin	0-65550	0	---	Run Settings	Effective immediately
Speed parameters	P04-00	Speed command source	0-3	0	---	Shutdown setting	Effective immediately
	P04-01	Speed command analog quantity inversion	0-1	0	---	Shutdown setting	Effective immediately
	P04-02	Digital speed given value	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-03	Zero speed position clamping function	0-1	0	---	Run Settings	Effective immediately
Speed parameters	P04-04	Zero speed position clamping speed limit	0-6000	30	1rpm	Run Settings	Effective immediately
	P04-05	Overspeed alarm value	0-6500	6400	1rpm	Run Settings	Effective immediate

							ly
	P04-06	Forward speed limit	0-6000	5000	1rpm	Run Settings	Effective immediately
	P04-07	Reverse speed limit	-6000-0	-5000	1rpm	Run Settings	Effective immediately
	P04-10	Zero speed detection value	0-200.0	2	1rpm	Run Settings	Effective immediately
	P04-11	Rotation detection value	0-200.0	30	1rpm	Run Settings	Effective immediately
	P04-12	Speed consistent amplitude	0-200.0	30	1rpm	Run Settings	Effective immediately
	P04-14	Acceleration time	0-10000	0	1ms/1000rpm	Run Settings	Effective immediately
	P04-15	Deceleration time	0-10000	0		Run Settings	Effective immediately
	P04-30	Internal setting speed 1	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-31	Internal setting speed 2	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-32	Internal setting speed 3	-6000-6000	0	1rpm	Run Settings	Effective immediately

	P04-33	Internal setting speed 4	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-34	Internal setting speed 5	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-35	Internal setting speed 6	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-36	Internal setting speed 7	-6000-6000	0	1rpm	Run Settings	Effective immediately
	P04-37	Internal setting speed 8	-6000-6000	0	1rpm	Run Settings	Effective immediately
Torque parameters	P05-00	Torque command source	0-3	0	---	Shutdown setting	Effective immediately
	P05-01	Reverse of torque command analog quantity	0-1	0	---	Shutdown setting	Effective immediately
	P05-02	Torque mode speed limit given value	0-5000	1500	1rpm	Run Settings	Effective immediately
	P05-03	Digital torque value	0-300.0	0	1.0%	Run Settings	Effective immediately
	P05-05	Torque limiting setting source	0-2	0	---	Shutdown setting	Effective immediately
	P05-06	Torque limit detection	0-10000	0	ms	Run	Effective

		output delay				Settings	immediately
	P05-10	Internal forward torque limit amplitude	0-300.0	200.0	1.0%	Run Settings	Effective immediately
	P05-11	Internal reverse torque limit amplitude	-300-0	-200.0	1.0%	Run Settings	Effective immediately
	P05-12	External forward torque limit amplitude	0-300.0	100.0	1.0%	Run Settings	Effective immediately
	P05-13	External reverse torque limit amplitude	-300-0	-100.0	1.0%	Run Settings	Effective immediately
I/O	P06-00	DI1 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-01	DI1 input port function selection (factory: servo ON)	0-24	1	---	Run Settings	Power on again
	P06-02	DI2 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-03	DI2 input port function selection (factory: alarm clear)	0-24	2	---	Run Settings	Power on again
	P06-04	DI3 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-05	DI3 input port function selection (factory: forward overtravel)	0-24	3	---	Run Settings	Power on again
	P06-06	DI4 input port effective level	0-4	0	---	Run Settings	Power on again

parameters	P06-07	DI4 input port function selection (factory: reverse overtravel)	0-24	4	---	Run Settings	Power on again
	P06-08	DI5 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-09	DI5 input port function selection (factory: forward rotation side external torque limit)	0-24	7	---	Run Settings	Power on again
	P06-10	DI6 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-11	DI6 input port function selection (Factory: External torque limit on reverse side)	0-24	8	---	Run Settings	Power on again
	P06-12	DI7 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-13	DI7 input port function selection (factory: control mode switching)	0-24	5	---	Run Settings	Power on again
	P06-16	DI8 input port effective level	0-4	0	---	Run Settings	Power on again
	P06-17	DI8 input port function selection (factory: position command reset)	0-24	16	---	Run Settings	Power on again
I/O parameters	P06-20	Effective level of DO1 output port	0-1	1	---	Run Settings	Power on again
	P06-21	DO1 output port function selection (factory: servo ready)	0-13	3	---	Run Settings	Power on again
	P06-22	Effective level of DO2	0-1	1	---	Run	Power on

		output port				Settings	again
	P06-23	DO2 output port function selection (factory: holding brake open)	0-13	2	---	Run Settings	Power on again
	P06-24	Effective level of DO3 output port	0-1	1	---	Run Settings	Power on again
	P06-25	DO3 output port function selection (factory: alarm output)	0-13	1	---	Run Settings	Power on again
	P06-26	Effective level of DO4 output port	0-1	1	---	Run Settings	Power on again
	P06-27	DO4 output port function selection (factory: positioning completed)	0-13	4	---	Run Settings	Power on again
	P06-28	Effective level of DO5 output port	0-1	1	---	Run Settings	Power on again
	P06-29	DO5 output port function selection (factory: torque limit detection)	0-13	8	---	Run Settings	Power on again
	P06-40	Speed analog command input gain	10-2000	300	1rpm/V	Run Settings	Effective immediately
	P06-41	Speed simulation command filtering constant	0-64.00	0.8	1ms	Run Settings	Effective immediately
	P06-42	Speed simulation instruction offset	-10.000 -10.000	0	1V	Run Settings	Effective immediately
	P06-43	Torque simulation command gain	0.0-100.0	10	%	Run Settings	Effective immediately

	P06-44	Torque simulation instruction filtering constant	0-64.00	0.8	1ms	Run Settings	Effective immediately
	P06-45	Torque simulation instruction offset	-10.000 -10.000	0	1V	Run Settings	Effective immediately
	P06-46	Speed simulation instruction dead band	0-10.000	0	1V	Run Settings	Effective immediately
	P06-47	Torque simulation instruction dead band	0-10.000	0	1V	Run Settings	Effective immediately
Advanced functional parameters	P08-01	Load rotation convention identification mode	0-1	0	---	Run Settings	Effective immediately
	P08-02	Inertia identification maximum speed	100-2000	800	1rpm	Run Settings	Effective immediately
	P08-03	Inertia identification acceleration and deceleration time	20-800	100	1ms	Run Settings	Effective immediately
	P08-04	Waiting time after single inertia identification completion	50-10000	1000	1ms	Run Settings	Effective immediately
	P08-05	Number of motor rotations required to complete a single moment of inertia		1.33	圈	Run Settings	只读
	P08-11	Adaptive notch filter mode selection	0-4	0	---	Run Settings	Effective immediately
	P08-13	Adaptive notch filter	1-7	3	---	Run	Immediat

Advanced functional parameters		vibration detection threshold				Settings	ely+
	P08-17	Speed observer	0-2	0		Run Settings	Effective immediately
	P08-19	Feedback speed low-pass filtering constant	0-25.00	0.8	1ms	Run Settings	Effective immediately
	P08-20	Torque command filtering constant 1	0-25.00	0.8	1ms	Run Settings	Effective immediately
	P08-21	Torque command filtering constant 2	0-25.00	0.8	1ms	Run Settings	Effective immediately
	P08-25	Disturbance torque compensation gain	0-100.0	0	%	Run Settings	Effective immediately
	P08-26	Disturbance torque filtering time constant	0-25.00	0.8	1ms	Run Settings	Effective immediately
	P08-30	Notch Filter 1 Frequency	300-5000	5000	HZ	Run Settings	Effective immediately
	P08-31	Notch Filter 1 Width	0-20	2	---	Run Settings	Effective immediately
	P08-32	Notch Filter 1 Depth	0-99	0	---	Run Settings	Effective immediately
	P08-33	Notch filter 2 frequency	300-5000	5000	HZ	Run Settings	Effective immediate

							ly
	P08-34	Notch filter 2 width	0-20	2	---	Run Settings	Effective immediately
	P08-35	Notch Filter 2 Depth	0-99	0	---	Run Settings	Effective immediately
	P08-36	Notch filter 3 frequency	300-5000	5000	HZ	Run Settings	Effective immediately
	P08-37	Notch filter 3 width	0-20	2	---	Run Settings	Effective immediately
	P08-38	Notch Filter 3 Depth	0-99	0	---	Run Settings	Effective immediately
	P08-39	Notch filter 4 frequency	300-5000	5000	HZ	Run Settings	Effective immediately
	P08-40	Notch filter 4 width	0-20	2	---	Run Settings	Effective immediately
	P08-41	Notch Filter 4 Depth	0-99	0	---	Run Settings	Effective immediately

8.2 Parameter Description

8.2.1 P00-xx motor and driver parameters

para code	name	illustrate

P00-00	Motor number	Factory set, no need to set 0: P0-01 to P0-17 works 2000: Absolute value encoder motor, at this time P0-01- to P0-05 are automatically recognized by the driver
P00-01	Rated speed of motor	Setting range: 1-6000, unit: rpm Factory set, no need to set
P00-02	Rated torque of motor	Setting range: 0.01-655.35, unit: N.M According to the equipped motor settings, it has been set at the factory
P00-03	Motor rated current	Setting range: 0.01-655.35, unit: A According to the equipped motor settings, it has been set at the factory
P00-04	Motor Moment of inertia	Setting range: 0.01-655.35, unit: kg.cm ² According to the equipped motor settings, it has been set at the factory
P00-05	Number of motor poles	Setting range: 1-31, unit: opposite pole According to the equipped motor settings, it has been set at the factory
P00-07	Encoder selection	Setting range: 0-3 1: Incremental encoder; 2: Single turn absolute value encoder; 3: Multi turn absolute value encoder;
P00-08	Provincial incremental encoder	Setting range: 0-1 0: Non provincial 1: Provincial line type
P00-09	Absolute value encoder type	Setting range: 0-1 0: Tama River encoder; 1: Nikon encoder 2: Cancel multi loop overflow alarm
P00-10	Number of incremental encoder lines	According to the equipped motor settings, it has been set at the factory
P00-11	Incremental encoder Z pulse electrical angle	According to the equipped motor settings, it has been set at the factory
P00-12	Initial angle of rotor 1	According to the equipped motor settings, it has been set at the factory
P00-13	Initial angle of rotor 2	According to the equipped motor settings, it has been set at the factory
P00-14	Initial angle of rotor 3	According to the equipped motor settings, it has been set at the factory

P00-15	Initial angle of rotor 4	According to the equipped motor settings, it has been set at the factory
P00-16	Initial angle of rotor 5	According to the equipped motor settings, it has been set at the factory
P00-17	Initial angle of rotor 6	According to the equipped motor settings, it has been set at the factory
P00-20	Power on interface display settings	Setting range: 0-100, default 100 Set according to customer display needs When set to 100, the operating status is displayed when the driver is powered on Set the serial numbers of other parameter settings corresponding to the monitoring item list (Chapter 8.3) For example, when the customer needs to drive and display the motor speed d08.F.SP when powered on, the parameter is set to 8
P00-21	RS232 communication Baud selection	Setting range: 0-3 default 2 Select Baud when communicating with PC 0:9600 1: 19200 2: 57600 3: 115200
P00-23	Slave address	Setting range: 0-255, default 1 Set according to equipment requirements
P00-24	Modbus communication Baud	Setting range: 0-7, default 2 0:2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 115200 7: 25600
P00-25	Verification method	Set range 0-3, default 0 0: No verification, 2-bit stop bit 1: Even parity, 1-bit stop bit 2: Odd parity, 1-bit stop bit 3: No verification, 1-bit stop bit

P00-26	Modbus communication response delay	Setting range: 0-100, default 0 When the parameter is set to 0, it responds according to standard communication. When the parameter is set to a value, the Modbus communication response time responds according to the set time
P00-28	Modbus compatible	Setting range: 0-2, default 1 0: Reserved 1: Default method 2: Compatible with Delta addresses (OX118 and 16E addresses)
P00-29	Modbus absolute encoder feedback format	Setting range: 0-1, default 0, Read the absolute position value 84D/84E through 485 0:84D is the circle value, 84E is the single circle value 1: 84D is the single lap value, 84E is the lap value
P00-30	Braking resistor setting	Setting range: 0-2 0: Use built-in resistor 1: Using an external resistor 2: Not using braking resistors
P00-31	External braking resistor power	Setting range: 0-65535, unit: 10W According to the correct setting of the external braking resistor, for example, if the setting value is 4, the resistance power is 40W
P00-32	External braking resistance value	Setting range: 0-1000, in ohms Correctly set according to the external braking resistor
P00-33	Regenerative open circuit and short circuit detection enable	Setting range: 0-1 0: Turn off regeneration open circuit and short circuit detection 1: Enable regeneration open circuit and short circuit detection
P00-40	Over temperature protection settings	Setting range: 0-1 0: Turn off overtemperature protection function 1: Using the internal temperature sensor of the module 2: Using an external temperature sensor 3: Automatic recognition of temperature sensors
P00-41	Control power failure protection settings	Setting range: 0-1 0: Turn off the power failure protection function of the control power supply 1: Turn on the power failure protection function of the control power supply
P00-46	Speed inconsistency	Setting range: 0-65535 Unit: ms

	alarm detection time setting	0: Turn off the speed inconsistency alarm detection protection function 1~65535: Set the speed inconsistency alarm detection time. When the speed error reaches the P04-12 setting and the time reaches the set time, the driver will alarm AL.423

8.2.2 P01-xx main control parameters

<table>
<tr><th>para code</th><th>name</th><th>illustrate</th></tr>
<tr><td>P01-01</td><td>Control mode setting</td><td>Setting range: 0-6
0: Position control mode
1: Speed control mode
2: Torque control mode
3: Speed and torque control modes. You need to use an external input port in CN1 to switch between the selected DI portInput Port Function SelectionSet to 5 (control mode switching). Control the logical state of the port to switch control mode.
<table>
<tr><td>Terminal logic</td><td>control model</td></tr>
<tr><td>Effective</td><td>Speed mode</td></tr>
<tr><td>Ineffective</td><td>Torque mode</td></tr>
</table>
4: Position and speed control modes. You need to use an external input port in CN1 to switch between the selected DI port Input Port Function Selection Set to 5 (control mode switching). Control the logical state of the port to switch control mode.
<table>
<tr><td>Terminal logic</td><td>control model</td></tr>
<tr><td>Effective</td><td>Position mode</td></tr>
<tr><td>Ineffective</td><td>Speed mode</td></tr>
</table>
5: Position and torque control mode. You need to use an external input port in CN1 to switch between the selected DI port Input Port Function Selection Set to 5 (control mode switching). Control the logical state of the port to switch control mode.
<table>
<tr><td>Terminal logic</td><td>control model</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>Effective</td><td>Position mode</td></tr>
<tr><td>Ineffective</td><td>Torque mode</td></tr>
</table>
6: Reserved
</td></tr>
<tr><td>P01-02</td><td>Real time automatic adjustment mode</td><td>Setting range: 0-2
0: Manually adjust the rigidity.
1: Standard mode automatically adjusts rigidity. In this mode, parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, and P08-20 will be automatically set based on the stiffness level set in P01-03. Manually adjusting these parameters will not have any effect. The following parameters are set by the user:
P02-03 (speed feedforward gain), P02-04 (speed feedforward smoothing constant).
2: The positioning mode automatically adjusts the rigidity. In this mode, parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, and P08-20 will be automatically set based on the rigidity level set by P01-03. Manually adjusting these parameters will not have any effect. The following parameters will be fixed values and cannot be changed:
P02-03 (Speed feedforward gain): 30.0%
P02-04 (Speed feedforward smoothing constant): 0.50
3: Automatic adjustment of rigidity 2. In this mode, parameters P02-00, P02-01, P02-10, P02-11, and P02-13 will be automatically set based on the rigidity level set in P01-03.
The following parameters are set by the user: P02-03 (speed feedforward gain), P02-14 (speed Constant of integration 2), P08-20 (torque command filter constant 1), P08-21 (torque command filter constant 2)</td></tr>
<tr><td>P01-03</td><td>Real time automatic adjustment of rigid settings</td><td>Setting range: 0-31
There are 32 built-in gain parameters that take effect when P01-02 is set to 1, 2, and 3. It can be directly called according to the actual situation, and the larger the set value, the stronger the rigidity.</td></tr>
<tr><td>P01-04</td><td>Moment of inertia ratio</td><td>Setting range: 0-100, unit: times
Set the load inertia ratio of the corresponding motor as follows:</td></tr>
</table>

		P01-04=load inertia/motor Moment of inertia This inertia ratio can be written into the parameters using the AF-J-L automatic inertia recognition value
P01-10	Control mode after overtravel	Setting range: 0-1 0: After overtravel, the motor is in a free state and only receives signals in the opposite direction for operation 1: After overtravel, the motor is in a locked state and only receives signals in the opposite direction for operation
P01-20	Dynamic brake delay	Setting range: 0-150, unit: ms When the braking conditions are met, the dynamic brake action delay time
P01-21	Prohibit dynamic brakes when the main power supply is turned off	Setting range: 0-1 0: Using dynamic braking 1: Turn off dynamic braking
P01-22	Prohibit dynamic brake when servo is OFF	Setting range: 0-1 0: Using dynamic braking 1: Turn off dynamic braking
P01-23	Prohibit dynamic brake during fault alarm	Setting range: 0-1 0: Using dynamic braking 1: Turn off dynamic braking
P01-24	Prohibit dynamic brake during overtravel	Setting range: 0-1 0: Using dynamic braking 1: Turn off dynamic braking
P01-30	Holding brake command - servo OFF delay time (holding brake opening delay)	Setting range: 0-255, unit: ms When enabled: After executing the enable command, the driver will only receive the position command after a period of P01-30. Off enable: When the motor is in a stationary state, after executing the off enable command, the time from when the brake is closed to when the motor becomes non energized.
P01-31	Speed limit value of holding brake command output	Setting range: 0-3000, unit: rpm The motor speed threshold when the holding brake output is effective when the motor is in a rotating state. When it is below this threshold, the bandgap

		output command is valid. Otherwise, it will wait for P01-32 time before the bandgap output command is valid.
P01-32	Servo OFF holding brake command waiting time	Setting range: 0-255, unit: ms The maximum waiting time for the brake output when the motor is in a rotating state.
P01-35	Z signal width setting	Setting range: 0-10000, unit: 0.1ms When set to 0, it is the default width When there is a numerical value, the width of the Z signal is measured in units of set time
P01-40	Loss of control detection enable	Prevent the motor from losing control and abnormal rotation. 0: Turn off enable 1: Enable

8.2.3 P02-xx gain class parameters

para code	name	illustrate
P02-00	Position control gain 1	Setting range: 0-3000.0, unit: 1/S ‣ The proportional gain of the position loop regulator, the larger the parameter value, the higher the gain ratio, the greater the stiffness, the smaller the position tracking error, and the faster the response. But excessive parameters can easily cause vibration and overshoot. ‣ This parameter is for steady-state response.
P02-01	Position control gain 2	Setting range: 0-3000.0, unit: 1/S ‣ The proportional gain of the position loop regulator, the larger the parameter value, the higher the gain ratio, the greater the stiffness, the smaller the position tracking error, and the faster the response. But excessive parameters can easily cause vibration and overshoot. ‣ This parameter is for dynamic response.
P02-03	Speed feedforward gain	Setting range: 0-100.0, unit: 1.0% The feedforward gain of the speed loop, the larger the parameter value, the smaller the system position tracking error, and the faster the response. However, if the feedforward gain is too large, it will make the position

		loop of the system unstable and prone to overshoot and oscillation.
P02-04	Speed feedforward smoothing constant	Setting range: 0-64.00, unit: ms This parameter is used to set the feedforward filtering time constant of the speed loop. The larger the value, the greater the filtering effect, but at the same time, the phase lag increases.
P02-10	Speed proportional gain 1	Setting range: 1.0-2000.0, unit: Hz ‣ The larger the speed proportional gain, the greater the servo stiffness, and the faster the speed response. However, excessive gain can easily cause vibration and noise. ‣ Under the condition that the system does not produce oscillations, try to increase this parameter value as much as possible. ‣ This parameter is for static response.
P02-11	Velocity Constant of integration 1	Setting range: 1.0-1000.0, unit: ms ‣ The integration time constant of the speed regulator, the smaller the set value, the faster the integration speed, and the greater the stiffness. If it is too small, it is easy to generate vibration and noise. ‣ Try to reduce this parameter value as much as possible without system oscillation. ‣ This parameter is for steady-state response.
P02-12	Pseudo differential feedforward control coefficient 1	Setting range: 0-100.0, unit: 1.0% ‣ When set to 100.0%, the speed loop adopts PI control, resulting in fast dynamic response; When set to 0, the speed loop integration has a significant effect and can filter low-frequency interference, but the dynamic response is slow. ‣ By adjusting this coefficient, the speed loop can have good dynamic response and increase its resistance to low-frequency interference.
P02-13	Speed proportional gain 2	Setting range: 1.0-2000.0, unit: Hz ‣ The larger the speed proportional gain, the greater the servo stiffness, and the faster the speed response. However, excessive gain can easily cause vibration and noise. ‣ Under the condition that the system does not produce oscillations, try to

<table>
<tr><td></td><td></td><td>increase this parameter value as much as possible.
‣ This parameter is for dynamic response.</td></tr>
<tr><td>P02-14</td><td>Velocity Constant of integration 2</td><td>Setting range: 1.0-1000.0, unit: ms
‣ The integration time constant of the speed regulator, the smaller the set value, the faster the integration speed, and the greater the stiffness. If it is too small, it is easy to generate vibration and noise.
‣ Try to reduce this parameter value as much as possible without system oscillation.
‣ This parameter is for dynamic response.</td></tr>
<tr><td>P02-15</td><td>Pseudo differential feedforward control coefficient 2</td><td>Setting range: 0-100.0, unit: 1.0%
‣ When set to 100.0%, the speed loop adopts PI control, resulting in fast dynamic response; When set to 0, the speed loop integration has a significant effect and can filter low-frequency interference, but the dynamic response is slow.
‣ By adjusting this coefficient, the speed loop can have good dynamic response and increase its resistance to low-frequency interference.</td></tr>
<tr><td>P02-16</td><td>Speed integration error limit amplitude</td><td>Setting range: 0-32767
Speed integration error limit amplitude</td></tr>
<tr><td>P02-19</td><td>Torque feedforward gain</td><td>Setting range: 0-30000, unit: 1.0%
Set the Current loop feedforward weighting value. This parameter adds the differential of speed command to the Current loop after weighting.</td></tr>
<tr><td>P02-20</td><td>Torque feedforward smoothing constant</td><td>Setting range: 0-64.00, unit: ms
This parameter is used to set the torque feedforward filtering time constant.</td></tr>
<tr><td>P02-30</td><td>Gain switching mode</td><td>Setting range: 0-10
Set the conditions for switching between the first and second gains
<table>
<tr><td>value</td><td>Switching conditions</td><td>remark</td></tr>
<tr><td>0</td><td>Fixed as First gain</td><td>P02-00、P02-10、P02-11、P02-12</td></tr>
<tr><td>1</td><td>Fixed as</td><td>P02-01、P02-13、P02-14、P02-15</td></tr>
</table></td></tr>
</table>

				Second gain	
			2	Use DI input switching	The DI port needs to be set to 9 (gain switching input) Invalid: First gain Effective: Second gain
			3	High torque command	Switch to the second gain when the torque command is greater than the threshold (determined by P02-31 and P02-32). When it is less than the threshold and exceeds the P02-33 delay setting, switch to the first gain.
			4	Large variation in speed command	Switch to the second gain when the speed command change is greater than the threshold (determined by P02-31 and P02-32). When it is less than the threshold and exceeds the P02-33 delay setting, switch to the first gain.
			5	High speed command	Switch to the second gain when the speed command is greater than the threshold (determined by P02-31 and P02-32). When it is less than the threshold and exceeds the P02-33 delay setting, switch to the first gain.
			6	Large positional deviation	Switch to the second gain when the position deviation is greater than the threshold (determined by P02-31 and P02-32). When it is less than the threshold and exceeds the P02-33 delay setting, switch to the first gain.
			7	With position command	Switch to the second gain when there is a position command. When the position command ends and the delay setting of P02-33 is exceeded, switch to the first gain.
			8	Positioning incomplete	Switch to the second gain when positioning Imperfect. When the positioning is completed

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>and the delay setting of P02-33 is exceeded, switch to the first gain.</td></tr>
<tr><td>9</td><td>Actual speed is high</td><td>Switch to the second gain when the actual speed is greater than the threshold (determined by P02-31 and P02-32). When it is less than the threshold and exceeds the P02-33 delay setting, switch to the first gain.</td></tr>
<tr><td>10</td><td>Position command+actual speed</td><td>Switch to the second gain when there is a position command. When there is no position command and the actual speed is less than the threshold (determined by P02-31 and P02-32), and the delay setting of P02-33 is exceeded, switch to the first gain.</td></tr>
</table>
</td></tr>
<tr><td>P02-31</td><td>Gain switching level</td><td>Setting range: 0-20000
The judgment threshold value during gain switching.
Torque unit: 1000bit=25% rated torque
Speed unit: 1000bit=200 revolutions per minute
Location unit: 131072bit per turn</td></tr>
<tr><td>P02-32</td><td>Gain switching hysteresis</td><td>Setting range: 0-20000
Hysteresis level during gain switching
Torque unit: 1000bit=25% rated torque
Speed unit: 1000bit=200 revolutions per minute
Location unit: 131072bit per turn</td></tr>
<tr><td>P02-33</td><td>Gain switching delay</td><td>Setting range: 0-1000.0, unit: ms
When switching from the second gain to the first gain, the time from the triggering condition to the actual switching.</td></tr>
<tr><td>P02-34</td><td>Position gain switching time</td><td>Setting range: 0-1000.0, unit: ms
Time for smooth switching from position control gain 1 to position control gain 2</td></tr>
<tr><td>P02-40</td><td>Mode switch selection</td><td>Setting range: 0-4
Set the conditions for speed loop PI control and P control</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><th>value</th><th>Judging conditions</th><th>remark</th></tr>
<tr><td>0</td><td>Torque command</td><td>When the torque command is less than P02-41 and the threshold is set, it is PI control; if it is greater than P02-41, it is P control</td></tr>
<tr><td>1</td><td>Speed command</td><td>When the speed command is less than P02-41 and the threshold is set, it is PI control; if it is greater than P02-41, it is P control</td></tr>
<tr><td>2</td><td>acceleration</td><td>When the acceleration is less than P02-41 and the threshold is set, it is PI control; if it is greater than P02-41, it is P control</td></tr>
<tr><td>3</td><td>Position deviation</td><td>When the position deviation is less than P02-41 and the threshold is set, it is PI control; if it is greater than P02-41, it is P control</td></tr>
<tr><td>4</td><td>No mode switch</td><td>Speed environmentally friendly with PI control, no longer switching</td></tr>
</table>
</td></tr>
<tr><td>P02-41</td><td>Mode switch level</td><td>Setting range: 0-20000
Set the threshold value for switching.
Torque unit: 1000bit=25% rated torque
Speed unit: 1000bit=200 revolutions per minute
Location unit: 131072bit per turn</td></tr>
<tr><td>P02-50</td><td>Torque command addition value</td><td>Setting range: -100.0-100, unit: 1.0%
Valid in position control mode. This value is added to the given torque value for vertical axis static torque compensation.</td></tr>
<tr><td>P02-51</td><td>Forward torque compensation</td><td>Setting range: -100.0-100.0, unit: 1.0%
Valid in position control mode. Used to compensate positive Stiction</td></tr>
<tr><td>P02-52</td><td>Reverse torque compensation</td><td>Setting range: -100.0-100.0, unit: 1.0%
Valid in position control mode. Used to compensate reverse Stiction</td></tr>
</table>

P02-59	Gain matching mode	0: Compatible with V4. X, V5. X, and older version gains 1: New Current loop version gain

8.2.4 P03-xx position parameters

para code	name	illustrate
P03-00	Location Command Source	0: Pulse instruction 1: Given numbers, used for communication control.
P03-01	Command pulse mode	0: Orthogonal pulse instruction (90 ° phase difference two-phase pulse) 1: Direction+pulse command 2 or 3: Double pulse instruction (CW+CCW)
P03-02	Command pulse input terminal	Used to specify the pulse input port in the CN1 port 0: Low speed pulse port 1: High speed pulse port
P03-03	Instruction pulse inversion	Used to adjust the direction of pulse instruction counting 0: Normal. 1: Reverse direction
P03-04	Position pulse filtering settings	Setting range: 0-3, unit: us 0: 0.1us 1: 1.6us 2: 3.2us 3: 6.4us 4~500: directly set the filtering time, unit: 0.1us. For example, set 10 and the filtering time is 1us
P03-05	Positioning completion judgment conditions	0: Output when the position deviation is less than the set value of P03-06 1: Output when the position setting is completed and the position deviation is less than the set value of P03-06 2: Output when the position setting is completed (after filtering) and the position deviation is less than the set value of P03-06
P03-06	Positioning completion scope	Setting range: 0-65535, unit: encoder unit Used to set the threshold value for positioning completion output. When

		using an absolute value motor, the encoder is calculated at 131072bit per revolution. If an incremental encoder motor is used, it is calculated based on the number of encoder wires * 4 per turn.
P03-07	Position feedback format	Setting range: 0-1 0: Incremental format. 1: Multi loop absolute value format
P03-09	Number of command pulses for one revolution of the motor	Setting range: 0-65535 Absolute encoder motor valid Used to set the number of command pulses for one revolution of the motor. When this parameter is set to 0, P03-10 and P03-11 parameters are valid.
P03-10	Molecules of electronic gear 1	When using absolute value motors, Refer to**6.1.3 Example of electronic gear ratio calculation method** Formula for calculating the electronic gear ratio of incremental motors: $G = \frac{\text{member}}{\text{denominaton}} = \frac{C \times 4}{P}$ C: Encoder line number ; P: Enter the number of pulses per revolution Example: The number of encoder lines is 2500, the number of input pulses per revolution is 3200, find the electronic gear ratio ? $G = \frac{C \times 4}{P} = \frac{2500 \times 4}{3200} = \frac{10000}{3200} = \frac{25}{8}$ Note: The numerator of 20B encoder is 131072 The numerator of the 17Z encoder is 160000
P03-11	Denominator of electronic gear 1	
P03-12	High molecular position of electronic gear 1	Setting range: 0-32767 This parameter can be used to amplify the electronic gear ratio: molecular value=P03-12 * 10000+P03-10
P03-13	Electronic gear 2 molecule	Refer to P03-10
P03-14	Electronic gear 2 denominator	Refer to P03-11
P03-15	Excessive position	Setting range: 0-65535, unit: instruction unit * 10

	deviation setting	Set the number of pulses with allowable deviation, exceeding the set value will cause an alarm. Example: Set a value of 20, when the following deviation exceeds 20 * 10, the driver will alarm AL.501 (position deviation is too large)
P03-16	Position instruction smoothing filter constant	Setting range: 1000, unit: ms Set the time constant of the position instruction smoothing filter
P03-20	Position feedback source	Set the source of position feedback 0: Encoder 1: Grating ruler
P03-22	Incremental encoder output pulse division ratio numerator	When using an incremental encoder, set the number of output pulses for the CN1 port. **P03-23 needs to be less than or equal to P03-22**Calculation formula: $G = \frac{molecule}{denominator} = \frac{C \times 4}{P \times 4}$ C: Number of encoder lines P: The expected output is A, B, and the number of pulses per revolution Example: The number of encoder lines is 2500; The output is A and the number of B pulses per revolution is 500; $G = \frac{C \times 4}{P \times 4} = \frac{2500 \times 4}{500 \times 4} = \frac{5}{1}$
P03-23	Incremental encoder output pulse division ratio denominator	
P03-25	Absolute value motor rotates one revolution to output pulse count	Setting range: 0-60000 Set the absolute value of the number of A and B frequency pulses each output when the motor rotates one revolution. Example: If the setting value is 2500, for each revolution of the motor, A and B signals will output 2500 pulses each
P03-30	Reverse phase of Linear encoder	Set whether the phase sequence of input A and B of the grating ruler is reversed 0: Do not invert

		1: Negate
P03-31	Polarity of Z pulse of Linear encoder	Set the effective level of the input Z signal of the grating ruler 0: Low level 1: High level
P03-40	Output pulse source	Set the source of the frequency division output signal in the CN1 terminal 0: Pulse output, alarm not output 1: Motor output 2: Pulse output 3: Grating ruler
P03-41	AB signal output inverted	0: Do not invert 1: Negate
P03-42	Output Z pulse polarity	Set the effective level of the frequency division output signal Z signal at the CN1 terminal 0: Low level 1: High level
P03-43	Pulse signal edge selection	0: Rising edge 1: Descending edge
P03-45	Digital instruction caching method	Setting range: 0-1 0: Do not cache (execute immediately) 1: Cache (execute new data after the last data execution)
P03-46	Maximum motor speed during digital position command operation	Setting range: 0-6000 Set the maximum motor speed during digital position command operation

8.2.5 P04-xx speed parameters

para code	name	illustrate
P04-00	Speed command source	0: External simulation instruction 1: Digital instruction (parameter setting) 2: Digital instructions (communication)

		3: Internal multiple sets of instructions
P04-01	Speed command analog quantity inversion	Used to adjust the polarity relationship of analog quantities 0: Normal 1: Polarity reversal
P04-02	Digital speed given value	Setting range: -6000 to 6000, unit: rpm When P04-00 is set to 1, P04-02 is the speed setting value
P04-03	Zero speed position clamping function	0: No position clamping function 1: With position clamping function When the speed control mode is in, the position lock mode is entered when the following conditions are met simultaneously A: P04-03 is set to 1 B: The absolute value of the speed command is less than the set threshold of P04-04 C: The external input port function is set to 10 (fixed zero position) and is in the input valid state
P04-04	Zero speed position clamping speed threshold	Setting range: 0-6000, unit: rpm Set the speed command threshold that triggers the zero speed position clamping function
P04-05	Overspeed alarm value	Setting range: 0-6500, unit: rpm Set the maximum allowable speed value, exceeding the set value will cause **AL.420**Speed Alarm
P04-06	Forward speed limit	Setting range: 0-6000, unit: rpm Limit the forward speed value of the motor
P04-07	Reverse speed limit	Setting range: -6000-0, unit: rpm Limit the reverse speed value of the motor
P04-10	Zero speed detection value	Setting range: 0-200.0, unit: rpm Set the zero speed detection threshold value, and the motor speed below this threshold can be output through the output port“**Motor zero speed output**”Signal
P04-11	Rotation detection value	Setting range: 0-200.0, unit: rpm Set the motor rotation detection threshold, and if the motor speed exceeds

<table>
<tr><td></td><td></td><td>this value, the status can be displayed on the LED panel</td></tr>
<tr><td>P04-12</td><td>Speed consistent amplitude</td><td>Setting range: 0-200.0, unit: rpm
Set the threshold value of the speed consistency signal. When the difference between the motor speed and the command speed is within this threshold range, it can be output through the output port“Speed consistent output”Signal</td></tr>
<tr><td>P04-14</td><td>Acceleration time</td><td>Setting range: 0-10000, unit: 1ms/1000rpm
Acceleration when setting speed control</td></tr>
<tr><td>P04-15</td><td>Deceleration time</td><td>Setting range: 0-10000, unit: 1ms/1000rpm
Set the deceleration during speed control</td></tr>
<tr><td>P04-30

P04-37</td><td>Internal speed setting 1-8</td><td>Setting range: -6000 to 6000, unit: rpm
Parameters P04-30 to P04-37 set the internal speed from 1 to 8, respectively
The implementation method for internal speed switching is as follows:
When the speed loop is controlled, P04-00 is set to 3,
The corresponding input port functions are defined as 13, 14, and 15
Example: Using input signal ports DI3, DI4, and DI5, and defining the I/O port functions as functions 13, 14, and 15 respectively (Refer to parameter description P06-01 for functional definitions), the speed switching operation of the corresponding parameter settings is achieved through the combination of I/O levels.
<table>
<tr><th>DI3</th><th>DI4</th><th>DI5</th><th>Action parameters</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>P04-30</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>P04-31</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>P04-32</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>P04-33</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>P04-34</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>P04-35</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>P04-36</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>P04-37</td></tr>
</table>
</td></tr>
</table>

8.2.6 P05-xx torque parameters

para code	name	illustrate
P05-00	Torque command source	0: External simulation command (speed limit amplitude set by P05-02) 1: Digital command (speed limit amplitude set by P05-02) 2: External simulation command (speed limit amplitude determined by speed simulation command) 3: Digital command (speed limit amplitude determined by speed analog command)
P05-01	Reverse of torque command analog quantity	Used to adjust torque direction 0: Normal 1: Reverse direction
P05-02	Torque mode speed limit given value	Setting range: 0-maximum speed, unit: rpm Set the maximum speed value of the motor in torque mode to prevent mechanical damage caused by excessive motor speed during no-load operation Effective torque control mode
P05-03	Digital torque given value	Setting range: -300-300, unit:% When P05-00 is set to 1, P05-03 sets the initial value for the digital torque
P05-05	Torque limiting setting source	Source for adjusting torque limit amplitude 0: Internal digital quantity (set by P05-10, P05-11, or P05-12, P05-13) 1: External analog quantity (given by the external analog quantity input T-REF. In this mode, the amplitude limit in the positive and negative directions is consistent) 2: The torque limit is limited by parameter P05-03
P05-06	Torque limit detection output delay	Setting range: 0-10000, unit: ms Set DO port output **Torque limit detection output** Signal delay time
P05-10	Internal forward torque limit amplitude	Setting range: 0-300.0, unit: 1.0% Limit the forward output of the motor, with 100 representing one time the torque and 300 representing three times the torque

<table>
<tr><td></td><td></td><td>When the torque output reaches the limit value, it can be output through the DO port Torque limit detection output 信号</td></tr>
<tr><td>P05-11</td><td>Internal reverse torque limit amplitude</td><td>Setting range: -300.0-0, unit: 1.0%
Limit the reverse output of the motor, with 100 representing one time the torque and 300 representing three times the torque
When the torque output reaches the limit value, it can be output through the DO port Torque limit detection output signal.</td></tr>
<tr><td>P05-12</td><td>External forward torque limit amplitude</td><td>Setting range: 0-300.0, unit: 1.0%
This function requires the use of an external input port in CN1 to switch between the selected DI port Input Port Function Selection Set to 7 (external torque limit on forward rotation side). Control the logical state of the port to switch control mode.
<table><tr><td>Terminal logic</td><td>Torque limit amplitude</td></tr><tr><td>effective</td><td>External limiting amplitude P05-12</td></tr><tr><td>invalid</td><td>Internal limiting amplitude P05-10</td></tr></table>If the DI function is not assigned, the default torque limit of the system is P05-10
When the torque output reaches the limit value, it can be output through the DO port Torque limit detection output 信号</td></tr>
<tr><td>P05-13</td><td>External reverse torque limit amplitude</td><td>Setting range: -300.0-0, unit: 1.0%
This function requires the use of an external input port in CN1 to switch between the selected DI port Input Port Function Selection Set to 8 (external torque limit on the reverse side). Control the logical state of the port to switch control mode.
<table><tr><td>Terminal logic</td><td>Torque limit amplitude</td></tr><tr><td>effective</td><td>External limiting</td></tr></table></td></tr>
</table>

		<table><tr><td></td><td>amplitude P05-13</td></tr><tr><td>invalid</td><td>Internal limiting amplitude P05-11</td></tr></table> If the DI function is not assigned, the default torque limit of the system is P05-11 When the torque output reaches the limit value, it can be output through the DO port **Torque limit detection output signal**

8.2.7 P06-xx I/O parameters

para code	name	illustrate
P06-00	DI1 input port effective level	Setting range: 0-4, factory setting: 0 Set valid inputs for the DI1 input port of CN1 0: represents low level effective (optocoupler conduction) 1: Represents high level active (optocoupler cutoff) 2: Effective rising edge 3: Effective falling edge 4: Both rising and falling edges are effective
P06-01	DI1 input port function selection	Setting range: 0-24, factory setting: 1 servo ON Set the function of the DI1 input port of CN1 0: Invalid pin 1: Servo ON 2: Alarm clear 3: Forward overtravel signal input 4: Reverse overtravel signal input 5: Control mode switching 6: Electronic gear input 7: External torque limit on forward rotation side 8: External torque limit on the reverse side 9: Gain switching input 10: Zero fixed input 11: Command pulse inhibit input 12: Encoder absolute value data requires input 13: Internal setting speed switching input 1 14: Internal setting speed switching input 2

		15: Internal setting speed switching input 3 16: Position command reset input 17: Magnetic pole detection input 18: Command pulse input rate switching input 19: Dragon Gate Simultaneous Action Enable 20: Gantry alignment reset signal 21: Origin switch signal 22: Origin reset start signal 23: Speed simulation command direction input 24: Torque simulation command direction input
P06-02	DI2 input port effective level	Refer to P06-00
P06-03	DI2 input port function selection	Refer to P06-01, factory setting: 2 Alarm clear
P06-04	DI3 input port effective level	Refer to P06-00
P06-05	DI3 input port function selection	Refer to P06-01, factory setting: 3 forward overtravel signal input
P06-06	DI4 input port effective level	Refer to P06-00
P06-07	DI4 input port function selection	Refer to P06-01, factory setting: 4 reverse overtravel signal input
P06-08	DI5 input port effective level	Refer to P06-00
P06-09	DI5 input port function selection	Refer to P06-01, factory setting: 7 external torque limit on forward rotation side
P06-10	DI6 input port effective level	Refer to P06-00
P06-11	DI6 input port function selection	Refer to P06-01, factory setting: 8 external torque limit on reverse rotation side
P06-12	DI7 input port effective level	Refer to P06-00
P06-13	DI7 input port function	Refer to P06-01, factory setting: 5 Control mode switching

	selection	
P06-16	DI8 input port effective level	Refer to P06-00
P06-17	DI8 input port function selection	Refer to P06-01, factory setting: 16 position command reset input
P06-20	Effective level of DO1 output port	Setting range: 0-1, factory setting: 1 0: When the state is valid, the optocoupler is cut off 1: When the state is valid, the optocoupler is on
P06-21	DO1 output port function selection	Setting range: 0-13, factory setting: 3 servo ready for output 0: Invalid pin 1: Alarm output 2: Holding brake open output 3: Servo ready for output 4: Positioning completion output 5: Positioning proximity output 6: Speed consistent output 7: Motor zero speed output 8: Torque limit detection output 9: Speed limit detection output 10: Warning output 11: Command pulse input rate switching output 12: Origin regression completion output 13: Electrical origin regression completed output
P06-22	Effective level of DO2 output port	Refer to P06-20
P06-23	DO2 output port function selection	Refer to P06-21, factory setting: 2 band brake open output
P06-24	Effective level of DO3 output port	Refer to P06-20
P06-25	DO3 output port function selection	Refer to P06-21, factory setting: 1 alarm output
P06-26	Effective level of DO4 output port	Refer to P06-20

P06-27	DO4 output port function selection	Refer to P06-21, factory setting: 4 positioning complete output
P06-28	Effective level of DO5 output port	Refer to P06-20
P06-29	DO5 output port function selection	Refer to P06-21, factory setting: 8 torque limit detection output
P06-40	Speed analog command input gain	Setting range: 10-2000, unit: 1rpm/V Set the coefficient between the analog command and speed control command of CN1 input Example: 500 represents 500 revolutions per minute per V
P06-41	Speed simulation command filtering constant	Setting range: 0-64.00, unit: ms Set the filtering time coefficient of analog instructions for CN1 input
P06-42	Speed simulation instruction offset	Setting range: -10.000-10.000, unit V Set the zero offset of the analog command input for CN1
P06-43	Torque simulation command gain	Setting range: 0-100.0, unit 1% Set the coefficient between the analog command and speed control command of CN1 input For example, 30.0 represents 30% of the rated torque per V
P06-44	Torque simulation instruction filtering constant	Setting range: 0-64.00, unit: ms Set the filtering time coefficient of analog instructions for CN1 input
P06-45	Torque simulation instruction offset	Setting range: -10.000-10.000, unit V Set the zero offset of the analog command input for CN1
P06-46	Speed simulation instruction dead band	Setting range: 0-10.000, unit V Set the dead band voltage value of the speed simulation command. When the analog quantity is given within the range of positive and negative values, the system defaults to zero
P06-47	Torque simulation instruction dead band	Setting range: 0-10.000, unit V Set the dead band voltage value of the torque simulation command. When the analog quantity is given within the range of positive and

		negative values, the system defaults to zero

8.2.8 P08-xx Advanced Function Parameters

para code	name	illustrate
P08-01	Load rotation convention identification mode	Setting range: 0-1 0: Valid 1: Invalid
P08-02	Inertia identification maximum speed	Setting range: 100-2000, unit: rpm The maximum speed of the motor during offline inertia identification
P08-03	Inertia identification acceleration and deceleration time	Setting range: 20-800, unit: ms Acceleration and deceleration time of the motor during offline inertia identification
P08-04	Waiting time after single inertia identification completion	Setting range: 50-10000, unit: ms When offline inertia identification is completed, the waiting time after a single inertia identification is completed
P08-05	Number of motor rotations required to complete a single moment of inertia	This parameter is an automatically generated rotation circle value based on the conditions set in P08-02, P08-03, and P08-04
P08-11	Adaptive notch filter mode selection	Setting range: 0-4 0: The parameters of the third and fourth notch filters are no longer automatically updated and are saved as the current values. But manual input is allowed 1: 1 adaptive notch filter is effective, and the parameters of the third notch filter are automatically updated and cannot be manually inputted 2: Two adaptive notch filters are effective, and the parameters of the third and fourth notch filters are automatically updated and cannot be manually inputted 3: Only detect resonance frequency 4: Clear the parameters of the third and fourth notch filters and

		restore them to the factory settings
P08-13	Adaptive notch filter vibration detection threshold	Setting range: 0-7 This parameter sets the vibration detection sensitivity of the adaptive notch filter, and the smaller the parameter value, the more sensitive the detection sensitivity is
P08-17	Speed observer	0: Turn off speed observer 1: Open speed observer 2: Speed, torque observer
P08-19	Feedback speed low-pass filtering constant	Setting range: 0-25.00, unit: ms The feedback speed low-pass filtering time constant can be appropriately increased when there is a howling during motor operation.
P08-20	Torque command filtering constant 1	Setting range: 0-25.00, unit: ms The torque command filtering time constant is 1. When there is a howling during motor operation, this value can be appropriately increased.
P08-21	Torque command filtering constant 2	Setting range: 0-25.00, unit: ms The torque command filtering time constant is 2. When there is a howling during motor operation, this value can be appropriately increased.
P08-25	Disturbance torque compensation gain	Setting range: 0-100.0 Gain coefficient of disturbance torque observation value. The higher the value, the stronger the ability to resist disturbance torque, but the action noise may also increase.
P08-26	Disturbance torque filtering time constant	Setting range: 0-25.00, unit: ms The larger the value, the stronger the filtering effect, which can suppress action noise. However, excessive interference can lead to phase delay, which in turn affects the effectiveness of disturbance torque suppression.
P08-30	Notch Filter 1 Frequency	Setting range: 300-5000, unit: Hz Center frequency of notch filter 1

		When set to 5000, the notch filter is invalid
P08-31	Notch Filter 1 Width	Setting range: 0-20 Notch width level of notch filter 1 Is the ratio of width to center frequency
P08-32	Notch Filter 1 Depth	Setting range: 0-99 Notch depth level of notch filter 1 The ratio relationship between the input and output of the center frequency of the notch filter The larger this parameter, the smaller the notch depth, and the weaker the effect
P08-33	Notch filter 2 frequency	Same as P08-30
P08-34	Notch filter 2 width	Same as P08-31
P08-35	Notch Filter 2 Depth	Same as P08-32
P08-36	Notch filter 3 frequency	Same as P08-30
P08-37	Notch filter 3 width	Same as P08-31
P08-38	Notch Filter 3 Depth	Same as P08-32
P08-39	Notch filter 4 frequency	Same as P08-30
P08-40	Notch filter 4 width	Same as P08-31
P08-41	Notch Filter 4 Depth	Same as P08-32

8.3 List of Monitoring Items

Display sequence number	Show items	illustration	Unit
d00.C.PU	Total position command pulses	This parameter can monitor the number of pulses sent by the user to the servo driver, thereby confirming whether there is a loss of pulse phenomenon	Instruction unit
d01.F.PU	Total position feedback pulse	This parameter can monitor the number of pulses fed back by the servo motor. Unit consistent with user input instruction unit	Instruction unit
d02.E.PU	Position deviation pulse count	This parameter can monitor the number of pulses with position lag during the operation of the servo system. Unit consistent with user input instruction unit	Instruction unit
d03.C.PE	Sum of position given pulses/ Gantry motor feedback pulse	This parameter can monitor the number of pulses sent by the user to the servo driver. Unit: When using an absolute value motor, calculate at 131072bit per revolution. If an incremental encoder motor is used, it is calculated based on the number of encoder wires * 4 per turn.	Encoder unit/ Instruction unit
d04.F.PE	Total position feedback pulse/	This parameter can monitor the number of pulses fed back by the servo motor. Unit: When using an absolute value motor, calculate at 131072bit per revolution. If an incremental encoder motor is used, it is calculated based on the number of encoder wires * 4 per turn.	Encoder unit/ Instruction unit
d05.E.PE	Position deviation pulse count/ Gantry pulse deviation	This parameter can monitor the number of pulses with position lag during the operation of the servo system. Unit: When using an absolute value motor, calculate at 131072bit per revolution. If an incremental encoder motor is used, it is calculated based on the number of encoder wires * 4 per turn.	Encoder unit/ Instruction unit
d06.C.Fr	Pulse command input frequency	This parameter can monitor the input frequency of external pulse commands	KHz

d07.C.SP	Speed control command	This parameter can monitor the servo given speed when the servo motor is running	rpm
d08.F.SP	Motor speed	This parameter can monitor the actual speed of the servo motor during operation	rpm
d09. C.tQ	Torque command	This parameter can monitor the servo given torque during the operation of the servo motor	%
d10.F.tQ	Torque feedback value	This parameter can monitor the feedback torque of the servo motor during operation	%
d11.AG.L	Average torque	This parameter can monitor the average torque of the servo motor over the past 10 seconds	%
d12.PE.L	Peak torque	This parameter can monitor the peak torque of the servo motor after being powered on	%
d13.oL	Overload load rate	This parameter can monitor the load occupancy rate of the servo motor in the past 10 seconds	%
d14.rG	Regeneration load rate	This parameter can monitor the load rate of the regeneration resistor	%
d16.I.Io	Input IO status	This parameter can monitor the input port status of CN1. The upper vertical bar represents high level (optocoupler cutoff), and the lower vertical bar represents low level optocoupler conduction). The corresponding relationship with the input port is that the operation panel corresponds to DI1-DI8 with 8 vertical bars from right to left	Binary
d17.o.Io	Output IO status	This parameter can monitor the output port status of CN1. The upper vertical bar represents the conduction of the optocoupler, and the lower vertical bar represents the cutoff of the optocoupler. The corresponding relationship with the output port is that the operation panel corresponds to DO1-DO5 with 5 vertical bars from right to left, respectively	Binary
d18.AnG	Electrical appliance angle	This parameter can monitor the Electrical appliance angle, which is 360 degrees after one revolution	0.1 degrees
d19.HAL	Motor UVW phase sequence	This parameter can monitor the phase sequence position of the incremental encoder motor	
d20.ASS	Absolute encoder single turn value	This parameter can monitor the feedback value of the absolute encoder, and the value varies between 0 and 65535 after one revolution	Decimal

d21.ASH	Absolute value encoder multi turn value	This parameter can monitor the number of rotations of the multi turn absolute encoder motor	
d22.J-L	Inertia ratio	This parameter can monitor the real-time inertia of the load carried by the motor	%
d23.dcp	Main circuit voltage (DC value)	This parameter can monitor the voltage value of the main circuit	V
d24.Ath	Driver temperature	This parameter can monitor the driver temperature	Degrees Celsius
d25.tiE	Accumulated running time	This parameter can monitor the drive running time in seconds	秒
d26.1.Fr	Resonance frequency 1	This parameter can monitor resonance frequency 1	Hz
d28.2.Fr	Resonance frequency 2	This parameter can monitor resonance frequency 2	Hz
d30.Ai1	Analog command 1 input voltage (V_REF)	This parameter can monitor the analog command (V-REF) input voltage value of the speed loop.	0.01V
d31.Ai2	Analog command 2 input voltage (t_REF)	This parameter can monitor the analog command (T-REF) input voltage value of the torque loop.	0.01V

8.4 Auxiliary functions

serial number	Show items	Function	Operate
1	AF_JoG	JOG trial operation	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_JoG**, press **ENT button** Enter Jog working mode. The default Jog speed is 30rpm. 2. Press **Up button** At this point, the motor rotates forward at a speed of 30r/min; Press **Down button** At this time, the motor reverses at a speed of 30r/min. 3. Long press **ENT button** Enter the speed editing menu. Adopt **Up button**， **Down button** and **Left button** To edit speed, press and hold after editing **ENT button**, re-enter Jog mode. The set speed will not be saved after exiting Jog mode. 4. Press **M button** Exit Jog mode.
2	AF_run	Forced enable running speed	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** 至 **AF_run**,

		mode	press **ENT button** Enter this working mode. 2. Press **Up button** Motor rotates forward, long press **Up button** The motor speed will continue to increase; Press **Down button** When the motor is in reverse, press and hold **Up button** The motor speed will continue to increase. 3. Press **M button** Exit this mode.
3	AF_oF1	Analog input 1 automatic zero drift calibration (VCMD)	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** 至 **AF_of1**, press **ENT button**, will display **clr.Ai1**。 2. Press and hold the **ENT button** Until it appears **Finsh** Flashing, completing automatic calibration of analog input 1 (speed analog) zero drift. 3. Press **M button** Exit this mode.
4	AF_oF2	Analog input 2 automatic zero drift calibration (TCMD)	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** 至 **AF_of2**, press **ENT button**, will display **clr.Ai2**。 2. Press and hold the **ENT button** Until it appears **Finsh** Flashing, completing automatic calibration of zero drift for analog input 1 (torque analog). 3. Press **M button** Exit this mode
5	AF_oF3	U. W current Automatic zero drift calibration	Same as AF_ OF1 **Attention:**When performing this function, the servo needs to be in the off enable state, otherwise it will not appear **Finsh** Flashing page, but also unable to complete automatic calibration
6	AF_En0	Absolute value encoder fault clearing	This auxiliary function must be operated in a non enabled state, and the operating steps are as follows 1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_En0**, press **ENT button**, will display **clr.Err**。 2. Press and hold the **ENT button** Until it appears **Finsh** Flashing completes the clearing of absolute encoder faults. 3. Press **M button** Exit this mode.
7	AF_En1	Absolute value encoder multi turn value reset	This auxiliary function must be operated in a non enabled state, and the operating steps are as follows 1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** 至 **AF_En1**, press **ENT button**, will display **clr.ASH**。

			2. Press and hold the **ENT button** Until it appears **Finsh** Flashing, completing the absolute value encoder multi turn value reset. 3. Press **M button** Exit this mode.
8	AF_ini	Factory reset	This auxiliary function must be operated in a non enabled state, and the operating steps are as follows 1. Enter the Factory reset interface: press the **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_ini**, press **ENT button**, will display press **Up** to **5，** Press and hold the **ENT button**, a Progress bar appears until **Finsh** Flashes, completing the Factory reset.
9	AF_Err	Fault record display	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_Err**, press **ENT button** Display the past 8 historical fault information. The number at the left end is 0, which represents the last fault that occurred 2. Press **Up button** It can display past faults one by one. Long press **ENT button** It can display the time of the fault occurrence, with the time coordinate referring to d25.tiE. 3. Press **M button** Exit this mode. **Attention:**The recording time of faults that occur during multiple power ups and downs within 30 minutes may have a deviation of 30 minutes.
10	AF_uer	Version display	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_uer**, press **ENT button** The servo information is displayed. 2. Press **Up button** Can switch version signal page 3. Press **M button** Exit this mode.
11	AF_unL	Operation permission setting	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_unL**, press **ENT button** You can edit the operation permissions. 0: All parameters are locked and cannot be changed; 1: Lock P00-XX parameters, others can be changed; 2: Not locked, can be changed. Set the value of 0,1, which can be saved after power failure. When set to 2, power down will not be saved. 2. Press **M button** Exit this mode.
12	AF_ Io	Force output port level	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_Io**, press

			ENT button You can edit it now. The corresponding relationship with the output port is that the operation panel corresponds to DO1-DO5 with 5 vertical bars from right to left 2. Press **M button** Exit this mode. The output port returns to its original output state.
13	AF_J-L	Measurement of load inertia ratio	1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_J-L**, press **ENT button** The inertia ratio measurement can be carried out. 2. Press and hold the **UP button or Down button** The motor will run back and forth within the maximum speed set by P08-02, the acceleration and deceleration time set by P08-03, the waiting time set by P08-04, and the number of turns set by P08-05 until the load inertia ratio appears. 3. Press **M button** Exit this mode. 4. Record the measured value and write it into P01-04 (Moment of inertia ratio) parameter
14	AF-GTO	Set Origin	Before running this auxiliary function, move the machine to the original position and follow the following steps 1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_GTO**, press **ENT button** The current multi turn value will be displayed. 2. Press and hold the **ENT button** Until it appears **Finsh** Flashing completes the absolute value encoder origin setting. 3. Press **M button** Exit this mode.

Chapter 9 Fault Analysis and Handling

9.1 Fault alarm information table

Alarm type	Serial number code	Alarm content
Hardware failure	AL.051	EEPROM parameter abnormality
	AL.060	Product model selection failure
	AL.063	Overcurrent detection
	AL.070	AD sampling failure (power on)
	AL.071	Current sampling fault (operation)
	AL.102	DI allocation failure
	AL.105	Electronic gear setting error
	AL.110	Power on again after parameter setting
Connection failure	AL.305	Power line disconnection
Operational faults	AL.401	Undervoltage
	AL.402	Overvoltage
	AL.412	Motor overload (continuous maximum load)
	AL.420	Overspeed
	AL.421	Out of control detection
	AL.423	Speed inconsistency alarm
	AL.432	Regenerative short circuit open circuit
	AL.440	heatsink OT
	AL.501	Excessive position deviation
	AL.551	Return to origin timeout fault
	AL.611	Incremental encoder Z signal loss
	AL.620	Bus encoder disconnected
	AL.621	Abnormal EEPROM parameters for reading and writing motor encoder
	AL.640	Bus encoder overspeed
	AL.641	Bus encoder overheating
	AL.643	Bus encoder battery low voltage fault
	AL.644	Bus encoder multi turn fault

	AL.645	Bus encoder multi turn overflow fault
	AL.646	Bus encoder communication abnormality 1
	AL.647	Bus encoder count abnormal 2
	AL.648	Bus encoder communication abnormality 3
	AL.649	Bus encoder communication abnormality 4
	AL.650	Bus encoder communication abnormality 5
	AL.651	Bus encoder communication abnormality 6
	AL.652	Bus encoder multi turn multiple faults
warm	AL.941	Parameter changes that require reconnecting the power supply

9.2 Causes and Handling of Fault Alarm

AL.051: EEPROM parameter abnormality

Reason for fault alarm	Fault alarm check	Disposal measures
Servo unit EEPROM data abnormality	Check wiring	Correct wiring and power on again If it persists, replace the drive

AL.060: Product model selection failure

Reason for fault alarm	Fault alarm check	Disposal measures
The product parameter settings do not match the actual hardware	Check product parameter settings and hardware models	Set product parameters correctly If it persists, contact the manufacturer
Driver power does not match motor power	The rated current of the selected motor is greater than or far less than the output current of the driver	Using matching drivers and motors

AL.063: Overcurrent detection

Reason for fault alarm	Fault alarm check	Disposal measures
U. Short circuit between phases V and W	Check if there is a short circuit in the U, V, and W wiring Check for short circuit between P+and C	Correct wiring
Drive damage	Disconnect the U, V, and W cables on the drive, and enable the drive	If the connection is disconnected and the alarm still sounds when starting the drive, replace the drive

AL.070: Current sampling fault (power on)

Reason for fault alarm	Fault alarm check	Disposal measures
Abnormal sampling data of current sensor components	Is the wiring correct	Correct wiring If it persists, replace the drive

AL.071: Current sampling fault (operation)

Reason for fault alarm	Fault alarm check	Disposal measures
Abnormal sampling data of current sensor components	Is the wiring correct	Correct wiring If it persists, replace the drive

AL.102: DI allocation failure

Reason for fault alarm	Fault alarm check	Disposal measures
At least two input ports have the same function selection	Check if the input port function selection parameters are the same (P06-00~P06-17)	Setting parameters correctly Power on the driver again

AL.105: Electronic gear setting error

Reason for fault alarm	Fault alarm check	Disposal measures
Electronic gear ratio setting error	Check the electronic gear ratio setting parameters. P03-10, P03-11	Correctly setting the electronic gear ratio
The output pulse setting of the gantry is too small	Check the gantry function. The feedback pulse number for one revolution of the motor: P03-52 must be greater than 128	Correctly set the number of feedback pulses for one rotation of the gantry function motor

AL.110: Power on again after parameter setting

Reason for fault alarm	Fault alarm check	Disposal measures
After setting the servo parameters, it needs to be powered on again to take effect	Power on the driver again	Power on the driver again

AL.305: Power line disconnection

Reason for fault alarm	Fault alarm check	Disposal measures

The power line is disconnected or not connected	Check if there is an open circuit in the motor power lines U, V, and W	Replace the power line or motor

AL.401: Undervoltage

Reason for fault alarm	Fault alarm check	Disposal measures
The input voltage of the main circuit is lower than the rated voltage value or there is no input voltage	Check if the voltage at the terminals L1 and L2 (L3) of the main circuit input is low. Bus voltage can be monitored through d23. dcp	Ensure correct wiring and use the correct voltage source or series voltage regulator
The power off time is too short	When turning off the power, confirm that the drive display screen is black (or turn off the power for 10s) before re powering on	Ensure sufficient power outage time

AL.402: Overvoltage

Reason for fault alarm	Fault alarm check	Disposal measures
The input voltage of the main circuit is higher than the rated voltage value	Use a Voltmeter to test whether the input voltage of the main circuit is too high	Use the correct voltage source or series voltage regulator
Excessive regenerative energy	Check if excessive regenerative energy occurs during rapid motor start and stop	Connect the external resistor and set the parameters P00-30, P00-31, and P00-32 correctly
Drive hardware failure	Overvoltage alarm is still triggered when the input voltage is confirmed to be correct	Please send it back to the dealer or original factory for maintenance

AL.412: Motor overload (continuous maximum load)

Reason for fault alarm	Fault alarm check	Disposal measures
Continuous use exceeding the rated load of the drive	Can be monitored through d13. oL in monitoring mode	Replace with a higher power motor or reduce the load
Improper setting of control system parameters	1. Is the mechanical system installed properly 2. Acceleration setting constant too fast 3. Is the gain class parameter set	1. Adjusting the gain of the control circuit 2. Acceleration and deceleration setting time slowing down

	correctly	
Motor wiring error	Check the U, V, and W wiring	Correct wiring

AL.420: Over speed

Reason for fault alarm	Fault alarm check	Disposal measures
Input speed command too high	Use a signal detector to check whether the input signal is normal	Adjusting the frequency of the input signal
Incorrect setting of over speed parameters	Check if P04-05 (overspeed alarm value) is set reasonably	Set P04-05 correctly (overspeed alarm value)

AL.421: Out of Control Detection

Reason for fault alarm	Fault alarm check	Disposal measures
Wrong wiring of motor power lines U, V, and W	Check wiring	Correct wiring
Incorrect motor parameter setting	Check P00-05; And whether the encoder parameter settings are correct	Setting parameters correctly When in torque mode, please set P01-40 to 0 to turn off the runaway detection function

AL.423 Speed inconsistency alarm

Reason for fault alarm	Fault alarm check	Disposal measures
Wrong wiring of motor power lines U, V, and W	Check wiring	Correct wiring
Incorrect motor parameter setting	Check if P00-46/P04-12 setting is reasonable	Setting parameters correctly

AL.432: Regeneration short circuit, open circuit

Reason for fault alarm	Fault alarm check	Disposal measures
Regenerative short circuit	Check if there is a short circuit in the P and C ports	If there is no short circuit in P and C, and the alarm still appears, please return the drive to the factory for maintenance
Regenerative open circuit	Please confirm the parameter settings for P00-30, P00-31, and P00-32	Set parameter values correctly

AL.440: Radiator overheating

Reason for fault alarm	Fault alarm check	Disposal measures
The internal temperature of the driver is higher than 95 ℃	Check if the cooling conditions of the drive are good	Improve the cooling conditions of the drive. If an alarm still occurs, please return the drive to the factory for maintenance
Parameter setting error	Check if parameter P00-40 is set correctly	Set parameter values correctly

AL.501: Excessive position deviation

Reason for fault alarm	Fault alarm check	Disposal measures
The position deviation is too large, and the parameter setting is too small	Confirm parameter settings for P03-15 (position deviation too large setting)	Increase the setting value of P03-15 (position deviation too large setting)
The gain value is set too low	Confirm whether the gain class parameters are set reasonably	Readjust the gain class parameters correctly
The internal torque limit amplitude setting is too small	Confirm internal torque limit amplitude	Correctly adjust the internal torque limit amplitude again
Excessive external load	Check external loads	Reduce load or replace high-power motor

AL.551: Home return timeout fault

Reason for fault alarm	Fault alarm check	Disposal measures
Timed out executing the return to home operation	Confirm whether parameter P03-68 (maximum time limit for searching the origin) is reasonable	Set P03-68 correctly

AL.611:20Z motor Z signal abnormality

Reason for fault alarm	Fault alarm check	Disposal measures
20Z motor Z signal abnormality	Check encoder wiring	Correct wiring Motor return for maintenance

AL.620: Bus encoder disconnected

Reason for fault alarm	Fault alarm check	Disposal measures
Bus encoder communication failure	Check encoder wiring	Correct wiring

AL.621: Abnormal EEPROM parameters for reading and writing motor encoder

Reason for fault alarm	Fault alarm check	Disposal measures
Encoder read/write error	Check the encoder wiring,	Correct wiring

AL.640: Bus encoder overspeed

Reason for fault alarm	Fault alarm check	Disposal measures
The speed value of the bus encoder exceeds 6000rpm	Check encoder wiring Confirm that the encoder shield wire is correctly connected	Reduce speed If the connection is normal, please return the drive to the factory for maintenance

AL.641: Bus encoder overheating

Reason for fault alarm	Fault alarm check	Disposal measures
Encoder overheating	Check if the temperature at the installation position of the motor encoder is too high. Is it caused by high motor load	Reduce load Replace the motor

AL.643: Bus encoder battery failure

Reason for fault alarm	Fault alarm check	Disposal measures
When the bus encoder is set to multi turn absolute value, the external battery voltage is low	Check the external battery voltage of the encoder and confirm that it is higher than 3.0V	When the battery voltage is below 3.0V, replace the battery, Above 3V using auxiliary function AF_ En0 Clear Alarm
Encoder cable disconnected or connected	Confirm if the encoder cable has been disconnected from the motor	Using auxiliary function AF_ En0 Clear Alarm

AL.644: Bus encoder multi turn fault

Reason for fault alarm	Fault alarm check	Disposal measures
Bus encoder multi turn fault	Does the device operate in the same direction for a long time, with the number of cycles exceeding the range of cycles counted	Using auxiliary function AF_ EN0, AF_ EN1 clears the alarm.

AL.645: Bus encoder multi turn overflow fault

Reason for fault alarm	Fault alarm check	Disposal measures
The number of rotations of the bus encoder exceeds the range	The number of turns can be monitored through monitoring mode d21. ASH, and multi turn absolute motors cannot rotate in one direction for a long time.	Using instruction AF_ En1 clear multi turn values

AL.646~AL.651: Bus encoder communication abnormality

Reason for fault alarm	Fault alarm check	Disposal measures
Encoder communication error	Check if the encoder cable is too long or if there are large interference sources around it	Use appropriate length of wire to reduce interference sources

AL.941: Parameter changes require power outage and restart to take effect

Reason for fault alarm	Fault alarm check	Disposal measures
After modifying the parameters, they need to be powered on again to take effect	Power outage restart	Power outage restart

Chapter 10 Communication

10.1 Modbus communication parameter settings

Parameter code	Name	Explanation
P00-23	Slave address	Setting range: 0-255, default 1 Set according to equipment requirements

P00-24	Modbus communication Baud	Setting range: 0-7, default 2 0:2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 115200 7: 25600
P00-25	Verification method	Setting range: 0-3, default 0 0: No verification, 2-bit stop bit 1: Even parity, 1-bit stop bit 2: Odd parity, 1-bit stop bit 3: No verification, 1-bit stop bit
P00-26	Modbus communication response delay	Setting range: 0-100, default 0 When the parameter is set to 0, it responds according to standard communication. When the parameter is set to a value, the Modbus communication response time responds according to the set time

10.2 Modbus communication supports reading and writing parameter settings

Support writing parameter list

address / Parameter number	Address Decimal system	Address Hexadecimal	Address Octal	remark
P03-09	309	135	465	Number of command pulses for one revolution of the motor
P03-10	310	136	466	Electronic gear molecule
P03-11	311	137	467	Electronic gear denominator
P05-03	280	118	430	Digital torque setting
P05-02	366	16E	556	Torque mode speed limit given value

Eeprom data	2050	802	4002	Data to be written
Eeprom control	2051	803	4003	Address: 0-11bit When the 12th bit is 1, it is a write operation When the 13th bit is 1, it is a read operation

Note: The above written parameters are only for temporary modification and will not be saved after power outage

Support reading parameter list

address / Parameter number	Address Decimal system	Address Hexadecimal	Address Octal	Remarks
P03-09	309	135	465	Number of command pulses for one revolution of the motor
P03-10	310	136	466	Electronic gear molecule
P03-11	311	137	467	Electronic gear denominator
P03-12	312	138	470	High position of electronic gear molecules
EEPROM reading data	2050	802	4002	Read out data
Eeprom Read Address	2051	803	4003	Address corresponding to data
Position given value	2106/2107	83A/83B	4072/4073	Address 2106 is the upper 16 bits Address 2107 is the low 16 bits
Position feedback value	2108/2109	83C/83D	4074/4075	Address 2108 is the upper 16 bits Address 2109 is the low 16 bits
Position deviation value	2110/2111	83E/83F	4076/4077	Address 2110 is the upper 16 bits Address 2111 is the low 16 bits
Speed control command	2113	841	4101	Unit: 1rpm/min
Motor running speed	2114	842	4102	Unit: 1rpm/min

Torque command	2115	843	4103	Unit: 0.1%
Torque feedback value	2116	844	4104	Unit: 0.1%
Overload load rate	2117	845	4105	Unit: 0.1%
Peak torque	2118	846	4106	Unit: 0.1%
Regeneration overload rate	2120	848	4110	Unit: 0.1%
port status	2121	849	4111	After reading in the numerical value, it is converted to a 16 bit binary system: the low 8 bits are the input port status, and the middle 5 bits are the output port status
Electrical appliance angle	2123	84B	4113	Unit: 0.1 degrees
Position feedback value (Absolute data)	2125/2126	84D/84E	4115/4116	Front high and rear low: high is the number of turns The low value is a single turn value, with 65536BIT per turn 注： Please refer to parameter P00-29 for details
Main circuit voltage	2128	850	4120	Unit: V
Speed loop analog voltage value	2133	855	4125	Unit: 0.01V
Torque loop analog voltage value	2134	856	4126	Unit: 0.01V

External instruction digital quantity given list

Instruction Address control model	Address Decimal system	Address Hexadecimal	Address Octal	remark

Speed loop digital quantity setting	2002	7D2	3722	Speed (rpm)=10 decimal value/5
Torque loop digital quantity setting	280	118	430	Torque=10 decimal value%
Torque loop speed digital quantity	366	16E	556	Speed (rpm)=10 decimal value

10.3 Overview of Modbus Communication Protocol

10.3.1 Introduction

The Nexus monitor can communicate with other devices using the RTU transmission mode of the AEG Modicon Modbus protocol. This communication is applicable to both RS-232 and RS-485 standards.

RS-232 communication requires a single connection between a Nexus monitor and another device, only using channel 1 of the Nexus monitor.

RS-485 supports multiple Nexus monitors connected to a single network, with a dual wire connection that can reach 115200 baud and ports 1-4 available.

10.3.2 Communication package

Communication occurs between a Modbus host and one or more Nexus slaves. The host initializes all communication by sending a "request packet" to the specified slave, and the slave responds with a "reply packet". The communication package consists of a string of 8-bit bytes, as follows:

• From address, one byte

Function code, one byte

• Data, N bytes, high bytes first, low bytes last

CRC (RTC Error Detection Code), 2 bytes

• Dead time, 3.5 byte transfer time.

A single communication packet can send up to 127 registers.

10.3.3 From Address and Send Request

Each slave device on the communication bus has its own dedicated address, only responding to the address addressed by the host. The packet returned to the host has the same address in the slave address domain as the request packet. These addresses are programmable and range from 0 to 255.

Slave address 0 is a transfer command that allows the host to immediately send the same packet to all devices. All slaves follow the instructions of the package but do not respond. The transfer request is only useful for functions up to 6 and 10, representing the preset of a single register and the preset of multiple registers, respectively. Refer to Tables 1.3 and 1.4.

10.4 Function number

The function number of a package tells the addressing slave what actions to perform. Nexus supports the following Modus function numbers.

Table 1.1 Function Numbers

Function number		description
Hexadecimal	Decimal system	
03H	3	Read Hold Register
06H	6	Preset a single register
10H	16	Preset multiple registers

10.4.1 Function number 03: Read hold register

This feature allows the host to read one or more parameter values (data registers) from a Nexus slave. This data register is a 16 bit value that is transmitted in the "Big Endian" format. Read high bytes first, read low bytes later.

BIG-ENDIAN means that the low byte is emitted at the low end of memory, while the high byte is emitted at the high end of memory

The host sends a packet to define a starting register and the number of registers to be read for the slave. The slave responds with a packet containing the requested parameter value, which is within the range specified in the

original request.

In the following example, the host device requests a slave located at 01 to send values from two registers, starting with register 00001. The slave responds with values 3031H and 3037H from registers 00001 and 00002.

Host sending format:

Number of data read from the starting address of the slave address function number data CRC

Slave sending format:

Slave Address Function Number Bytes Value of Each Data CRC

Table 1.2 Function Number 03 Example Question

host package definition	Hexadecimal address	Slave Package Definition	Hexadecimal address
Slave address	01H	Slave address	01H
Function number	03H	Function number	03H
Data start address high byte	00H	Bytes	04H
Data start address low byte	01H	Data 1 high byte	30H
Register count high byte	00H	Data 1 Low Byte	31H
Register count low byte	02H	Data 2 High Bytes	30H
CRC low byte	95H	Data 2 Low Bytes	37H
CRC high byte	CBH	CRC low byte	F1H
		CRC high byte	2AH

10.4.2 Function number 06: Adjusting a single register

This function allows the host to modify a single register on the Nexus slave. The data register is a 16 bit value, with high bytes transmitted first and low bytes transmitted later. In the following example, the host device stores the value 0001H of register 57346 (E002) in the Nexus slave with address 01H

Host sending format:

Slave address function number data starting address data value CRC

Slave sending format:

Slave address function number data starting address data value CRC

Table 1.3 Function Number 6 Example Question

Host Package Definition	Hexadecimal address	Slave Package Definition	Hexadecimal address
Slave address	01H	Slave address	01H
Function number	06H	Function number	06H
Data start address high byte	E0H	Data start address high byte	E0H
Data start address low byte	01H	Data start address low byte	01H
Data high byte	00H	Data high byte	00H
Low Byte of Data	01H	Low Byte of Data	01H
CRC low byte	2EH	CRC low byte	2EH
CRC high byte	0AH	CRC high byte	0AH

10.4.3 Function number 10: Adjustment register

This function allows the host to modify a continuous set of registers on the Nexus slave. The data registers are 16 bit values, with high bytes being transmitted first and low bytes being transmitted later.

In the following example, the host device stores the value 0001H of registers 57345, 0001H of 57346, and 0001H of 57347 in the Nexus slave with address 01H.

Host sending format:

Slave address function number data start address modification data number first data... CRC

Slave sending format:

Slave address function number data start address modification data number CRC

10.4.4 Data Start Address

Hexadecimal range: 0000H-FFFFH

Decimal range: 0001-65535

For example, for some Scada software, to read the value in the storage register, the address format should be 4 (XXXXX), and XXXXX is the Decimal address.

Table 1.4 Example Question of Function Number 10

Host Package Definition	Hexadecimal	Slave Package Definition	Hexadecimal

	address		address
Slave address	01H	Slave address	01H
Function number	10H	Function number	10H
Data start address high byte	E0H	Data start address high byte	E0H
Data start address low byte	01H	Data start address low byte	01H
Set point quantity high byte	00H	Set point quantity high byte	00H
Set point quantity low byte	03H	Set point quantity low byte	03H
Bytes	06H	CRC low byte	E6H
Data 1 high byte	00H	CRC high byte	08H
Data 1 Low Byte	01H		
Data 2 High Bytes	00H		
Data 2 Low Bytes	01H		
Data 3 High Bytes	00H		
Data 3 Low Bytes	01H		
CRC low byte	4DH		
CRC high byte	46H		

10.5 Dead time

If the Nexus slave does not receive the data from the host within the 3.5 byte transmission time (about 7ms at 4800 Baud and about 300us at 115200 Baud), it is considered that the data reception is over. If the delay between two bytes of the master is greater than this time during transmission, the slave is considered as Dead time. Therefore, the conclusion drawn from the Dead time is that all the addressless slaves pay attention to the new packets from the host.

10.6 Exception procedure response

When executing host instructions, if the slave encounters an illegal instruction or other problem, an exception program response packet will be sent to the host. The exception program response package contains an error code to indicate the type of error.

The following table shows the error codes and corresponding error types.

Table 1-5 Error Codes and Types

error code	Error type	interpretation
01	Illegal function number	The slave does not support the function number in the request package
02	Illegal address	The slave does not recognize the address of the data area in the transmitted request packet
03	invalid data	The data mentioned in the transmission request packet is not supported by the registers in the Nexus slave
06	Busy, reject package	The slave is busy performing long operations and cannot receive request packets

In the following example, the host device requests the value in the slave send register 00256 with address 01H, and the slave sends an error response message indicating that it is busy.

Table 1.6 Example of Exception Program Response

Host Package Meaning	Hexadecimal address	Meaning of slave package	Hexadecimal address
address	01H	address	01H
Function number	03H	Function number	03H
Data start address high byte	01H	error code	06H
Data start address low byte	00H	CRC low byte	C1H
Number of Registers High Bytes	00H	CRC high byte	32H
Register count low byte	01H		
CRC low byte	85H		
CRC high byte	F6H		

Chapter11 Instructions for using special functions

11.1 Origin reset function

11.1.1 Function Description

Origin: refers to the mechanical origin, which can represent the position of the origin switch or motor Z signal, and is selected and set by function code P03-61.

Zero point: refers to the positioning of the target point, which can be represented as the origin+offset (set at P03-69/P03-70). When P03-69/P03-70 is set to 0, the zero point coincides with the origin.

The origin reset function refers to the position control mode, when the servo enable is ON, after triggering the origin reset function, the servo motor will actively search for the zero point and complete the positioning function.

11.1.2 Basic servo settings and instructions

P03-60	Origin regression enable control	Setting range: 0-6, default 0 Set the origin regression mode and trigger signal source 0: Turn off the origin reset function 1: Enable the origin reset function by inputting the origin reset start signal through DI 2: Enable the electrical reset function by inputting the origin reset start signal through DI 3: Immediately start the origin reset after power on 4: Immediately perform the origin reset 5: Start the electrical reset command 6: Use the current position as the origin
P03-61	Origin regression mode	Setting range: 0-9, default 0

		Set the control signal source for the zero return direction, deceleration point, and origin during the origin regression operation 0: Forward return to zero, deceleration point and origin are origin switches 1: Reverse return to zero, deceleration point and origin are origin switches 2: Forward return to zero, deceleration point and origin are motor Z signals 3: Reverse return to zero, deceleration point and origin are motor Z signals 4: Forward return to zero, deceleration point is origin switch, origin is motor Z signal 5: Reverse return to zero, deceleration point is origin switch, origin is motor Z signal 6: Forward return to zero, deceleration point Origin is forward overtravel switch 7: reverse return to zero, deceleration point, origin is reverse overtravel switch 8: forward return to zero, deceleration point is forward overtravel switch, origin is motor Z signal 9: reverse return to zero, deceleration point is reverse overtravel switch, origin is motor Z signal
P03-65	Speed when searching for the origin switch_ high speed	Setting range: 0-3000, default 100 When setting the origin to zero, search for the high-speed speed value of the deceleration point signal. When returning to zero electrically, the motor always runs at high speed P03-65.

P03-66	Speed when searching for the origin switch_ low speed	Setting range: 0-1000, default 10 Set the low speed value when searching for the origin when returning to zero. The speed setting should be low enough to prevent mechanical shock during shutdown.
P03-67	Search for acceleration and deceleration time of the origin switch	Set the time for the motor to change from 0 to 1000rpm when resetting the origin. Unit: MS
P03-68	Maximum time limit for searching for origin	Limit the total time for returning to the origin, and if it exceeds the limit, a warning AL.551 (return to the origin timeout fault) will occur.
P03-69	Mechanical origin offset H	Set the high and low absolute position values of the motor after resetting the origin. Calculation method for total offset: Offset=(P03-69) * 65535+(P03-70)
P03-70	Mechanical origin offset L	
P06-01	DI1 input port function selection	DI1 set to 1, servo ON
P06-05	DI3 input port function selection	DI3 set to 3, forward overtravel signal input
P06-07	DI4 input port function selection	DI4 set to 4, reverse overtravel signal input
P06-09	DI5 input port function selection	DI5 set to 21, origin switch signal
P06-11	DI6 input port function selection	DI6 set to 22, zero point reset start signal

11.1.3 Precautions for using origin reset

If the deceleration point signal is effective and the origin signal is not fully decelerated, it may lead to unstable final positioning. The displacement required for deceleration should be fully considered before setting the

deceleration point and origin signal input position. Acceleration and deceleration time when searching for the origin (P03-67) and speed when searching for the origin switch_ High speed (P03-65) can also affect positioning stability, and therefore should be taken into account when setting.

11.2 Use of absolute encoders

11.2.1 Function Description

Using a servo motor with an absolute value encoder, an absolute value detection system can be constructed through the upper device. By using the absolute value detection system, it is possible to eliminate the need for zero point reset operations every time the power is turned on. This function is based on MODBUS communication to read the number of turns and position data of the absolute encoder, and the upper device processes and controls to achieve the relevant functions of the absolute encoder.

11.2.2 Basic settings and instructions for MODBUS based communication servo

When a system using an absolute value encoder is put into use, it is necessary to initialize the rotation number data (AF-En1 absolute value encoder multi turn value reset). Therefore, in situations where initialization is required for the first time when the power is turned on, an alarm related to the absolute value encoder will occur. By setting (initializing) the absolute value encoder and initializing the rotation data, the alarms related to the absolute value encoder will be cleared.

Parameter code	Name	Illustration
P00-23	Slave address	Setting range: 0-255, default 1 Set according to equipment requirements
P00-24	Modbus communication Baud	Setting range: 0-7, default 2 0:2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600

		6: 115200 7: 25600
P00-25	Verification method	Setting range: 0-3, default 0 0: No verification, 2-bit stop bit 1: Even parity, 1-bit stop bit 2: Odd parity, 1-bit stop bit 3: No verification, 1-bit stop bit
P00-29	Modbus absolute encoder feedback format	Setting range: 0-1, default 0, Read the absolute position value 84D/84E through 485 0:84D is the circle value, 84E is the single circle value 1: 84D is the single lap value, 84E is the lap value

11.2.3 Absolute data address based on MODBUS communication

Address / Parameter number	Address: Decimal system	Address: Hexadecimal	Address: Octal	Remarks
Position feedback value (Absolute data)	2125/2126	84D/84E	4115/4116	Front high and rear low: high is the number of turns The low value is a single turn value, with 65536BIT per turn

11.2.4 Absolute encoder related alarm processing

Alarm code	Reason for fault alarm	Fault alarm check	Disposal measures
AL.640	Bus encoder overspeed	Appears during initial use	Clear the alarm through AF-EN0 (Refer to Chapter 8.4 for details)
AL.643	When the bus encoder is set to multi turn absolute value, the external battery voltage is low	Check the external battery voltage of the encoder and confirm that it is higher than 3.0V	Replace the battery and clear the alarm through AF-EN0 (Refer to Chapter 8.4 for details)

AL.644 AL.645	Abnormal reading of multi loop data, or multi loop data greater than 32767	Check d21. ASH (Refer to Chapter 8.3 for details) for multi turn values	If the multi turn value is greater than 32767, clear the multi turn data through AF-EN1 (Refer to Chapter 8.4 for details)
AL.930	Absolute value encoder battery failure	Check the voltage of the encoder's external battery	Replace the battery and clear the alarm through AF-EN0 (Refer to Chapter 8.4 for details)

11.2.5 Absolute encoder battery replacement

If any of the following situations occur in the drive, to avoid absolute position data loss, please replace the battery.

When the driver displays AL.930, it indicates a low battery voltage warning. The battery must be replaced in a timely manner to avoid the loss of absolute motor position data. After replacing the battery, use the auxiliary function AF-EN0 to clear the alarm

When the driver displays AL.643, it indicates a low battery voltage alarm. When this alarm occurs, the motor coil count data cannot be recorded normally and the battery must be replaced immediately. After replacing the battery, use the auxiliary function AF-EN0 to clear the alarm and verify the origin of the device. Simultaneously using auxiliary functions to reset the multi turn data of the motor

Note： It is recommended to replace the battery with the driver powered on to avoid the loss of absolute position data

11.3 Multi turn absolute value origin regression function

11.3.1 Function Description

The multi turn absolute value origin regression function refers to the use of multi turn absolute value drivers and motors in position control mode. By setting the origin position through the driver, after the motor moves, an I/O signal can be given to return the motor to the set origin position

11.3.2 Basic servo settings and instructions

Parameter code	Name	illustration
P03-06	Origin reach range	Setting range: 0-65535, unit: 1/10000 turn Used to set the threshold value for completing the output at the origin.
P03-65	Speed when searching for the origin switch_ high speed	Setting range: 0-3000, default 100 When setting the origin to zero, search for the high-speed speed value of the deceleration point signal. When returning to zero electrically, the motor always runs at high speed P03-65.
P03-66	Speed when searching for the origin switch_ low speed	Setting range: 0-1000, default 10 Set the low speed value when searching for the origin when returning to zero. The speed setting should be low enough to prevent mechanical shock during shutdown.
P03-67	Search for acceleration and deceleration time of the origin switch	Set the time for the motor to change from 0 to 1000rpm when resetting the origin. Unit: MS
P03-68	Maximum time limit for searching for origin	Limit the total time for returning to the origin, and if it exceeds the limit, a warning AL.551 (return to the origin timeout fault) will occur.
P03-58	Origin circle numerical display	Used to display the origin setting position
P03-59	Display of single circle value at the origin	
P06-01	DI1 input port function selection	DI1 set to 1, servo ON
P06-05	DI3 input port function selection	DI3 set to 22, origin start signal (can choose any input port to set to 22)

P06-27	DO4 output port function selection	DO4 is set to 12, and the origin reaches the signal output (any output port can be selected to be set to 12)

11.3.3 Origin setting

The origin setting needs to be set through the auxiliary function AF-GTO, and the setting steps are as follows: Before running this auxiliary function, please move the machine to the desired home position and follow the steps below

1. Press the button on the operation panel **M button** Switch to auxiliary mode **AF_xxx**, Operation **Up/Down button** to **AF_GTO**, press **ENT button** The current multi turn position will be displayed.
2. Long press **ENT button** Until it appears **Finsh** Flashing completes the absolute value encoder origin setting.

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