Mach Motion Products

MCDS808

Digital AC Servo Drive

Manual

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Preface

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Chapter 1 - Safety Issues

Avoid any dangers to people or property, please pay attention to the WARNING LOGOS as below!

	May cause death or heavy damage.
	May cause injury or damage to people or property
	Forbidden!

1.1 Installation Warning!

 : 1、Please assemble driver and motor following this manual, failure to do so can cause a fire or damage to the machine.

2、Do not install it in places with serious water, fog, flammable gas or corrosive gas etc, It may cause electric shock, fire or machine damage etc.

1.2 Wiring Warning!

 1.Don't connect power supply to U, V, W, it will damage the driver! Even cause hurt to human or cause fire !

2. Tighten all screw nut to wires, loose connector or pins maybe cause fire spark even cause fire.

3.Choose the right power cable, less capacity to current maybe cause fire.

4. Make sure connect driver shell and motor to ground correct. In correct method may cause electric shock.

1. In order to avoid any interference to signal, do not tie power cable with signal cable together, or put them in the same tube

2. In order to increase anti-interference, please use shield cable as signal cable or extension encoder cable.

3. Check once more to make sure that all the wiring is correct before Power ON.

1.3 Operation Warning !

1. Test machine without any loading to avoid any accident.

2. Operate machine by professional people, otherwise will cause machine damage or hurt to human.

3. Do not touch driver while it is working ! It may cause high temperature burns or electric shock.

1. Please set all parameter correctly before long time working, otherwise it will damage driver or machine.

2. Make sure POWER ON, EMERGENCY STOP, POWER OFF is activity, then runs machine.

3. 3.Do not Power On / Power off in often.

1.4 Maintain cautions

：1、 Do not touch driver or motor inside while it is running ! May cause electric shock.

2.Do not change any wire while Power On, may cause electric shock.

3.Operate machine by professional people

4.Do not disassemble by unprofessional people.

Chapter 2 Product Instruction

2.1 Servo Driver

2.1.1 Overview

MCDS808 AC servo driver, is a high-performance AC servo device. DSP with FPGA program. Small size, high integration, stable performance and reliability etc. Huge digital and analog I/O interface. Apply to variety of host devices, supports ModBus communication protocol to facilitate networking. After optimized the PID control algorithm, it comes to whole digital control to the position, speed and torque accuracy, with the advantages of high precision and fast response. It not only supports increment encoder of 1000lines, 1250lines and 2500lines, but support absolute encoder of 17 bits, 20bits and 23 bits. It is able to work with different CNC machines. It is wildly used for CNC machine, printing and packing machinery, textile machinery, robots, automated production lines etc.

2.1.2 Characters

DSP+FPGA dual-chip platform, the optimized current loop, makes the driver high dynamic response, extremely short setting time, stable operation and low vibration at stop.

Automatic gain adjustable module, user is able to use different rigidity.

Inside FIR filter and multiple sets of notch filter, is able to identify and suppress mechanical vibration.

Inside disturbance torque observer, the driver owns high resistance to our side interference.

Control module option: Speed, Position and Torque control module.

If position pulse frequency is 4Mhz, it will support Pulse+direction, orthogonal pulse, dual-pulse etc.

RS485 port, Modbus communication, matches to multi-turn absolute encoder with memory function. Applied to robots field.

With programmable 4 ways Input and 3 ways Output port. User could define parameter to input and output flexibility.

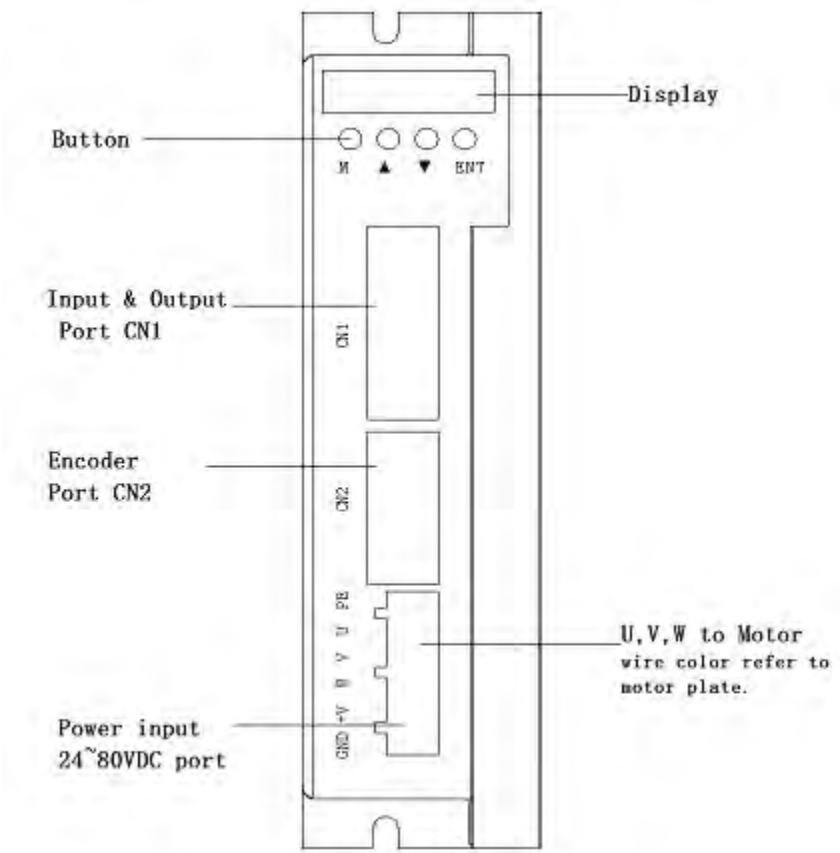
Support increment encoder and absolute encoder (17bits, 20 bits and 23bits).

Protection of:Over voltage, Shortage voltage, Over Speed, Over loading, Big position tolerance, Encoder mistake etc. Memory 8 historical fault information.

A lot of monitor projects option.

Be able to communicate with PC via RS232 port. Adjust system simply and fast

2.1.3 Driver Description



Note：

1. CN3/CN4/CN5 CN3/CN4/CN5 Ports on the top of driver.

2.CN3 . CN3 applies to RS232.

3.CN4/CN5. CN4/CN5 ports apply to 485 and CAN communication.

2.1.4 Specification:

1、 Electric Specification:

	MCDS808
input voltage	DC24~80V
Input current	10A
output current	8A
Max.output	20A
Max pulse frequency	300K

2、 Basic Specification

Item		Description
control method		IGBT PWM control, sine wave current driver
feedback		increment encoder absolute encoder
Work condition	temperature	work: 0～55℃ storage: : -25～85℃
	humidity	work: 10%～90%
	altitude	When it is less than 1000m and higher than 1000m, it shall be used according to GB / T 3859.2-93 derat
	protect grade	neat: 2 Non-corrosive gas or flammable gas. no oil or water drops light dusty,salty environment.
performance	speed	1:5000
	speed accuracy	±0.01%：0～100% Outside load change ±0.01%：±10%（220V）Power input change ±0.1%：±25℃（25℃）environment temperature
	speed reaction frequency	1200Hz
	torque accuracy	±2%

Input and output signal	encoder divided pulse output	A,B,C phase: line drive output Divided pulse: set freely
	input signal	Points: 4. Function: Driver ON. Alarm clear, Forward overtravel signal input, reverse overtravel signal input, control mode switching,P action demand signal input, P action command input, forward side external torque limit, reverse side external torque limit, gain switching input, zero fixed input, command pulse inhibit input, encoder absolute value data request input, internal set speed switching input 1 , internal setting speed switching input 2, internal setting speed switching input 3, position command clear input, magnetic pole detection input, command pulse input multiplying switching input
	output signal	Point 3 Function: alarm output, brake open output, servo ready output, positioning completion output, positioning proximity output, speed consistent output, motor zero speed output, torque limit detection output, speed limit detection output, warning output, command pulse Input magnification switching output
Display		LED 6-digit 8 level LED
communication	RS485	Support Modbus protocol. Axis position: set parameter
	RS232	test with PC
	CAN	Support CAN bus communication

Regeneration treatment	No
Protection	Over voltage, shortage voltage, over current, over load etc.

2.2 Servo Motor

2.2.1 Overview

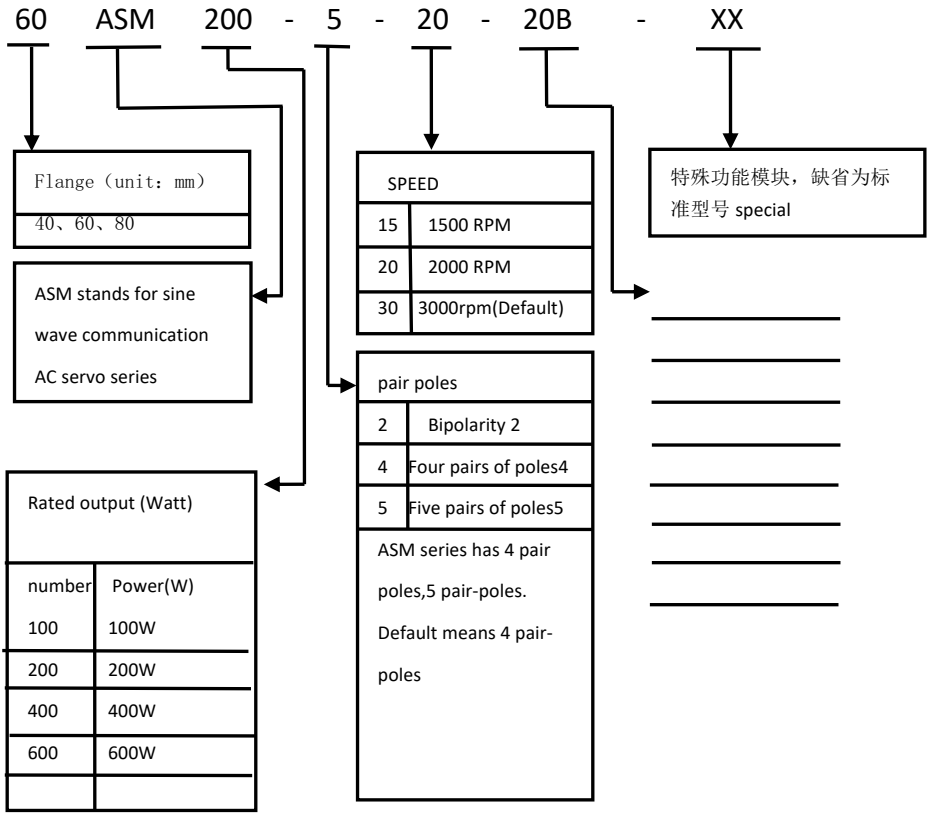
MCDS808 series low-voltage servo motor is a high-speed, high-precision servo motor. In order to meet the modern automatic control. This series of servo motors offers high accuracy to the speed and position, and can convert the voltage signal into Torque and speed to drive the control object. The servo motor rotor speed of this series is controlled by the input signal and can react quickly. It is used as an actuator in the automatic control system, and has the characteristics of small electrical and mechanical time constant, high linearity and low starting voltage. The received electrical signal is converted into an angular displacement or angular velocity output on the motor shaft, and the feedback signal can be fed back to the servo drive for real-time control.

2.2.2 Motor Character

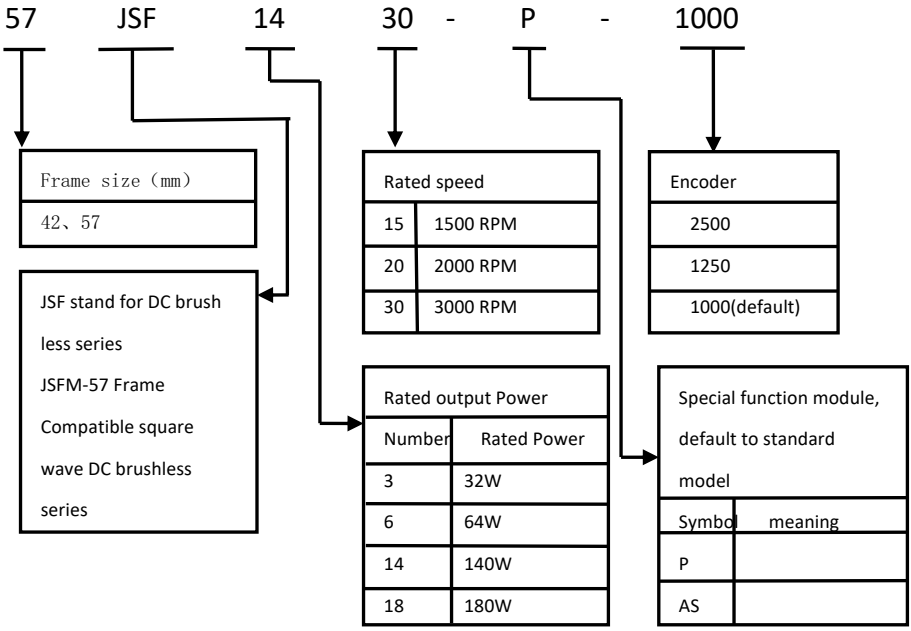
1. High energy magnetic force
2. Short-term 200% overload capability
3. Frame size (mm): 40, 42, 57, 60, 80
4. Power: 32-600W optional,
5. Low noise, low heat, high precision, high speed, etc.

2.2.3. Servo model description

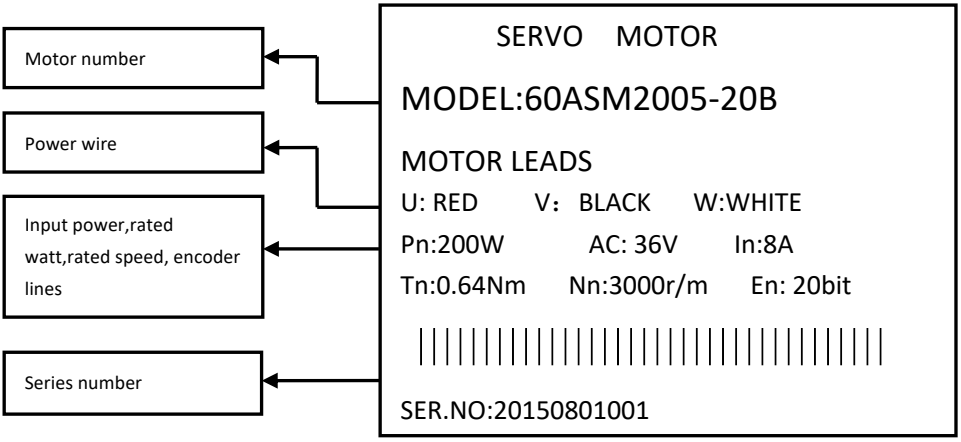
1、40/60/80 servo motor model number description



2、 42/57 series motor introduce.



3、Name Plate

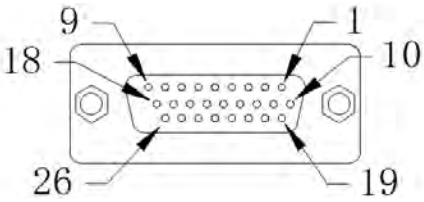


Chapter 3 Port and Wiring

3.1 CNI PORT DESCRIPTION

3.1.1 CNI control port define

Connect driver to machine controller, control driver and feedback signal.



CN1：PIN define

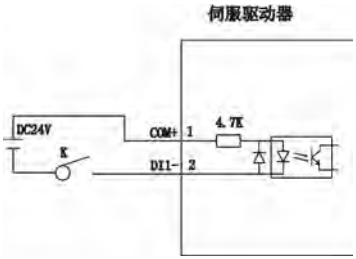
number	sign	define	Description
1	COM+	common input port	Active at high level 24V
2	DI1-	digital input -	Self-set input port
3	PUL+	Pulse +	Active at high level 3.6V~24V
4	PUL-	Pulse -	Low level 0V effective
5	DIR+	direction+	High level 3.6V ~ 24V effective
6	DIR-	direction-	Low level 0V effective
7	DI2-	digital input-	Self-set input port
8	DO1+	digital output+	Self-set output port
9	DO1-	digital output-	self-set output port
10	DO2+	digital output+	self-set output port

11	DO2-	digital output-	self-set output port
12	DO3+	digital output+	self-set output port
13	DO3-	digital output-	self-set output port
14	DI3-	digital input-	self-set output port
15	DI4-	digital input-	self-set output port
16	T_REF	Torque analog control+	
17	V_REF	speed analog control	
18	OCZ	Encoder Z phase open collector output	
19	+15V	+15VOutput (for analog command)	Max.output current: 50mA.
20	OA+	Encoder A phase output+	
21	OA-	encoder A phase output-	
22	OB+	encoder B phase B output+	
23	OB-	encoder B phase output-	
24	OZ+	encoder Z phase output +	
25	OZ-	encoder Z phase output -	
26	GND	Power Ground	

Note: How to set DI and DO parameter, please refer to I/O parameter in Chapter 8.

3.1.2 How to connect CN1 port ?

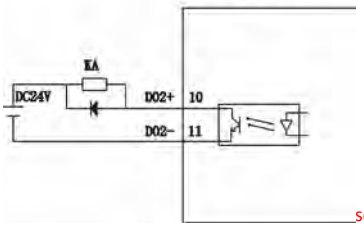
Digital input : DI(DI1-DI4) is able to connect to switch, relay, collector open transistor circuit. (input I/O set refer to 8.2.7 P06-xx I/O parameter description.



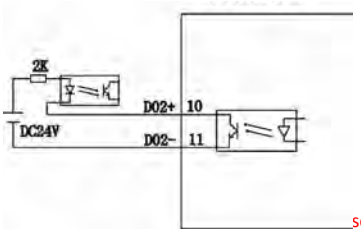
servo driver, connect to outside power.

Use external power input

Digital output : DO(DO1-DO3) is able to connect to relay, Optocoupler connection. (output I/O set refer to 8.2.7 P06-xx I/O parameter description.



servo driver



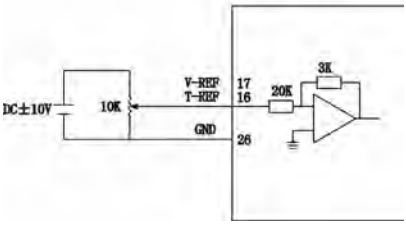
servo driver

（ Relay connection

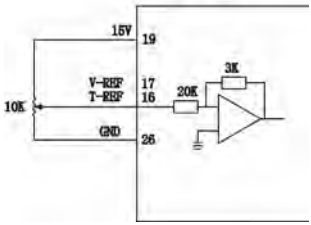
Optocoupler connection

Input voltage range to analog control for Speed and Torque Control is (-10V~10V). The command value corresponding to this voltage range can be set by the following parameters: P06-40 speed analog command input gain, P06-43 torque analog command input gain. Please read the detailed description of the parameters setting.

Servo Driver



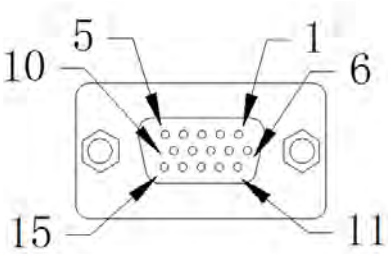
Servo Driver



Outside power analog signal

15V Power-self, Adjusting speed/torque through potentiometer

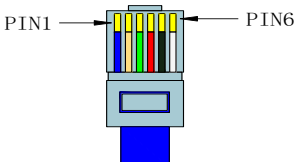
3.2 CN2 Encoder Port



CN2 Encoder Port

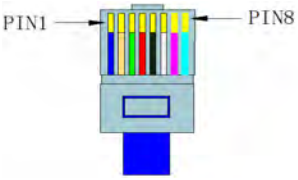
PIN Number	Sign	Define	Description
1	EA+	Encoder A input +	
2	EB+	Encoder B input +	
3	GND	Output GND	
4	Hallw+	入 Polar W input +	
5	Hallu+	Polar U input+	
6	FG		
7	EZ+	Encoder Z input +	
8	EZ-	Encoder Z input -	
9	Hallv+	入 Polar V input+	
10	NC	non	
11	EA-	Encoder A input -	
12	EB-	Encoder B input -	
13	+5V	Output +5V	
14	T+	Bus encoder T+	For Bus only
15	T-	Bus encoder T-	For Bus only

3.3 Driver CN3 Port



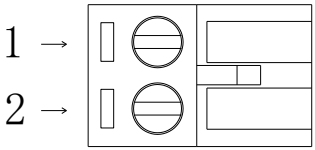
PIN number	Sign	Description
PIN1	TX232	Datas to PC RS232 RV. from driver port
PIN2	RX232	Datas to PC RS232 emission from driver
PIN3	Reserved	Don't connect !
PIN4	Reserved	Don't connect !
PIN5	Reserved	Don't connect !
PIN6	GND	RS232 Ground

3.4 CN4/CN5 Port



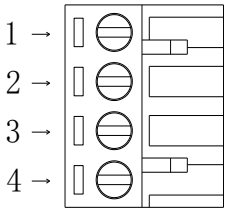
PIN number	SIGN	Description
PIN1	CANH	CANH
PIN2	CANL	CANL
PIN3	CGND	CAN ground
PIN4	reserved	Don't connect
PIN5	reserved	Don't connect
PIN6	GND	Ground
PIN7	485-	485-
PIN8	485+	485+

3.6 Power Port



Port number	Sign	Define	Description
1	GND	Input power ground	0V
2	VDC	input DC power +	DC24～80V

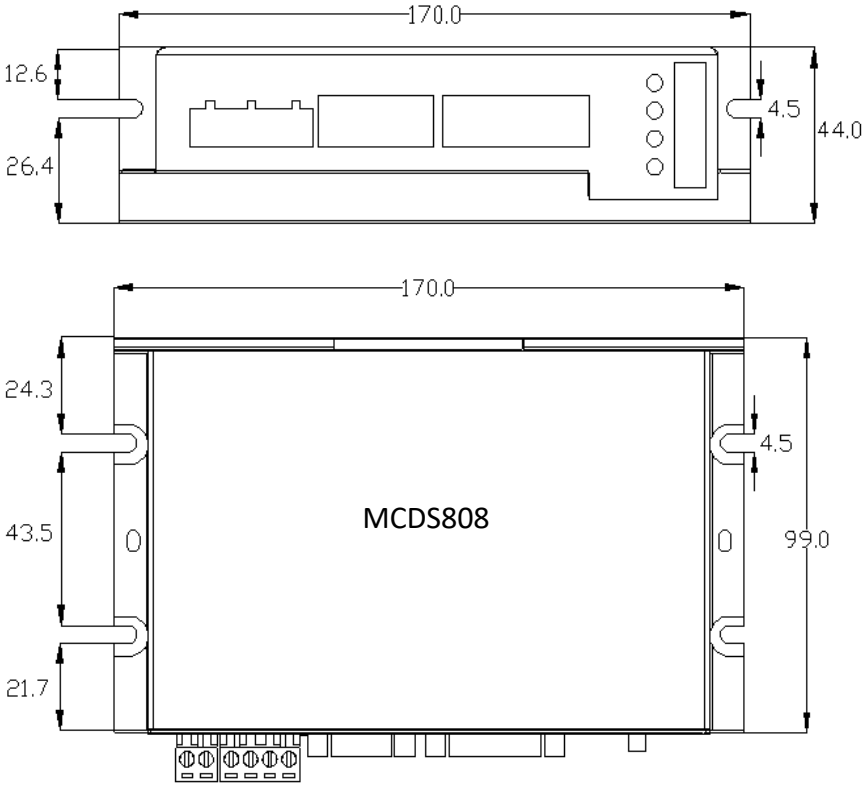
3.7 Motor Power Port



Port Number	Sign	Define	Description
1	W	Motor W phase	
2	V	Motor V phase	
3	U	Motor U phase	
4	PE	Ground	Motor ground

Chapter 4 Install

4.1 Install Dimension (unit: mm)



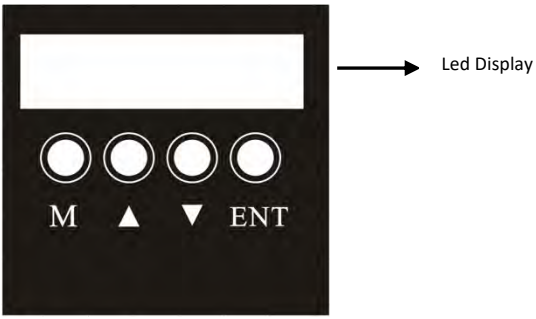
4.2 Work condition

The installation and use environment has a direct impact on 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% (no condensation).
2. Storage environment: - 20 ℃ ~ + 85 ℃; storage environment humidity: below 90% (no condensation).
3. Vibration: below 0.5g.
4. Prevent rain dripping or humid environment.
5. Avoid exposure to sunlight.
6. Prevent oil mist and salt erosion.
7. Prevent corrosive liquid, gas, etc.
8. Prevent the invasion of dust, cotton and metal filings.
9. Keep away from radioactive materials and combustibles.
10. Space shall be reserved around the location of the drive in the cabinet to facilitate loading, unloading and maintenance.
11. Pay attention to the air flow in the cabinet. If necessary, install an external fan to enhance the air flow and reduce the ambient temperature of the driver to facilitate heat dissipation. The long-term working temperature is below 55 ℃.
12. Try to avoid vibration source nearby, and install damping device such as vibration absorber or anti vibration rubber gasket.
13. If there is an electromagnetic interference source nearby, the power supply and control circuit of the driver are easy to be interfered and lead to misoperation, the noise filter can be added or various effective anti-interference measures can be adopted to ensure the normal operation of the driver (the noise filter will increase the leakage current, and the isolation transformer shall be loaded at the power input end of the driver).

Chapter 5 - Display Panel

5.1 Panel part



MCDS808 Driver interface, 6 digital LED display; 4 Digital position for Demand Set. Detail as below:

Interface Sign	Define	Description
△	UP	Increase digital
▽	DOWN	Minus digital
M	M Key	function change, cancel and log out.
ENT	ENT Key	a、 Press 3s to confirm or save. B、Press for short time, shift function (Exchange high/low level under parameter mode).

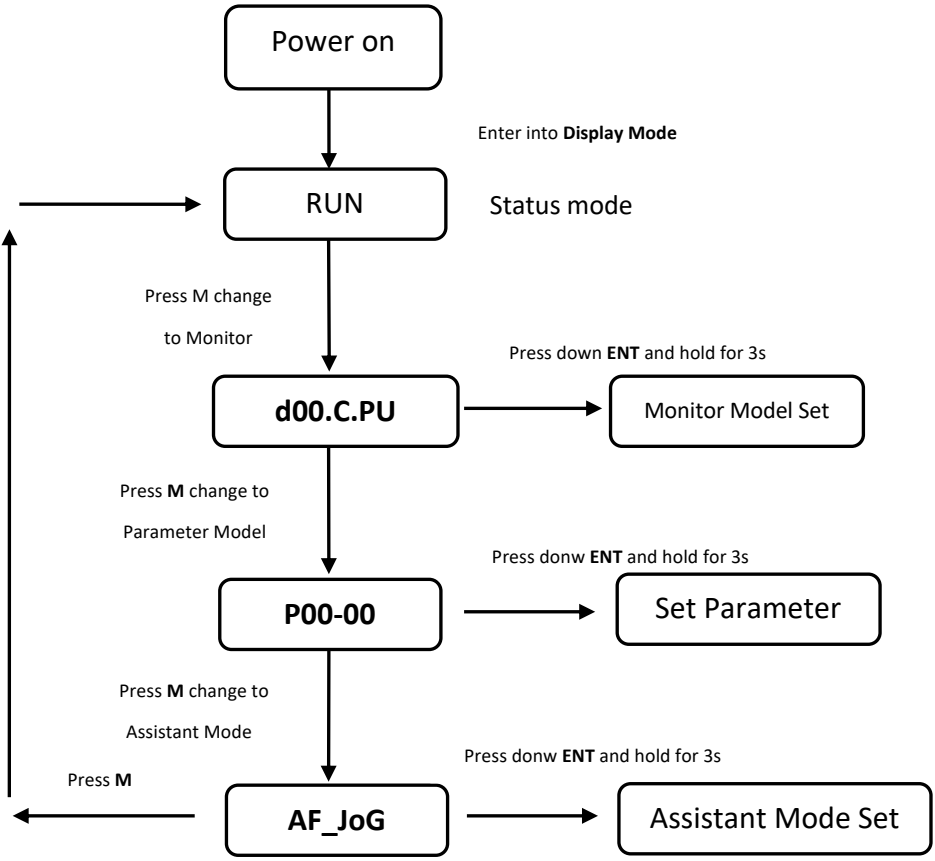
Note:

a。ENT button: Press for 3second, Confirm or Save.

b、Press button UP or Down to scroll under monitor and parameter mode.

5.2 How to change operation model

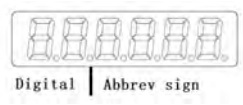
There are 4 modes for MCDS808 servo driver: Status Display, Monitor, Parameter setting and Assistant. Exchanging procedure as below:



Remark: Press M button could log out mode choice while it is in any mode set.

5.3 Status Display

Display as below



Status Display Description

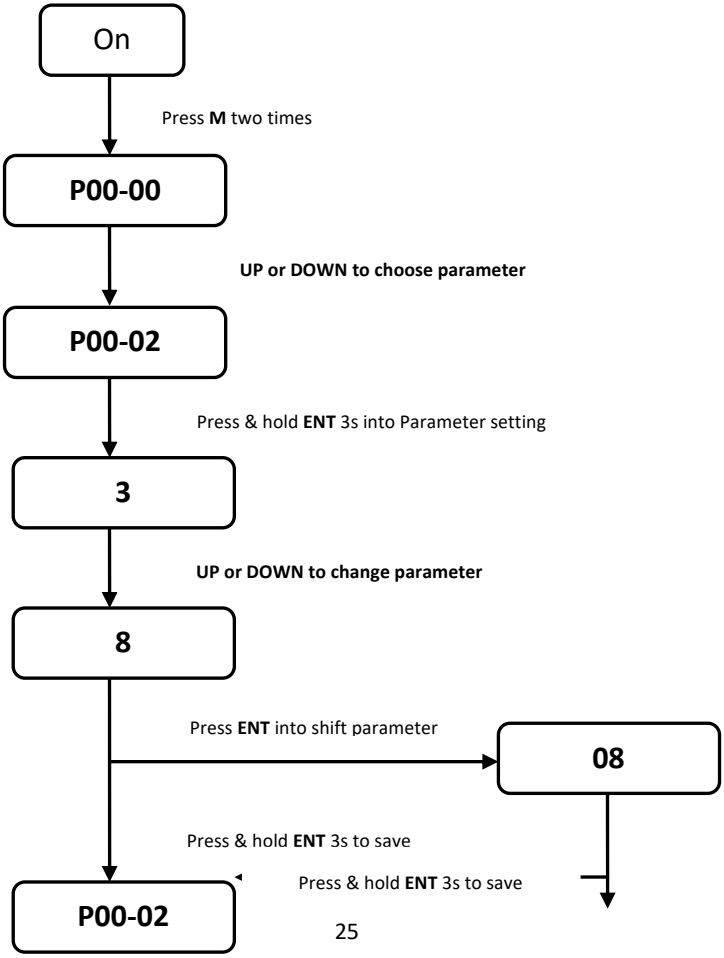
Display	Define	Display	Define
	Control power back loop after Power On		Main Power Back Loop ready
	Speed/Torque control: speed synchronize. Position control: position completed		Rotatory checking
	Base Polar Lock Status light On while Driver is OFF, Statues light off while Driver is ON.		Speed/Torque control: speed command is being set. Position control: Pulse command is being set.

：Status Mode Abbrev.

Display	Description
	Not ready (no power)
	Driver is ready, (motor no power)
	Driver is Enable, (motor power on)
	Forward overtravel signal input port is active, and the motor forward rotation command is invalid.
	The reverse overtravel signal input port is active and the motor reversal command is invalid.

FinSh	All process finished.
SY_on	Driver is Enable, can not handle it. Need to shut off Enable.
no_oP	Invalid digital input, driver rejects it.
LocKd	In lock, need to unlock to operate with it.
AL-501	Error, please refer to chapter 9 for which error.

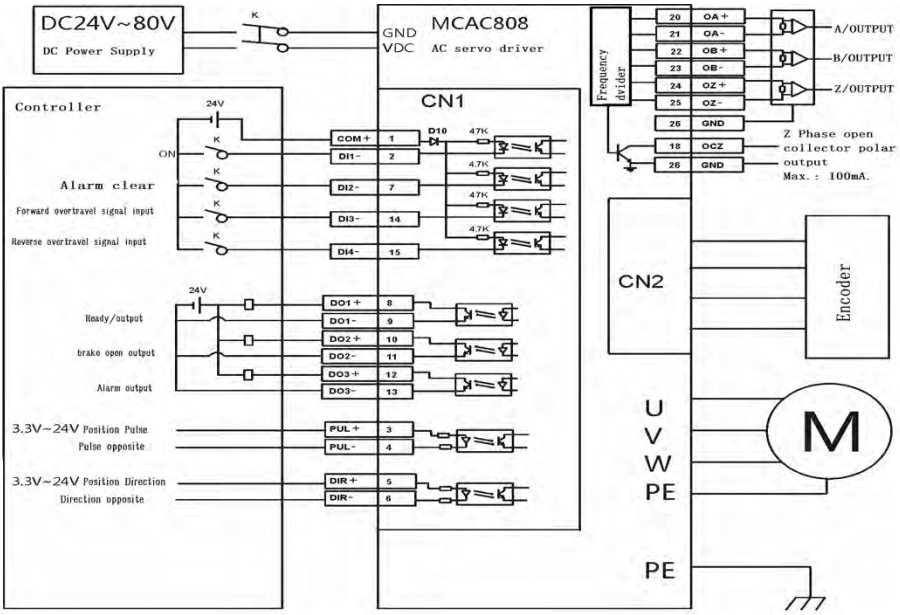
5.4 Set Parameter and save.



Chapter 6- Control mode and setting

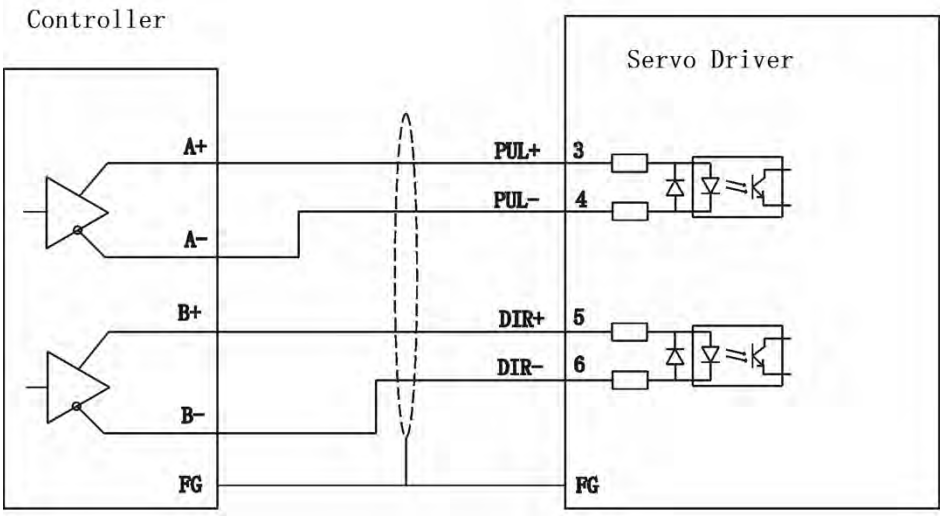
6.1 Position Control

6.1.1 Position Control Wiring.

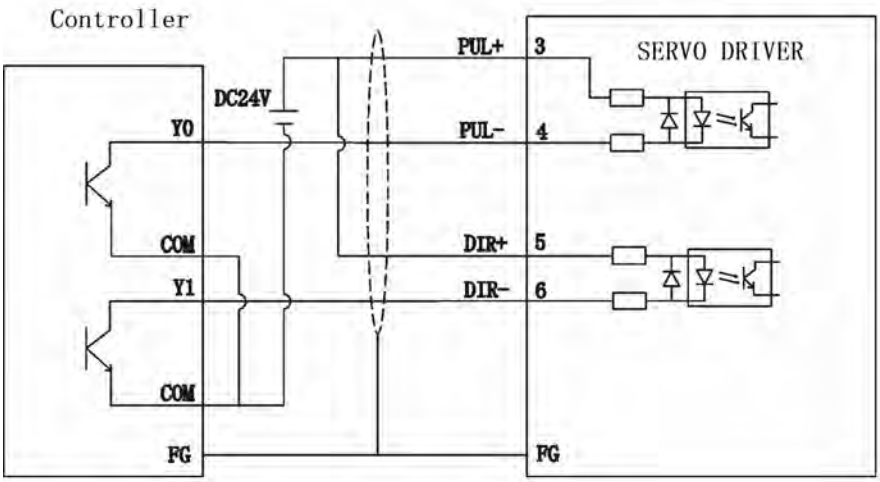


6.1.2 Position Control Wiring Graphic

Controller direction +pulse input method: direction +pulse input includes 3 ways: 3.3V, 5V, 24V signal input. It could be improved immunity to interference by twisted pair connectors. In general, the MCU controller system uses this position control wiring method. The maximum input pulse frequency is 500KHz by this conrol way.



Controller open collector input mode description: Single-ended input mode can use the inside power , or use an external power supply. However, you cannot use dual power input, otherwise will damag the drive. In general, the PLC controller system uses this position control wiring method.



6.1.3Position Control Mode Parameter

1、 Motor and driver control parameter

Parameter Code	Define	Range	Set	Description
P01-01	Control mode set	0-6	0	0：position mode 1：speed mode 2：Torque mode 3：speed, torque mode 4：position, speed mode 5：position torque mode 6：full closed loop
P00-05	motor pole pair	1-31	---	Adjust the parameter according to motor operation
P0-07	Encoder option	0-3	---	
P00-10	Incremental encoder lines	0-65535	---	

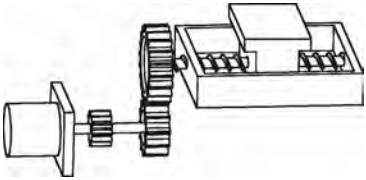
P03-00	Position command	0-1	0	0：Pulse command 1：Set number
P03-01	Command pulse mode	0-3	1	0：Quadrature pulse instruction 1：Direction+Pulse command 2&3： Dual pulse command
P03-02	Command pulse input terminals	0-1	0	0：Low speed pulse. 1：High speed pulse.
P03-03	Instruction pulse inversion	0-1	0	Set the initial direction of motor rotary
P03-09	Pulses per rotary	0-65535	0	User setting Refer to 8.2 parameter instruction.
P03-10	Electronic gear 1 molecule	1-65535	1	User setting Refer to 8.2 parameter instruction.
P03-11	electronic gear 1 denominator	1-65535	1	

2、Gain Parameter

Please refer to chapter 7, how to adjust parameter.

6.1.4 Electronic Gear scale

1.Ball Screw tans mission:



For example：

（1）Mechanical parameter：Speed Ratio"R" is 1:2, screw lead is 10mm.

（2）Absolute encoder position loop,PPR is：17bit=131072

（3）Related each movement per position pulse command：0.001mm

Then count it as :

1、 According {1}&(3),the platform moves 10mm per rotary, ball screw needs pulses as below:

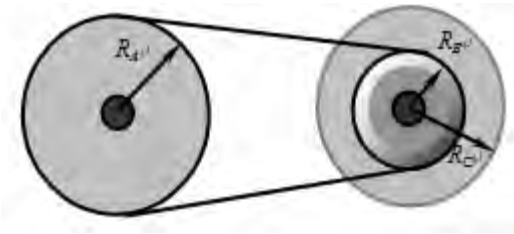
$$\frac{10}{0.001}=10000$$

Electronic gear scale：（B=molecule，A=denominator）

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

Parameter sets as : P03-10 sets as 16384，P03-11 sets as 625

2、Belt Wheel transmission



For example：

（1）Mechanical parameter：Speed ratio R：1:5，wheel diameter：0.2m(wheel circumference：0.628m)

（2）Absolute encoder position loop,PPR is：17bit=131072

（3）Related each movement per position pulse command：：0.000005m

Then counts it as ：

According {1}&(3),the wheel moves 0628m per rotary,it needs pules per rotary as below:

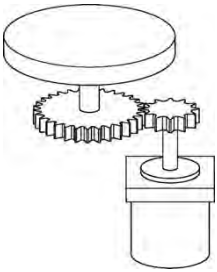
$$\frac{0.628}{0.000005}=125600$$

Electronic gear scale:：（B=molecule，A=denominator）

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

Parameter: P03-10 sets as 4096，P03-11 sets as 785

3.Rotary Loading



For example：

（1）Mechanical parameter：speed ratio R: 1:10，360° / per rotary circle

（2）Absolute encoder position loop,PPR is：17bit=131072

（3）Related each movement per position pulse command : 0.01°

Then counts as：

According {1}&(3)，it needs pluses per circle：

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

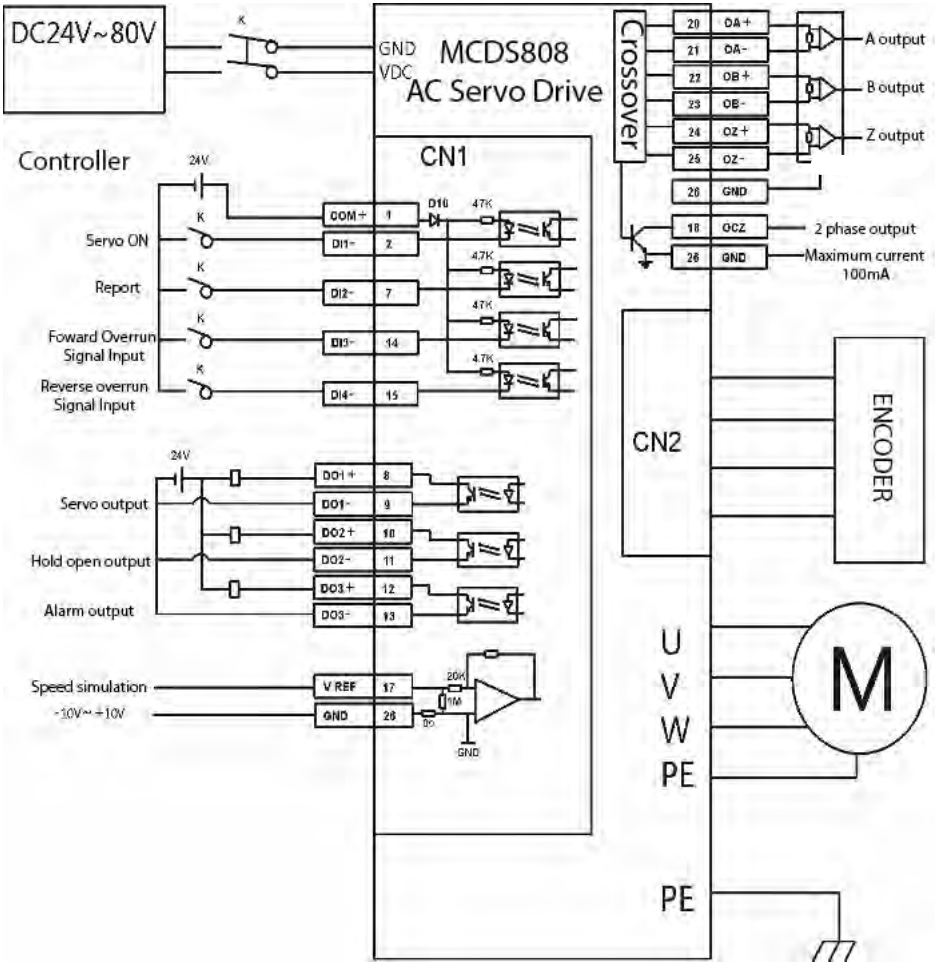
Electronic gear scale：（B B=molecule，A=denominator）

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

Then: P03-10 sets as 8192，P03-11 sets as 225

6.2 Speed Control

6.2.1 Speed control wiring diagram



6.2.2 Speed Mode Control Parameter Description

1、 Motor and Driver control parameter:

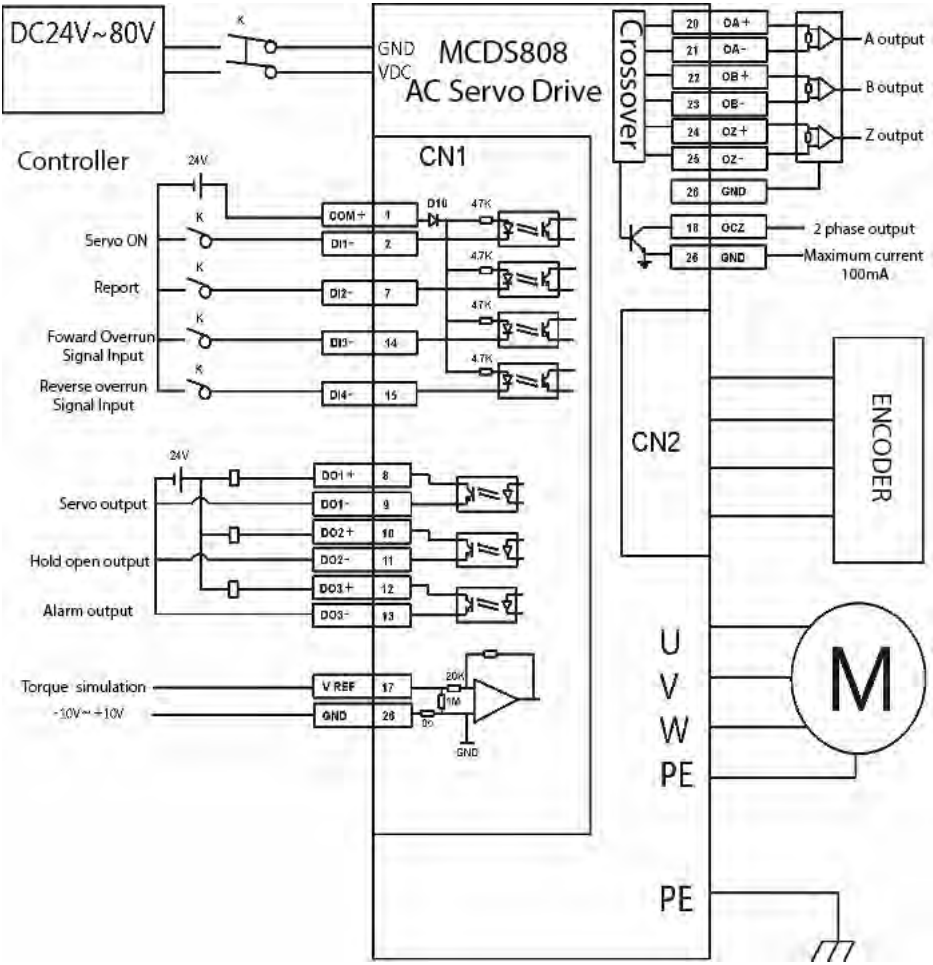
Parameter code	Description	Setting range	Define	Details
P01-01	Control mode setting	0-6	1	0：position mode 1：speed mode 2：torque mode 3：speed, torque 4：position, speed 5：position, torque 6：full closed loop mode
P00-05	Motor pole pairs	1-31	---	Adjust the parameter according to motor operation
P00-07	Encode option	0-3	---	
P00-10	Incremental encoder lines	0-65535	---	
P04-00	Rotational speed command	0-3	0	0：External analog instruction 1：Digital command (parameters) 2：Digital instruction (communication) 3：Internal multiple sets of instructions
P04-01	Speed analog command inverting	0-1	0	Set the initial direction of motor rotary
P04-02	Digital setting.	-6000—6000	0	Set rotary pulses.It is active while Speed mode P04-00 is 1.
P04-06	Forward speed limit	0-6000		Positive direction speed limit
P04-07	Reverse speed limit	0-6000		Reverse rotation speed limit
P06-40	Speed analog command input gain	10-2000		User setting. Refer to 8.2 parameter instruction.

2、 Gain Parameter

Refer to Chapter 7 parameter adjustment.

6.3 Torque Control

6.3.1 Torque control wiring diagram



6.3.2Torque Control Mode Parameter

1、 Motor and Driver Control Parameter

Parameter Code	Description	Setting Range	Parameter	Details
P01-01	Control mode setting	0-6	2	0： Position mode 1：Speed mode 2：torque mode 3：speed/torque mode 4：position /speed mode 5：position/torque mode 6：full closed loop mode
P00-05	motor pole pairs	1-31	---	Detail parameter follows motor.
P00-07	encoder option	0-3	---	
P00-10	incremental encoder lines	0-65535	---	
P05-00	torque command source	0-3	0	0：External analog command（speed limited can be set by P05-02) 1: Digital command（speed limited can be set by P05-02) 2：External analog command（speed limited can be set by speed analog command). 3：Digital command（speed limited can be set by speed analog command).
P05-01	torque analog command inverting	0-1	0	Set the motor initial rotor direction
P05-02	speed limited setting under Torque mode	0-6000	1000	Set the highest speed under torque mode, it is active while PO5-00 is 0,1.
P05-05	Source of torque limited setting.	0-1	0	Source of torque limited adjustable
P05-10	Internal forward torque limit setting	0-300.0	200.0	Torque forward limited setting.
P05-11	Internal reverse torque limit setting	0-300.0	200.0	torque reverse limited setting

P06-43	torque analog command input gain	0-100	10	User setting, refer to chapter 8.2

2、torque control command related gain parameter.

Refer to chapter 7 parameter adjustment.

Chapter 7- Test and parameter adjustment

7.1 Test operation

7.1.1 Check before operation

In order to avoid any damage to the driver or machine, please remove all loadings from platform. Check details listed carefully as below. Then test operation. Loading operation only after non-loading operation passed test.

Check list !

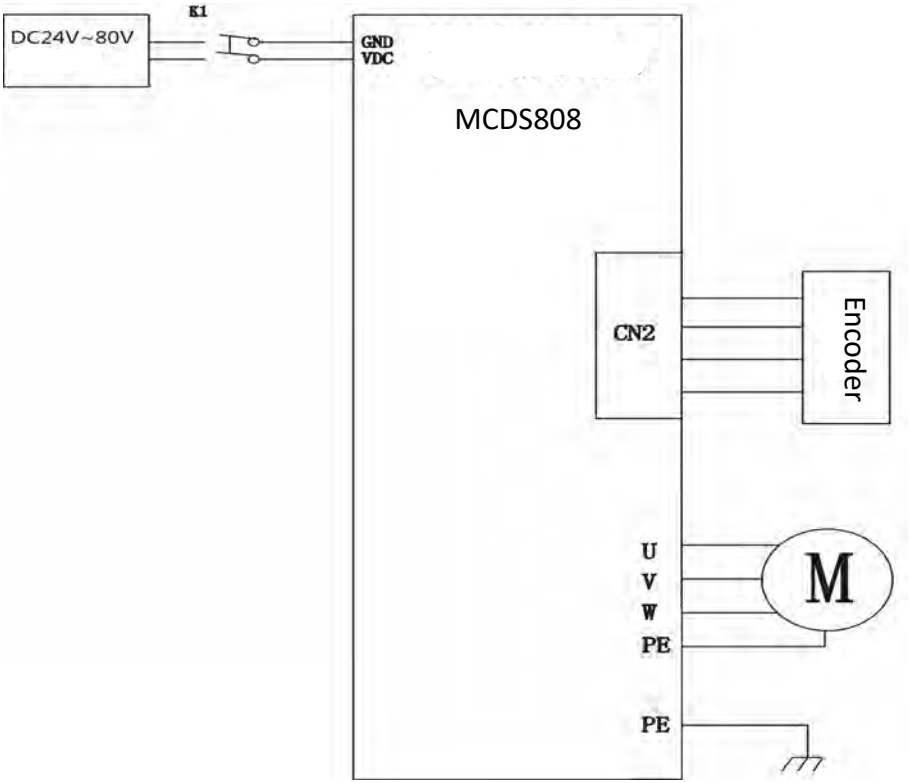
Checking before power on	1、 Is there any damage to the driver ? 2、 Make sure each wire connector is isolated 3、 Is there any foreigner inside driver ? 4、 Don't put regenerate resistance of the driver and motor on any flammable object. 5、 Avoiding electric-magnetic brake inactive, please check Emergency Stop and Power circuit disconnect fouction is workable. 6、 Check if out source of power voltage is complied to servo driver. 7、 Check U,V,W power wires, encoder wires and signal wires connect rightly. (Follow motor label and instruction).
Checking while power on	1、 Is LED of the servo driver light ? 2、 Check again to each parameter, make sure it was set correct. There maybe unexpected action. So do not set parameter to limited one. 3、 Check if servo motor can self-lock.

	4、 If there is vibration or noise, please contact Mach Motion Products

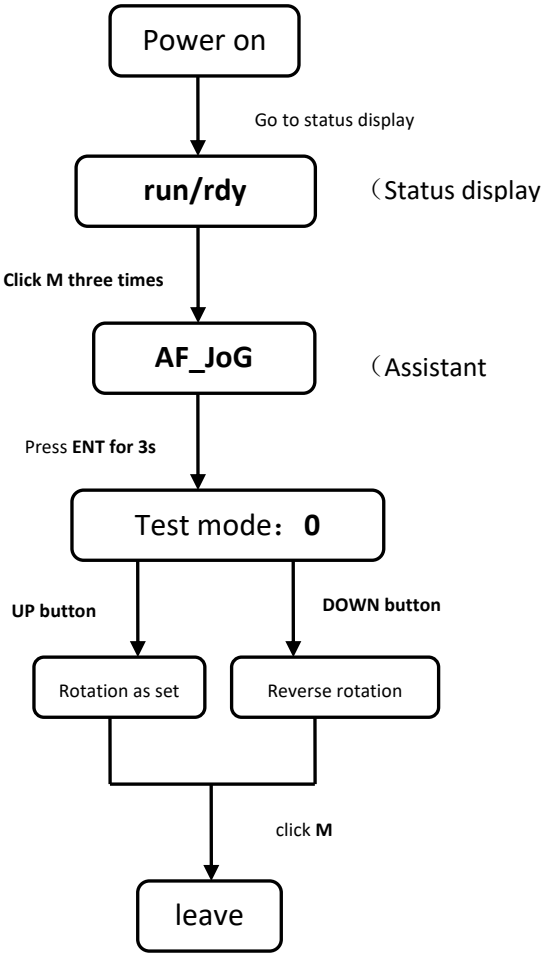
7.1.2 Test to non-loading operation

1、 Users need not to connect additional wiring while doing no-load testing under JOG mode. In safety, please fix the motor base before the JoG no-load speed test, to prevent any dangerous from motor while speed is changing. .

The following is wiring diagram in JoG mode:

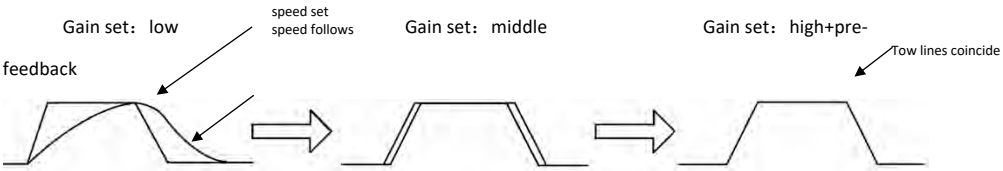


2、Following procedure as below, Choose JoG mode to do test operation.



7.2 Parameter Adjustment

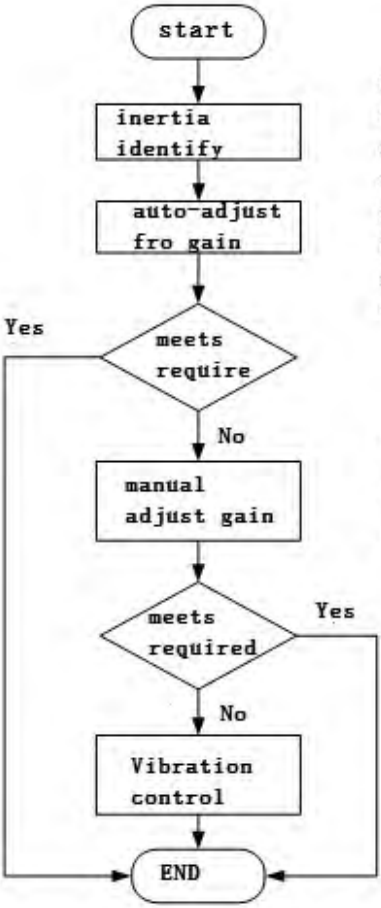
Choose correct control mode according to machine behavior, adjust rightly to servo gain parameter.



Position Loop Gain：80.0Hz	Position Loop Gain：160.0Hz	Position Loop Gain：160.0Hz
Speed loop scale gain：40.0Hz	Speed loop scale gain：60.0Hz	Speed loop scale gain：60.0Hz
Speed loop integral	Speed loop integral	Speed loop integral
time constant：10.0ms	time constant：10.0ms	time constant：10.0ms
Speed pre-feedback gain：0	Speed pre-feedback gain：0	Speed pre-feedback gain：50.0%
Load inertia ratio：1.00	Load inertia ratio：1.00	Load inertia ratio：1.00

Servo gain adjustment need to consider multi-loop parameters (position loop, speed loop and filter etc), it will inter-effect. So gain setting needs to compliance with its ruler and makes parameter in balance.

Gain adjustment follows procedure as below:



Set parameter to P01-04 according to inertia scale out from the mechanism or operate with loading rotor inertia identify AF J-L

Set P01-02 to 1 or 2
Increase P01-03 step by step till noise, then back to grade 2 under this rigidity.

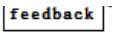
Manual save P02-00,P02-01,P02-10,P02-11,P02-13,P02-14,P08-20. Then set P01-02 to 0. It is manual-adjustable now.

7.3 Gain adjust by manual

7.3.1 Parameter

Please do micro-adjustment to gain by manual if it is unable to reach an ideal result under gain auto-adjustment.

The servo system consists of three control loops. The basic control diagram as below.



The gain adjustment complies with the inner loop first, then out loop. First, set the load moment of inertia ratio P01-04, adjust the speed loop gain, and finally adjust the position loop gain.

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

Speed integral constant: The smaller the set value, the faster the integral speed, the stronger the integral action, and the smaller value be set, the more likely it is to generate vibration and noise.

Parameter code	Description	Set range	Value	说明
P01-02	Auto-adjustable mode	0-2	2	0： Adjust rigidity manually。 1 Auto-adjust rigidity under standard mode。 Under this mode，Parameter P02-00，P02-01，P02-10，P02-11，P02-13，P02-14，P08-20 will auto-adjustable follow rigidity set by P01-03 .Unable to adjust manually：Below parameter set by user. P02-03（speed feedforward gain），P02-04（speed feedforward smoothing constant）。 2：Auto-adjust rigidity under positin mode. Parameter P02-00，P02-01，P02-10，P02-11，P02-13，P02-14，P08-20 will auto-adjustable follow rigidity set by P01-03 .Unable to adjust manually：Below parameter is firmed, unable to change P02-03（speed feedforward gain）：30.0% P02-04（speed feedforward smoothing constant）：0.50
P01-03	Instantly adjust the stiffness	0-31	13	。Built-in 32 gain class parameters, when P01-02 is set to 1, or 2, it works. It can be called directly according to the actual situation. The larger the

	setting automatically			setting value, the stronger the rigidity.
P02-00	1Position 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 lag, but if the value is too large, the system will oscillate and overshoot. Increase the value as much as possible without shock. ‣ For the gain at rest.
P02-01	2 Position control gain	0-3000.0	80.0	The larger the setting value, the higher the gain, the greater the rigidity, and the smaller the position lag, but if the value is too large, the system will oscillate and overshoot. 值 Increase the value as much as possible without shock. ‣ For the gain during exercise
P02-03	Speed feed forward 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, the feedforward gain is too large, which will make the position loop of the system unstable, and it is easy to produce overshoot and oscillation.
P02-04	Speed feedforward smoothing constant	0-64.00	0	This parameter is used to set the speed loop feedforward filter time constant. The larger the value, the greater the filtering effect, but at the same time the phase lag increases.
P02-10	1 speed scale gain 1	1-2000.0	40.0	The larger the setting, the greater the gain and stiffness, and the parameter values are set according to the motor and load conditions. ‣。 The value is increased as much as possible without oscillating. ‣。‣ For the gain at rest.
P02-11	1 Speed integral constant 1.	0.1-1000.0	10.0	‣。The integral time constant of the speed regulator, the smaller the setting value, the faster the integration speed, the greater the stiffness, and the vibration is too small to generate vibration. ‣。Try to reduce the value of this parameter if the

				system does not oscillate. ‣ This parameter is for a 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, and the dynamic response is fast; when set to 0, the speed loop integral action is obvious, and the low frequency interference can be filtered, but the dynamic response is slow. ‣ By adjusting this coefficient, the speed loop can have a better dynamic response and at the same time increase the resistance of low frequency interference.
P02-13	速度比例增益 2 Speed proportional gain2	1-2000.0	45.0	‣ The larger the setting, the greater the gain and stiffness, and the parameter values are set according to the motor and load conditions. ‣ 。 The value is increased as much as possible without oscillating. ‣ 。 ‣ For the gain at rest.
P02-14	Velocity integral constant	0.1-1000.0	1000.0	‣ 。 The integral time constant of the speed regulator, the smaller the setting value, the faster the integration speed, the greater the stiffness, and the vibration is too small to generate vibration. ‣ 。 Try to reduce the value of this parameter if the system does not oscillate. ‣ 。 This parameter is for a 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, and the dynamic response is fast; when set to 0, the speed loop integral action is obvious, and the low frequency interference can be filtered, but the dynamic response is slow. ‣ 。 By adjusting this coefficient, the speed loop can have a better dynamic response and at the same time increase the resistance of low frequency interference.

7.3.2 Gain ex-change

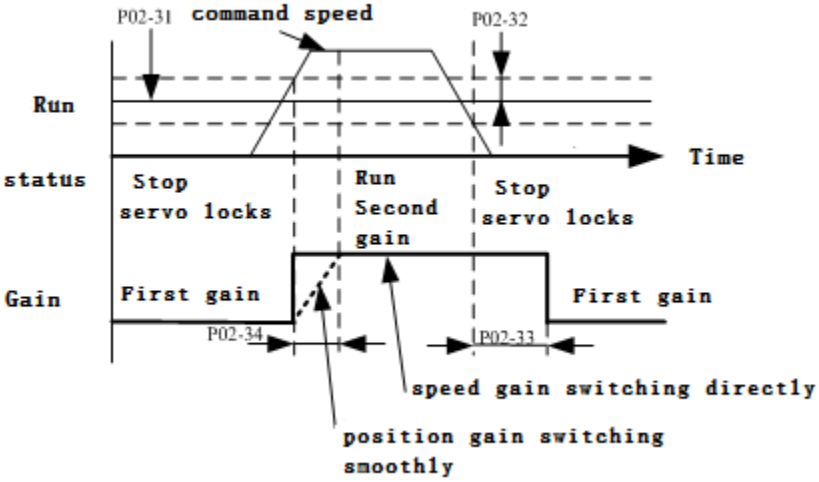
The gain switching function can be triggered by the servo internal state or an external DI port, and is valid only in the position control and speed control modes. Use gain switching, Can play the following role:

Switching to a lower gain in the motor stationary (servo enable) state to suppress vibration;

Switching to a higher gain in the motor stationary (servo enable) state to shorten the positioning time;

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

Switch different gain settings with external signals depending on usage



Related Reference

code	Description	Range	Default	unit	Effective time
P02-30	Gain switching mode	0-10	7	---	Effective immediately
P02-31	Gain switching grade	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

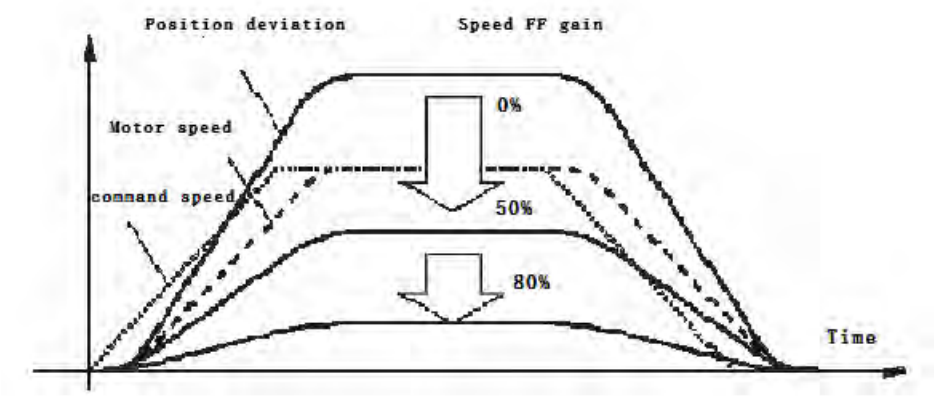
7.3.3Feedforward function

Speed feed forward: In position control, the speed control command required from the position command calculation is added to the output of the position regulator to reduce the position deviation and improve the position control response.

Torque feed forward: Calculate the required torque command from the speed control command and add it to the speed regulator output to increase the response of the speed control.

A. Speed feedforward operation

In the state where the speed feedforward smoothing constant is set to 50 (0.5 ms), the speed feed forward gain is gradually increased to meet the system requirements. However, excessive speed feedforward gain can cause position overshoot, which in turn makes the set time longer.



B. Torque feedforward operation

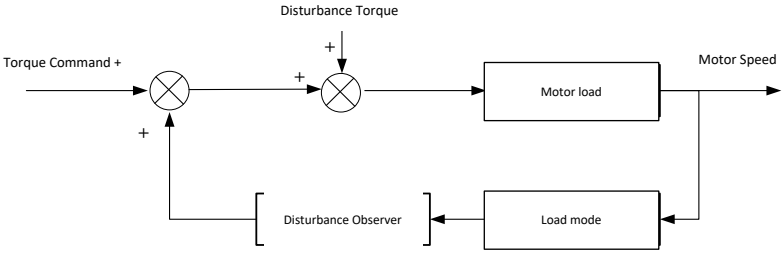
C. When the smooth constant of torque feedforward is set to 50 (0.5ms), the gain of torque feedforward is gradually increased to meet the system requirements.

relevant

Parameter	Name	Setting range	Default	unit	Effect time
P02-03	Speed feedforward gain	0-100.0	30.0	1.0%	立即生效
P02-04	Velocity feedforward smoothing constant	0-64.00	0.5	1ms	立即生效
P02-19	Torque feedforward gain	0-30000	0	1.0%	立即生效
P02-20	Torque feedforward smoothing constant	0-64.00	0.8	1ms	立即生效

7.3.4 Disturbance observer

The disturbance torque can be reduced and the vibration can be reduced by using disturbance observer to deduce the disturbance torque value and compensate on the torque command. In position mode and speed mode, the observation function is effective.



Usage method:

a) Set p08-26 (filter constant) to a large value, and then gradually increase p08-25 (compensation gain), at this time, the action sound may become larger; 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 larger.

c)When the time constant of the filter is reduced, the disturbance torque with less delay can be estimated, and the effect of restraining the disturbance can be improved, but the action sound will become larger.

d) Please look for a balanced setting。

Relevant parameters

parameter code	Name	Setting range	Default	Setting	Effective time
P08-25	Disturbance torque compensation gain	0-100.0	0	%	Effective immediately
P08-26	Time constant of disturbance torque filtering	0-25.00	0.8	1ms	Effective immediately

7.3.5 Resonance suppression

If the servo system is just too large and the response is too fast, it may cause resonance of the mechanical system, which can be improved by reducing the gain of the control loop. Without reducing the gain, the resonance can also be suppressed by using a low-pass filter and a notch filter.

1、 Resonance frequency detection

The resonance frequency of the mechanical system can be observed by monitoring item d26.1.fr

2、Torque command lowpass filter（P08-20）

The low-pass filter can be used in the case of vibration frequency deviation, and it can be used in the case of high-frequency vibration. By setting the filter time constant, the resonance can be attenuated near the resonance frequency. However, the low-pass filter will make the system phase lag, reduce the bandwidth, and reduce the phase margin, which is easy to cause loop oscillation. So it can only be used in high frequency vibration.

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

parameter code	Name	Setting range	Default	Unit	Effective time
P08-20	Torque command filter 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. By reducing the gain at a specific frequency, the notch filter can suppress the mechanical resonance. When the notch filter is set correctly, the vibration can be restrained effectively, and the servo gain can be increased continuously. There are 4 groups of traps in the servo. When p-8-11 is set to 0, 4 groups of traps can be started at the same time, and parameters can be input manually.

A. Adaptive notch mode

Through the Adaptive Notch function module, the servo system will automatically identify the current resonance frequency and automatically configure the notch parameters. Use steps:

a) Set p08-11 to 1 or 2 according to the number of resonance points. When resonance occurs, first set p08-11 to 1, open an adaptive notch filter. After gain adjustment, if a new resonance occurs, then set p08-11 to 2, open two adaptive notch filters.

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

c) If resonance is suppressed, the adaptive notch filter is effective. After waiting for the servo to run stably for a period of time, set p08-11 to 0, and the notch filter parameter will be fixed to the last updated value. This operation can prevent the parameter of the wave trap from being updated to the wrong value due to the misoperation during the servo operation, which will aggravate the vibration.

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

If there are more than two resonance frequency points, the adaptive notch filter can not meet the demand, and the manual notch filter can be used at the same time.

Relevant parameters

parameter code	designation	explain
P08-11	Adaptive trap Mode selection	Setting range：0-4 0：The parameters of the third and fourth notch are no longer automatically updated and saved as current values. But manual input is allowed One adaptive trap is effective. The parameters of the third trap are automatically updated and cannot be entered manually Two adaptive traps are effective. The parameters of the third and fourth traps are automatically updated and cannot be entered manually 3：Only resonant frequencies are detected 4：Clear the third and fourth trap parameters and restore to factory Settings

A. Manually set the parameters of the trap

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

b) The resonant frequency observed in the previous step is input into the parameters of the trap, and the width grade and depth grade of the trap are also input

c) If the vibration is suppressed, the trap is effective. You can continue to increase the gain until a new vibration occurs. Repeat the previous 2 steps

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

B. Notch width class

$$\text{Notch depth level 1} = \frac{\text{Output value}}{\text{Programm value}}$$

The width of the trap represents the frequency relative to the center of the trap， The frequency bandwidth with amplitude attenuation rate of -3db

C. Depth rating of trappers

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

When the depth level of the trap is 0, the input is completely suppressed at the central frequency. At a depth level of 100, the input is fully passable at the central frequency.

Relevant parameter

parameter code	designation	explain
P 08-30	Notch filter 1 frequency	setting range：50-5000，Unit：Hz Center frequency of trap 1 Set to 5000, the trap is invalid

P 08-31	Notch filter 1 width	setting range：0-20 Notch width class of trap 1 Is the ratio of width to center frequency
P08-32	Notch filter 1 Width depth	setting range：0-99 Notch depth level of trap 1 Is the ratio between the central frequency input and output of the trap The larger the parameter, the smaller the depth of the notch and the weaker the effect

Relevant parameters of the trap

parameter code	designation	setting range	The factory set	unit	Effective time
P08-11	Selection of adaptive trap mode	0-4	0	---	Effective immediately
P08-30	Notch filter 1 frequency	50-5000	5000	HZ	Effective immediately
P08-31	Notch filter 1 width	0-20	2	---	Effective immediately
P08-32	Notch filter 1 depth	0-99	0	---	Effective immediately
P08-33	Notch filter 2 frequency	50-5000	5000	HZ	Effective immediately
P08-34	Notch filter 2 width	0-20	2	---	Effective immediately
P08-35	Notch filter 2 depth	0-99	0	---	Effective immediately

P08-36	Notch filter 3 frequency	50-5000	5000	HZ	Effective immediately
P08-37	Notch filter 3 width	0-20	2	---	Effective immediately
P08-38	Notch filter 3 depth	0-99	0	---	Effective immediately
P08-39	Notch filter 4 frequency	50-5000	5000	HZ	Effective immediately
P08-40	Notch filter 4 width	0-20	2	---	Effective immediately
P08-41	Notch filter 4 depth	0-99	0	---	Effective immediately

Chapter 8- Parameters and functions

8.1 List of parameters

P00-xx Represents motor and driver parameters

P01-xx Main control parameter

P02-xx Represents a gain class parameter

P03-xx Represents position parameter

P04-xx Represents velocity parameter

P05-xx Represents torque parameter

P06-xx Represents the I/O parameter

P08-xx Represents advanced function parameters

type	parameter code	designation	setting range	The factory set	unit	Setting method	Effective time
Motor and driver parameters	P00-00	Motor No.	0-65535	2000		Stop setting	power-on again
	P00-01	Motor rated rotating speed	1-6000	---	rpm	Stop setting	Power on again
	P00-02	Motor rated torque	0.01-655.35	---	N.M	Stop setting	Power on again
	P00-03	motor rated current	0.01-655.35	---	A	Stop setting	Power on again
	P00-04	Inertia of motor	0.01-655.35	---	kg.cm^2	Stop setting	Power on again
	P00-05	Motor pole pair	1-31	---	antipode	Stop setting	Power on again

	P00-07	Encoder selection	0-3	---	---	Stop setting	Power on again
	P00-08	Provincial incremental encoder	0-1	---	---	Stop setting	Power on again
	P00-09	Absolute encoder type	0-1	---	---	Stop setting	Power on again
	P00-10	Incremental encoder line number	0-65535	---		Stop setting	Power on again
	P00-11	Incremental encoder Z pulse electrical angle	0-65535	---		Stop setting	Power on again
	P00-12	Initial rotor Angle 1	0-360	---	degre e	Stop setting	Power on again
	P00-13	Initial rotor Angle 2	0-360	---	degre e	Stop setting	Power on again
	P00-14	Initial rotor Angle 3	0-360	---	1degr ee	Stop setting	Power on again
	P00-15	Initial rotor Angle 4	0-360	---	1degr ee	Stop setting	Power on again
	P00-16	5Initial rotor Angle 5	0-360	---	degre e	Stop setting	Power on again
	P00-17	Initial rotor Angle 6	0-360	---	degre e	Stop setting	Power on again
	P00-20	Power-on interface display setting	0-100	100	---	Run setting	Power on again
	P00-21	RS232 communication baud rate	0-3	2	---	Stop setting	Power on again
	P00-23	From the station address	0-255	1	---	Stop setting	Power on again

	P00-24	Modbus Communication baud rate	0-7	2	---	Stop setting	Power on again
	P00-25	verification mode	0-3	1	---	Stop setting	Power on again
	P00-26	Modbus Communication response delay	0-100	0	1ms	Stop setting	Power on again
	P00-30	Setting of brake resistance	0-2	---	---	Stop setting	Power on again
	P00-31	External Brake resistance power	0-65535	---	10W	operation setup	Effective immediately
	P00-32	External Brake resistance value	0-1000	---	1 欧姆	Stop setting	Power on again
	P00-40	Over-temperature protection setting	0-1	1	---	Stop setting	Power on again
	P00-41	Control the power supply power-off protection settings	0-1	1	---	Stop setting	Power on again
	P00-42	Overvoltage protection setting voltage	0-150	130	V	Stop setting	Power on again
Main control parameters	P01-01	Control mode setting	0-6	0	---	Stop setting	Effective immediately
	P01-02	Real-time auto-tune mode	0-2	2	---	operation setup	Effective immediately
	P01-03	Real-time automatic adjustment of rigidity setting	0-31	13	---	operation setup	Effective immediate

							y
	P01-04	Ratio of moment of inertia	0-100.00	3	1 倍	operation setup	Effective immediatel y
	P01-10	After - pass control mode	0-1	1	---	operation setup	Effective immediatel y
	P01-20	Dynamic brake delay	0-250	50	1ms	operation setup	Effective immediatel y
	P01-21	No dynamic brake when main power is off	0-1	1	---	operation setup	Effective immediatel y
	P01-22	Disable dynamic brake when servo OFF	0-1	1	---	operation setup	Effective immediatel y
	P01-23	Do not use dynamic brakes when alarming	0-1	1	---	operation setup	Effective immediatel y
	P01-24	No dynamic brakes during overdrive	0-1	1	---	operation setup	Effective immediatel y
	P01-30	Holding brake command - servo OFF delay time (holding brake open delay)	0-255	50	1ms	operation setup	Effective immediatel y
	P01-31	The speed limit value of the lock instruction output	0-3000	100	1rpm	operation setup	Effective immediatel y

	P01-32	Wait time for Servo OFF hold command	0-255	50	1ms	运行设定 operation setup	Effective immediately
	P01-40	Out-of-control detection enables	0-1	1	---	operation setup	Effective immediately
Parameter of gain	P02-00	1Position Control Gain 1	0-3000.0	48.0	1/S	operation setup	Effective immediately
	P02-01	2Position Control Gain 2	0-3000.0	57.0	1/S	operation setup	Effective immediately
	P02-03	Speed feed-forward gain	0-100.0	30.0	1.0%	operation setup	Effective immediately
	P02-04	Speed feed-forward smoothing constant	0-64.00	0.5	1ms	operation setup	Effective immediately
	P02-10	1Speed proportional gain 1	1.0-2000.0	27.0	1Hz	operation setup	Effective immediately
	P02-11	Velocity integral constant 1	0.1-1000.0	10.0	1ms	operation setup	Effective immediately
	P02-12	Pseudo-differential feedforward control Coefficient 1	0-100.0	100.0	1.0%	operation setup	Effective immediately

	P02-13	2Velocity proportional gain 2	1.0-2000.0	27.0	1Hz	operation setup	Effective immediately
	P02-14	speed integral constant 2	0.1-1000.0	1000.0	1ms	operation setup	Effective immediately
	P02-15	Pseudo-differential feedforward control Coefficient 2	0-100.0	100.0	1.0%	operation setup	Effective immediately
	P02-16	Error Margin of velocity integral	0-32767	25000	---		Effective immediately
	P02-19	Torque feedforward gain	0-30000	0	1.0%	operation setup	Effective immediately
	P02-20	Torque feedforward smoothing constant	0-64.00	0.8	1ms	operation setup	Effective immediately
	P02-30	Gain switching mode	0-10	7	---	operation setup	Effective immediately
	P02-31	Gain switching level	0-20000	800	---	operation setup	Effective immediately
	P02-32	Gain switching hysteresis	0-20000	100	---	operation setup	Effective immediate

							y
	P02-33	Gain switching delay	0-1000.0	10.0	1ms	operation setup	Effective immediately
	P02-34	Position Gain switching time	0-1000.0	10.0	1ms	operation setup	Effective immediately
	P02-40		0-4	0	---	operation setup	Effective immediately
	P02-41	Mode switch selection	0-20000	10000	---	operation setup	Effective immediately
	P02-50	Torque instruction addition	-100.0-100.0	0	1.0%	operation setup	Effective immediately
	P02-51	Forward Torque compensation	-100.0-100.0	0	1.0%	operation setup	Effective immediately
	P02-52	Reverse torque compensation	-100.0-100.0	0	1.0%	operation setup	Effective immediately
Position param	P03-00	Source of location command	0-1	0	---	Stop setup	Effective immediately
	P03-01	Instruction pulse mode	0-3	1	---	Stop setup	Effective immediately

eter	P03-02	Instruction Pulse Input Terminal	0-1	0	---	Stop setup	Effective immediately
	P03-03	Instruction Pulse Inversion	0-1	0	---	Stop setup	Effective immediately
	P03-04	Position Pulse filtering	0-1	0	---	operation setup	Effective immediately
	P03-05	Positioning completion criteria	0-2	1	---	operation setup	Effective immediately
Position parameter	P03-06	12/5000 Location complete range	0-65535	100	Encoder unit	operation setup	Effective immediately
	P03-07	Position Feedback format	0-1	0	---	Shutdown setup	Effective immediately
	P03-09	Number of instruction pulses per turn of motor	0-65535	10000	Pulse	operation setup	Re-power
37	P03-10	Electron Gear 1 molecule	1-65535	1	---	operation setup	Re-power
	P03-11	Electronic gear	1-65535	1	---	operation setup	Re-power
	P03-12	Electron Gear 1 is 16-bit higher	0-32767	0	---	operation setup	Re-power
	P03-15		0-65535	30000		operation	Effective

		Excessive position deviation setting			command unit *10	setup	immediately
	P03-16	Position Instruction smoothing filter time constant	0-1000.0	0	1ms	operation setup	Effective immediately
	P03-20	Position loop feed	0-1	0	---	operation setup	Effective immediately
	P03-21	Encoder split output enable	0-1	1	---	Stop setup	Effective immediately
	P03-22	Increment encoder output pulse frequency division ratio molecule	1-65535	1	---	operation setup	Effective immediately
	P03-23	Delta encoder output pulse frequency divider	1-65535	1	---	operation setup	Effective immediately
	P03-25	Absolute number of output pulses per revolution of the motor	0-60000	2500	---	Operation setup	Effective immediately
	P03-30	LINEAR encoder	0-1	0	---	Shutdown setup	Effective immediately
	P03-31	The polarity of the LINEAR ENCODER Z pulse	0-1	1	---	Shutdown setup	Effective immediately

	P03-40	Source of output pulse	0-1	0	---	Shutdown setup	Effective immediately
	P03-42	Output Z pulse polarity	0-1	1	---	Shutdown setup	Effective immediately
	P03-45	Digital Position Instruction caching mode	0-1	0	---	Shutdown setup	Effective immediately
	P03-46	Maximum speed of motor at digital position command run time	0-6000	1000	---	operation setup	Effective immediately
	P03-50	The Gantry function enables	0-1	0	---	Shutdown setup	Effective immediately
	P03-51	The input signal of Gantry function is reversed	0-1	0	---	Shutdown setup	Effective immediately
	P03-52	Number of feedback pulses per turn of Gantry Motor	0-65535	10000	---	Shutdown setup	Effective immediately
	P03-53	Gantry function position deviation too large settings	0-65535	10000	---	operation setup	Effective immediately
	P03-55	Gantry proportional gain	0-200	10	---	operation setup	Effective immediately
	P03-60	Origin regression enable	0-6	0	---	Shutdown	Effective

		control				setup	immediatel y
	P03-61	Origin regression model	0-9	0	---	Shutdown setup	Effective immediatel y
	P03-65	High speed searching for origin switch	0-3000	100	---	operation setup	Effective immediatel y
	P03-66	Low speed searching for origin switch	0-1000	10	---	operation setup	Effective immediatel y
	P03-67	Search origin switch acceleration and deceleration time	0-5000	0	---	operation setup	Effective immediatel y
	P03-68	Maximum time limit for searching origin	0-10000	0	---	operation setup	Effective immediatel y
	P03-69	H Mechanical Origin Offset H	0-65535	0	---	operation setup	Effective immediatel y
	P03-70	L Mechanical Origin Offset L	0-65535	0	---	operation setup	Effective immediatel y
Speed param eter	P04-00	Speed instruction source	0-3	0	---	Shutdown setup	Effective immediatel y
	P04-01	Speed instruction analog counter	0-1	0	---	Shutdown setup	Effective immediatel

							y
	P04-02	Digital speed given value	-6000—6000	0	1rpm	operation setup	Effective immediatel y
	P04-03	Zero speed position clamp function	0-1	0	---	operation setup	Effective immediatel y
	P04-04	Zero speed position clamp speed threshold	0-6000	30	1rpm	operation setup	Effective immediatel y
	P04-05	Overspeed alarm value	0-6500	6400	1rpm	operation setup	Effective immediatel y
	P04-06	Forward speed limit	0-6000	5000	1rpm	operation setup	Effective immediatel y
	P04-07	Reverse speed limit	0-6000	5000	1rpm	operation setup	Effective immediatel y
	P04-10	Zero velocity detection value	0-200.0	2	1rpm	operation setup	Effective immediatel y
	P04-11	Rotation detection value	0-200.0	30	1rpm	operation setup	Effective immediatel y
	P04-12	Consistent range of velocity	0-200.0	30	1rpm	operation setup	Effective immediatel y

	P04-14	Acceleration time	0-10000	0	1ms/ 1000rpm	operation setup	Effective immediately
	P04-15	Deceleration time	0-10000	0		operation setup	Effective immediately
	P04-30	Internal setting speed 1	0-6000	0	1rpm	operation setup	Effective immediately
	P04-31	Internal set speed 2	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-32	Internal setting speed 3	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-33	Internal set speed 4	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-34	Internal set speed 5	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-35	Internal setting speed 6	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-36	Internal setting speed 7	-6000—6000	0	1rpm	operation setup	Effective immediately
	P04-37	Internal setting speed 8	-6000—6000	0	1rpm	operation	Effective

						setup	immediately
Torque parameter	P05-00	Torque instruction source	0-3	0	---	Shutdown setup	Effective immediately
	P05-01	Inverse Torque instruction analog	0-1	0	---	Shutdown setup	Effective immediately
	P05-02	Torque mode speed limit given value	0-6000	1500	1rpm	operation setup	Effective immediately
	P05-05	Torque limiter source	0-1	0	---	Shutdown setup	Effective immediately
	P05-06	Torque limit check out delay	0-10000	0	ms	operation setup	Effective immediately
	P05-10	Internal Forward Torque limit	0-300.0	200.0	1.0%	operation setup	Effective immediately
	P05-11	Internal reverse torque limit	0-300.0	200.0	1.0%	operation setup	Effective immediately
	P05-12	External Positive Torque limit	0-300.0	100.0	1.0%	operation setup	Effective immediately
	P05-13	External Reverse torque limit	0-300.0	100.0	1.0%	operation setup	Effective immediate

							y
I/O Parameter	P06-00	Effective level of DI1 input port	0-4	0	---	operation setup	Get the power back on
	P06-01	DI1 input port function selection (Servo ON)	0-24	1	---	operation setup	Get the power back on
	P06-02	Valid level of DI2 input port	0-4	0	---	operation setup	Get the power back on
	P06-03	DI2 input port function selection (alarm clear)	0-24	2	---	operation setup	Get the power back on
	P06-04	Valid level of DI3 input port	0-4	0	---	operation setup	Get the power back on
	P06-05	DI3 input port function selection (forward overtrip)	0-24	3	---	operation setup	Get the power back on
	P06-06	Valid level of DI4 input port	0-4	0	---	operation setup	Get the power back on
I/O	P06-07	DI4 input port function selection (reverse overtrip)	0-24	4	---	operation setup	Get the power back on
	P06-20	Effective level of DO1 output port	0-1	1	---	operation setup	Get the power back on

	P06-21	DO1 output port function selection (Servo Ready)	0-13	3	---	operation setup	Get the power back on
	P06-22	Effective level of DO2 output port	0-1	1	---	operation setup	Get the power back on
	P06-23	DO2 output port function selection (hold gate open)	0-13	2	---	operation setup	Get the power back on
	P06-24	Effective level of DO3 output port	0-1	1	---	operation setup	Get the power back on
	P06-25	DO3 output port function selection (alarm output)	0-13	1	---	operation setup	Get the power back on
	P06-40	Speed analog instruction input gain	10-2000	300	1rpm/V	operation setup	Effective immediately
	P06-41	Speed analog command filter constant	0-65535	0.8	1ms	operation setup	Effective immediately
	P06-42	Velocity analog instruction offset	-10.000 —10.000	0	1V	operation setup	Effective immediately
	P06-43	Torque simulation instruction gain	0.0-100.0	10	%	operation setup	Effective immediate

							y
	P06-44	Torque analog instruction filter constant	0-64.00	0.8	1ms	operation setup	Effective immediatel y
	P06-45	Torque analog instruction offset	-10.000 —10.000	0	1V	operation setup	Effective immediatel y
	P06-46	Dead Zone of speed simulation instruction	0-10.000	0	1V	operation setup	Effective immediatel y
	P06-47	Dead Zone of Torque simulation instruction	0-10.000	0	1V	operation setup	Effective immediatel y
	P08-01	Identification mode of load rotation routine	0-1	0	---	operation setup	Effective immediatel y
	P08-02	Inertia identification maximum velocity	100-2000	800	1rpm	operation setup	Effective immediatel y
	P08-03	talnertia identification of acceleration and deceleration time	20-800	100	1ms	operation setup	Effective immediatel y
	P08-04	Waiting time after completion of single inertia identification	50-10000	1000	1ms	operation setup	Effective immediatel y
	P08-05	The number of turns required to complete a single		1.33	loop	operation setup	Read only

Advanced function parameter		moment of inertia					
	P08-11	Mode selection of adaptive notch filter	0-4	0	---	operation setup	Effective immediately
	P08-13	ADAPTIVE NOTCH FILTER VIBRATION DETECTION threshold	1-7	4	---	operation setup	Effective immediately
	P08-20	Torque command filter constant	0-25.00	0.8	1ms	operation setup	Effective immediately
	P08-25	Disturbance Torque compensation gain	0-100.0	0	%	operation setup	Effective immediately
	P08-26	Disturbance torque filtering time constant	0-25.00	0.8	1ms	operation setup	Effective immediately
	P08-30	Notch Filter 1 frequency	50-5000	5000	HZ	operation setup	Effective immediately
	P08-31	Notch Filter 1 frequency	0-20	2	---	operation setup	Effective immediately
	P08-32	Notch Filter 1 depth	0-99	0	---	operation setup	Effective immediately
	P08-33	Notch Filter 2 frequency	50-5000	5000	HZ	operation setup	Effective immediate

							y
	P08-34	Notch filter 2 width	0-20	2	---	operation setup	Effective immediatel y
	P08-35	Notch filter 2 depth	0-99	0	---	operation setup	Effective immediatel y
	P08-36	Notch filter 3 frequency	50-5000	5000	HZ	operation setup	Effective immediatel y
	P08-37	Notch filter 3 width	0-20	2	---	operation setup	Effective immediatel y
	P08-38	Notch filter 3 depth	0-99	0	---	operation setup	Effective immediatel y
	P08-39	Notch filter 4 frequency	50-5000	5000	HZ	operation setup	Effective immediatel y
	P08-40	Notch filter 4 width	0-20	2	---	operation setup	Effective immediatel y
	P08-41	Notch filter 4 depth	0-99	0	---	operation setup	Effective immediatel y

8.2 Parameter interpretation

8.2.1 P00-xx Motor and driver parameters

parameter code	name	instruction
P00-00	motor code	Factory has been set, do not need to set 0: P0-01 TO P0-17 Function 2000: Absolute Encoder Motor, at this time P0-01-to P0-05 by the driver automatically identified
P00-01	motor rated speed	Setting range:1-6000,Unit:rpm Factory setting has been done, no need to set
P00-02	motor rated torque	N.M Setting range0.01-655.35:,Unit:N.m Factory setting has been done according to the matched motor
P00-03	motor rated current	A Setting range0.01-655.35:,Unit:A Factory setting has been done according to the matched motor
P00-04	Motor moment of inertia	range0.01-655.35:,Unit:kg.cm^2 Factory setting has been done according to the matched motor
P00-05	Pole logarithm	Setting range:1-31:,Unit: Pole Factory setting has been done according to the matched motor
P00-07	Encoder selection	Setting range: 0-3 1.Incremental encoder 2: single-circleabsolute value encoder; 3: multi-circel absolute value encoder
P00-08	Provincial incremental encoder	0: non-provincial form 1: provincial line type
P00-09	Absolute encoder type	0-1 Setting range: 0-1 0: Tamagawa encoder; 1: nikon encoder

P00-10	Incremental encoder line number	Factory setting has been done according to the matched motor
P00-11	Incremental encoder Z pulse electrical Angle	Factory setting has been done according to the matched motor
P00-12	Initial rotor Angle 1	Factory setting has been done according to the matched motor
P00-13	2Initial rotor Angle2	Factory setting has been done according to the matched motor
P00-14	3Initial rotor Angle3	Factory setting has been done according to the matched motor
P00-15	4Initial rotor Angle 4	Factory setting has been done according to the matched motor
P00-16	5Initial rotor Angle 5	Factory setting has been done according to the matched motor
P00-17	6 Initial rotor Angle 6	Factory setting has been done according to the matched motor
P00-20	Interface display Settings on power	Setting range: 0-100, default 100 Set according to customer display requirements When setting 100, the running state is displayed when the drive is powered on Other parameters are set according to the serial number of the list of monitoring items (chapter 8.3) For example, when the customer needs to drive the display motor speed d08.f.p, the parameter is set as 8.
P00-21	communication baud rate selection	Select baud rate when communicating with PC 0：9600 1：19200 2：57600 3：115200
P00-23	slave station address	Set according to equipment requirements
P00-24	Modbus	Setting range: 0-7, default 1 0:2400 1:4800 2:9600 3:19200 4:38400 5:57600

		6:115200 7:25600
P00-25	Check way	Set range 0-3, default 1 0: no check, 2-bit stop bit 1: even check, 1 bit stop bit 2: odd check, 1 bit stop bit 3: no check, 1 bit stop bit
P00-26	Communication response delay	Setting range: 0-100, default 0 When the parameter is set to 0, the response is conducted according to the standard communication. When the parameter is set to a value, the response time of Modbus communication is conducted according to the set time
P00-30	Brake resistance setting	0: use built-in resistance 1: use an external resistor 2: no brake resistance
P00-31	External brake resistance power	40WSetting range: 0-65535, unit: 10W According to the external brake resistance correctly set, such as: set value is 4, the resistance power is 40W
P00-32	Value of external brake resistance	Setting range: 0-1000, unit: ohm Set up correctly according to the external brake resistance
P00-40	Overtemperature protection Settings	Set range : 0-1 0: turn off the overtemperature protection function 1: enable overtemperature protection function
P00-41	Control power off protection Settings	Setting range: 0-1 0: turn off the power off protection function of the control power 1: turn on the power off protection function of the control power
P00-42	Overvoltage protection setting voltage	Setting range: 0-150, unit: 1V

8.2.2 P01-x x Main control parameter

parameter code	name	instruction

<table>
<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 mode. An external input port in CN1 should be used for switching, and the DI port function selected should be set to 5 (control mode switching). The control mode can be switched by controlling the logical state of the port.
<table>
<tr><td>Terminal logic</td><td>control mode</td></tr>
<tr><td>valid</td><td>speed mode</td></tr>
<tr><td>invalid</td><td>torque mode</td></tr>
</table>
Position and speed control mode. An external input port in CN1 should be used for switching, and the DI port function selected should be set to 5 (control mode switching). The control mode can be switched by controlling the logical state of the port.
<table>
<tr><td>Terminal logic</td><td>control mode</td></tr>
<tr><td>valid</td><td>speed mode</td></tr>
<tr><td>invalid</td><td>torque mode</td></tr>
</table>
5： Position, torque control mode. An external input port in CN1 should be used for switching, and the DI port function selected should be set to 5 (control mode switching). The control mode can be switched by controlling the logical state of the port.
<table>
<tr><td>Terminal logic</td><td>control mode</td></tr>
<tr><td>valid</td><td>position mode</td></tr>
<tr><td>invalid</td><td>torque mode</td></tr>
</table>
6： l close loop</td>
</tr>
<tr>
<td>P01-02</td>
<td>Real-time automatic adjustment mode</td>
<td>0: manually adjust rigidity.
1: standard mode automatically adjusts rigidity. In this mode, the parameters p02-00, p02-01, p02-10, p02-11, p02-13, p02-14, p08-20 will be automatically set according to the rigidity level set by p01-03. Manual</td>
</tr>
</table>

		adjustment of these parameters will not work. The following parameters are set by the user: P02-03 (speed feedforward gain), p02-04 (speed feedforward smoothing constant). 2: automatic adjustment of rigidity in positioning mode. In this mode, parameters p02-00, p02-01, p02-10, p02-11, p02-13, p02-14, p08-20 will be automatically set according to the rigidity level set by p01-03. Manual adjustment of these parameters will not work. The following parameters will be fixed and cannot be changed: P02-03 (speed feedforward gain) : 30.0% P02-04 (velocity feedforward smoothing constant) : 0.50
P01-03	Adjust rigidity setting automatically in real time	Setting range: 0-31 Built-in 32 gain class parameters that work when p01-02 is set to 1, or 2. Can call directly according to the actual situation, the larger the set value, the stronger the rigidity.
P01-04	Ratio of moment of inertia	Setting range: 0-100, unit: times The load inertia ratio of the corresponding motor is set as follows: P01-04= inertia of load/inertia of motor rotation This inertia ratio can use af-j-l automatic inertia recognition value to write the recognized value into the parameter
P01-10	After - pass control mode	Setting range: 0-1 0: after overpass, the motor is in free state and only receives the opposite direction signal to run 1: after overshoot, the motor is locked and only receives the signal in the opposite direction
P01-20	Dynamic brake delay	Setting range: 0-150, unit: ms When the braking condition is satisfied, the delay time of dynamic brake action is obtained

P01-21	No dynamic brake when main power is off	Setting range: 0-1 0: use dynamic braking 1: close dynamic braking
P01-22	NO dynamic brake when servo OFF	Setting range: 0-1 0: use dynamic braking 1: close dynamic braking
P01-23	Do not move when fault alarm 器	Setting range: 0-1 0: use dynamic braking 1: close dynamic braking
P01-24	No dynamic brakes during overdrive	Setting range: 0-1 0: use dynamic braking 1: close dynamic braking
P01-30	Holding brake command - servo OFF delay time (holding brake open delay)	Setting range: 0-255, unit: ms On enable: after executing the enable instruction, the driver will receive the position instruction after p01-30. Turn off enable: when the motor is in a static state, after executing the turn off enable command, the time after the holding brake is closed until the motor becomes non-energized.
P01-31	The speed limit of the lock instruction output	Setting range: 0-3000, unit: RPM When the motor is in a rotating state, the lock outputs the motor speed threshold when it is effective. If it is lower than this threshold, the lock brake output instruction is valid; otherwise, the lock brake output instruction will be valid after p01-32.
P01-32	Servo OFF- lock instruction wait time	Setting range: 0-255, unit: ms When the motor is in the rotating state, the maximum waiting time of the lock output.

P01-40	Out of control detection enable	Prevent motor from losing control and abnormal rotation. 0: close enable 1: on enable

8.2.3 P02-xx Gain class parameter

Parameter code	name	instruction
P02-00	1Position control gain 1	Setting range: 0-3000.0, unit: 1/S For the proportional gain of the position loop regulator, the larger the parameter value, the higher the gain ratio, the larger the stiffness, the smaller the position tracking error, and the faster the response. But too much parameter can easily cause vibration and overshoot. This parameter is for the steady-state response.
P02-01	Position control gain 2	Setting range: 0-3000.0, unit: 1/S For the proportional gain of the position loop regulator, the larger the parameter value, the higher the gain ratio, the larger the stiffness, the smaller the position tracking error, and the faster the response. But too much parameter can easily cause vibration and overshoot. This parameter is for the dynamic response.
P02-03	Speed feedforward gain	Setting range: 0-100.0, unit: 1.0% For the feedforward gain of the velocity loop, the larger the parameter value, the smaller the system position tracking error, and the faster the response. However, if the feed-forward gain is too large, the position loop of the system will be unstable and prone to overshoot and oscillation.
P02-04	Speed feedforward smoothing constant	设定范围：0-64.00，单位：ms 该参数用于设置速度环前馈滤波时间常数。值越大，滤波效果增大，但同时相位滞后增大。Setting range: 0-64.00, unit: ms

		This parameter is used to set the velocity loop feedforward filter time constant. The larger the value, the larger the filtering effect, but the larger the phase lag.
P02-10	Speed proportional gain 1	Setting range: 1.00-2000.0, unit: Hz The larger the velocity proportional gain is, the larger the servo stiffness is, and the faster the velocity response is. Under the condition that the system does not oscillate, increase the value of this parameter as much as possible. This parameter is for the static response.
P02-11	16/5000 Speed integral constant	Setting range: 1.00-1000.0, unit: ms Speed regulator integral time constant, the smaller the setting value, the faster the integral speed, the greater the stiffness, too small easy to produce vibration, noise. In the case that the system does not oscillate, try to reduce the value of this parameter. This parameter is for the steady-state response.
P02-12	1Pseudo-differential feedforward control Coefficient 1	Setting range: 0-100.0, unit: 1.0% When set to 100.0%, the speed loop adopts PI control, with fast dynamic response. When set to 0, the velocity loop integral function is obvious and can filter low-frequency interference, but the dynamic response is slow. By adjusting this coefficient, the velocity loop can have better dynamic response and increase the resistance of low frequency interference.
P02-13	Speed proportional gain 2	Setting range: 1.0-2000.0, unit: Hz speed proportional gain, the greater the servo stiffness, the faster the speed response, but too much easy to produce vibration, noise. The parameter value should be increased as much as possible under the condition that the system does not produce oscillation. This parameter is for dynamic response.
P02-14	2Speed integral constant 2	Setting range: 1.0-1000.0, unit: Ms Speed regulator integral time constant, the smaller the setting value, the faster the integral speed, the greater the

<table>
<tr><td></td><td></td><td>stiffness, too small easy to produce vibration, noise. Reduce this parameter value as far as possible without system oscillation. This parameter is for dynamic response.</td></tr>
<tr><td>P02-15</td><td></td><td>Setting range: 0-100.0, unit: 1.0% set to 100.0% , the speed loop uses Pi Control, the dynamic response is fast; set to 0, the speed loop integral effect is obvious, can filter low frequency interference, but the dynamic response is slow. By adjusting the coefficient, the speed loop can have better dynamic response and increase the resistance to low frequency interference.</td></tr>
<tr><td>P02-16</td><td>Error Margin of Speed integral</td><td>Setting range: 0-32767 speed integral error margin</td></tr>
<tr><td>P02-19</td><td>Torque feedforward gain</td><td>Setting range: 0-30000, unit: 1.0% setting current loop feedforward weighting. The differential of the speed instruction is weighted by this parameter and the current loop is added</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 sets the conditions for first and second gain switching
<table>
<tr><td>Value</td><td>Switching condition</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 second gain</td><td>P02-01、P02-13、P02-14、P02-15</td></tr>
<tr><td>2</td><td>Switch using DI input</td><td>Need to set Di Port to 9(gain switching input) invalid: First Gain Effective: Second Gain</td></tr>
</table></td></tr>
</table>

		3	Torque command large	Switch to second gain when Torque instruction is greater than threshold (as determined by P02-31 and P02-32) . When less than the threshold and more than the P02-33 delay setting, switch to the first gain.
		4	The velocity commands vary widely	Switch to the second gain when the speed instruction variation is greater than the threshold (determined by P02-31 and P02-32) . When less than the threshold and more than the P02-33 delay setting, switch to the first gain.
		5	Speed command large	Switch to the second gain when the speed instruction is greater than the threshold (as determined by P02-31 and P02-32) . When less than the threshold and more than the P02-33 delay setting, switch to the first gain
		6	Position Deviation is large	Switch to the second gain when the position deviation is greater than the threshold (determined by P02-31 and P02-32) . When less than the threshold and more than the P02-33 delay setting, switch to the first gain.。
		7	There's a location command	Switch to second gain when position instruction is available. When the position instruction ends and the P02-33 delay setting is exceeded, switch to the first gain.
		8	Location not complete	Switch to second gain when positioning is not complete. When positioning is complete

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>and the P02-33 delay setting 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 (as determined by P02-31 and P02-32) . When less than the threshold and more than the P02-33 delay setting, switch to the first gain.</td></tr>
<tr><td>10</td><td>has position command + actual speed</td><td>Switch to second gain when position instruction is available. Switch to the first gain when no position instruction is available and the actual speed is less than the threshold (determined by P02-31 and P02-32) and exceeds the P02-33 delay setting.</td></tr>
</table>
</td></tr>
<tr><td>P02-31</td><td>Gain switching level</td><td>Setting range: threshold value of 0-20000 gain switch. Torque unit: 1000bit 25% rated torque speed unit: 1000bit 200 RPM position unit: 131072bit per lap</td></tr>
<tr><td>P02-32</td><td>Gain switching hysteresis</td><td>Set Range: 0-20000 hysteresis level Torque Unit for gain switching: 1000bit 25% rated torque speed unit: 1000bit 200 RPM position unit: 131072bit per lap</td></tr>
<tr><td>P02-33</td><td>Gain switching delay</td><td>Setting range: 0-1000.0, in MS, the time from the trigger condition to the actual switching when switching from the second gain to the first gain.</td></tr>
<tr><td>P02-34</td><td>Position Gain switching time</td><td>Setting range: 0-1000.0, in Ms Position Control Gain 1 time to smoothly switch to position control gain 2</td></tr>
<tr><td>P02-40</td><td>Mode switch selection</td><td>Setting range: 0-4 setting speed loop Pi Control and P control conditions
<table>
<tr><td>Value</td><td>Judgment Condition</td><td>remark</td></tr>
</table>
</td></tr>
</table>

		0	Torque command	Torque instruction less than P02-41 set the threshold for Pi Control, greater than for P control
		1	Speed command	When the speed instruction is less than P02-41, the threshold is set to Pi Control, and more than is p control
		2	Acceleration	When the acceleration is less than P02-41 and the threshold is set to Pi Control, the acceleration is greater than p control
		3	Position Deviation	The position deviation is less than P02-41, the threshold is Pi Control, more than is p control
		4	Mode free switch	Speed loop maintains Pi Control and no longer switches
P02-41	Mode switch level	Setting range: 0-20000 sets the threshold value for switching. Torque unit: 1000bit 25% rated torque speed unit: 1000bit 200 RPM position unit: 131072BIT PER LAP		
P02-50	Torque instruction addition	Setting range:-100.0-100, unit: effective in 1.0% position control mode. This value is added to the torque given value for vertical shaft static torque compensation.		
P02-51	Forward Torque compensation	Setting range:-100.0-100.0, unit: effective in 1.0% position control mode. To compensate for the forward static friction		
P02-52	Reverse torque compensation	Setting range:-100.0-100.0, unit: effective in 1.0% position control mode. To compensate for the reverse static friction		

8.2.4 P03-xx Position parameter

Parameter code	name	instruction

P03-00	Source of location command	0: Pulse Command 1: Digital Given, used in communication control.
P03-01	12/5000 Instruction pulse mode	0: Orthogonal Pulse Instruction 1: Direction + Pulse Instruction 2 or 3: Double Pulse Instruction
P03-02	Instruction Pulse Input Terminal	Use to specify pulse input Port 0 in CN1 port: Low Speed Pulse Port 1: High Speed Pulse Port
P03-03	Instruction Pulse Inversion	Used to adjust the direction of Pulse Instruction Count 0: Normal. 1: Reverse Direction
P03-04	Position Pulse filter setting	Setting range: 0-3, unit: US 0：0.1us。 1：0.4us 2：0.8us。 3：1.6us
P03-05	Positioning completion criteria	0: Output when position deviation is less than P03-06 setting value 1: Output when position is given, and output when position deviation is less

		than P03-06 setting value 2: Output when position is given (after filtering) , and output when position deviation is less than P03-06 setting value
P03-06	Location complete range	Setting range: 0-65535, unit: Encoder Unit used to set the threshold value of positioning completion output. When using an absolute motor, the encoder is calculated at 131072 bit per turn. Use Incremental encoder motor, then each turn according to encoder line number * 4 calculate.
P03-07	Position Feedback format	Setting range: 0-10: Incremental format. 1: MULTI-LOOP ABSOLUTE VALUE FORMAT
P03-09	Number of instruction pulses per turn of motor	Setting range: 0-65535 absolute encoder motor is effectively used to set motor rotation number of instructions pulse. The parameters P03-10 and P03-11 are valid when this parameter is set to 0.
P03-10	Electron Gear 1 molecule	When absolute motor is used, see 6.1.3 for example of calculation method of electronic gear ratio Calculation formula of electronic gear ratio of incremental motor: G=molecular= CX4 Denominator P C: Encoder line P: the number of pulses per revolutioncle for Input
P03-11	Denominator of electronic gear 1	
P03-12	Molecular high order of electronic gear 1	Setting range: 0-32767 The electronic gear ratio can be amplified by using this parameter: molecular value = p03-12 *10000+ p03-10
P03-15	Position deviation too much	Setting range: 0-65535, unit: instruction unit *10 Set the allowable deviation pulse number, exceeding the set value will alarm.

		Example: set the value 20, when the following deviation exceeds 20*10, the drive will alarm AL.501 (position deviation is too large).
P03-16	Position instruction smoothing filter constant	Setting range: 1000, unit: ms Sets the time constant of the position instruction smoothing filter
P03-20	Position feedback source	Set the source of location feedback 0: encoder 1: grating ruler
P03-21	Encoder frequency division output enable	Set whether CN1 port has encoder frequency division output 0: close enable 1: on enable
P03-22	Incremental encoder output pulse frequency ratio molecule	When using incremental encoder, set the number of output pulses of CN1 port.
P03-23	Incremental encoder output pulse frequency division ratio	
P03-25	Absolute motor rotation one turn output pulse number	Setting range: 0-60000 Set the absolute value motor to rotate for one turn and output the number of frequency division pulses of A and B respectively. Example: with the set value of 2048, each turn of the motor will output 2048 pulses for A and B signals
P03-30	Linear encoder inverting	Set the grating ruler input A,B phase sequence is inverted 0: no tails 1: take the
P03-31	Polarity of linear encoder Z pulse	Set the effective level of grating ruler input Z signal 0: low level

		1: high level
P03-40	Output pulse source	Set the source of frequency division output signal in CN1 terminal 0: motor encoder 1: grating ruler
P03-42	Output Z pulse polarity	Set the effective level of Z signal of CN1 terminal frequency division output signal 0: low level 1: high level
P03-45	Numeric instruction cache	Setting range: 0-1 0: no cache (immediate execution) 1: cache (execute new data after the last data execution)
P03-46	Maximum speed of motor when digital position instruction is running	Setting range: 0-6000 Set the maximum speed of the motor when the digital position instruction is running

8.2.5 P04-xx Speed parameters

parameter code	name	instruction
P04-00	Speed command source	0: External simulation instruction 1: Digital command (parameter setting) 2: Digital command(communication) 3: Internal multiple sets of instructions
P04-01	Speed instruction analog quantity inversion	Used to adjust the polar relationship of the analog quantity 0: Normal 1: Polarization
P04-02	Digital speed given value	Set range: -6000-6000, units: rpm When P04-00 is set to 1, P04-02 is the speed control setting value

P04-03	Zero speed position clamp function	0: No position clamp function 1: With position clamp function When the speed control mode satisfies the following conditions, enter the position lock mode A: P04-03 Set to 1 B: The absolute value of the speed instruction is less than the P04-04 setting threshold C: External input port function set to 10(zero bit fixed) and in active state of input
P04-04	Zero speed position clamp speed threshold	Set range: 0-6000 in rpm Set the threshold value of the speed command that triggers the zero speed position clamp function
P04-05	Speed alarm value	Set range: 0-6500, unit: rpm Set allowed maximum speed, exceeding set value will A.420 speed alarm
P04-06	Forward speed limit	Set range: 0-6000 in rpm Limit motor forward speed
P04-07	Reverse speed limit	Setting range: 0-6000 RPM limit motor reverse speed value
P04-10	Zero velocity detection value	Setting range: 0-200.0, unit: RPM set the threshold value of zero speed detection, motor speed below the threshold through the output port output motor zero speed output something signal
P04-11	Rotation detection value	Setting range: 0-200.0, unit: RPM setting motor rotation detection threshold, motor rotation speed above the value can be displayed through the LED panel status
P04-12	Consistent range of velocity	Setting range: 0-200.0, unit: RPM Set the threshold value of speed consistent signal. When the difference between motor speed and instruction speed is within the threshold value, the "speed consistent output" signal can be output through the output port
P04-14	acceleration time	： 1ms/1000rpm

<table>
<tr><td></td><td></td><td>Setting range: 0-10000 in 1ms / 1000rpm setting acceleration for speed control</td></tr>
<tr><td>P04-15</td><td>Deceleration time</td><td>Setting range: 0-10000 in 1ms / 1000rpm setting deceleration for speed control</td></tr>
<tr><td>P04-30

P04-37</td><td>Internal speed set at 1-8</td><td>range:-6000-6000, unit: RPM PARAMETERS P04-30 TO P04-37 setting internal speed 1 to internal speed 8 internal speed internal speed internal speed switch method as follows: When speed loop control, P04-00 SET 3, the corresponding input port function is defined as 13,14,15 internal rotation speed switching, which is realized by setting the input port function to 13,14,15 on-off state combination, as shown in the following table
<table>
<tr><td>DI13</td><td>DI14</td><td>DI15</td><td>Action parameter</td></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

Parameter code	name	instruction
P05-00	Torque command source	0: External simulation instruction (speed limit set by P05-02) 1: Digital command(speed limit set by P05-02) 2: External simulation instruction(speed limit determined by speed

		simulation instruction) 3: Digital command(speed limit determined by speed simulation command)
P05-01	Torque instruction analog quantity inversion	Used to adjust torque direction 0: Normal 1: Reverse direction
P05-02	Torque mode speed limit given	Set range: 0-maximum speed in rpm Set the maximum speed of the motor in torque mode to prevent mechanical damage due to high motor speed when empty Torque control mode is effective
P05-05	Torque limit setting source	Sources used to adjust torque limits 0: Internal number (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 positive and negative direction limits are the same)
P05-06	Torque limit detection output delay	Setting range: 0-10000, unit: MS Setting DO Port Output Torque Limit Detecting Output Signal Delay Time
P05-10	Internal forward torque limit	Setting range: 0-300 .0, in 1.0 % Limit the motor's forward output, 100 is 1 times torque, 300 is 3 times torque When the torque output reaches the limit value, the output signal can be detected by the DO port output torque limit
P05-11	Internal reverse torque limit	Setting range: 0-300 .0, in 1.0 % Limit the reverse output of the motor, 100 for 1 times torque, 300 for 3 times torque When the torque output reaches the limit value, the output signal can be detected by the DO port output torque limit
P05-12	External forward torque limit	◦ Setting range: 0-300 .0, in 1.0 % This feature needs to be switched using an external input port in CN1,

<table>
<tr>
<td></td>
<td></td>
<td>and the selected DI port input port function selection is set to 7(positive rotation external torque limit). Control mode can be switched by controlling the logical state of the port.
<table>
<tr><td>Terminal logical</td><td>torque limit</td></tr>
<tr><td>valid</td><td>P05-12External limit value</td></tr>
<tr><td>invalid</td><td>Internal limitP05-10</td></tr>
</table>
If the DI function is not assigned, the system's default torque limit is P05-10
When the torque output reaches the limit value, the output signal can be detected by the DO port output torque limit</td>
</tr>
<tr>
<td>P05-13</td>
<td>External reverse torque limit</td>
<td>。Setting range: 0-300 .0, in 1.0 %
This feature needs to be switched using an external input port in CN1, and the selected DI port input port function selection is set to 8(reverse side external torque limit). Control mode can be switched by controlling the logical state of the port.If the di function is not assigned, the default torque limit amplitude of the system is p05-11
When the torque output reaches the limit value, the output signal can be detected through the do port output torque limit
<table>
<tr><td>Terminal logical</td><td>torque limit</td></tr>
<tr><td>valid</td><td>P05-13External limit value</td></tr>
<tr><td>invalid</td><td>P05-11nternal limit</td></tr>
<tr><td></td><td></td></tr>
</table>
</td>
</tr>
</table>

8.2.7 P06-xx I/O Parameter

Parameter code	name	instruction
P06-00	Input Port Valid Level	Set range: 0-4, factory settings: 0 Set the valid input for the DI1 input port of CN1

		0: Represents low level valid(optical coupling) 1: Represents high level valid(optical coupling cutoff) 2: Rising edge valid 3: The descent edge is effective 4: Up, down, all valid
P06-01	Input Port Function Selection	Set range: 0-18, factory settings: 1 Set the function of the DI1 input port of CN1 0: Foot invalid 1: Servo ON 2: Alarm clearance 3: Forward overpass signal input 4: Reverse Overpass Signal Input 5: Control Mode Switching 6: P Action command input 7: Positive side external torque limit 8: Reverse side external torque limit 9: Gain switch input 10: Zero bit fixed input 11: Command pulse prohibits input 12: Encoder absolute value data requires input 13: Internal speed switch input 1 14: Internal speed switch input 2 15: Internal speed switch input 3 16: Location command zero input 17: Magnetic pole detection input 18: Directive pulse input multiplier switching input 19: Longmen with moving energy 20: gantry alignment zero signal 21: origin switch signal 22: origin return start signal

		23: Speed simulation instruction direction input 24: torque simulation instruction direction input
P06-02	Input Port Valid Level	check on P06-00
P06-03	DI2 Input port function selection	see P06-01, factory setting :2
P06-04	Input Port Valid Level	See P06-00
P06-05	Input Port Function Selection	See P06-01 Factory Setting :3
P06-06	Input Port Valid Level	See P06-00
P06-07	Input Port Function Selection	See P06-01, factory setting:4
P06-20	Output Port Valid Level	Set range: 0-1, factory settings: 1 0: When the state is valid, the optical coupling is off 1: When the representative state is valid, the optical coupling is connected
P06-21	output Port Function Selection	Set range: 0-11, factory settings: 3 0: Foot invalid 1: Alarm output 2: Open the output 3: Servo ready to output 4: Location complete output 5: Position near output 6: Speed consistent output 7: Motor zero-speed output 8: Torque limit detection output 9: Speed limit detection output 10: Warning output 11: Directive pulse input multiplier switching output

		12: origin regression complete output 13: Electric origin regression complete output
P06-22	Output Port Valid Level	See P06-20
P06-23	output Port Function Selection	See P06-21, factory setting :2
P06-24	Output Port Valid Level	See P06-20
P06-25	output Port Function Selection	See P06-21, factory setting
P06-40	Speed simulation command input gain	Set range: 10-2000, unit 1 RPM / V Set the coefficient between the analog instruction entered by CN1 and the speed control instruction Example: 500 represents 500 rpm per V
P06-41	Speed Simulation Command Filter Constant	Setting range: 0-64 .00, unit: MS Setting the filter time coefficient of the analog instruction input of CN1
P06-42	Speed simulation instruction offset	Setting range: -10.000 -10.000, unit V Set the zero offset of the analog instruction input for CN1
P06-43	Torque simulation instruction gain	Set range: 0-100 .0, 1 % Set the coefficient between the analog instruction entered by CN1 and the speed control instruction For example: 30.0 represents 30 % rated torque per V
P06-44	Torque simulation instruction filter constant	Setting range: 0-64 .00, unit: MS Setting the filter time coefficient of the analog instruction input of CN1
P06-45	Torque simulation instruction offset	Setting range: -10.000 -10.000, unit V Set the zero offset of the analog instruction input for CN1
P06-46	Speed simulation command dead zone	Set range: 0-10 .000, unit V Set the dead zone voltage value of the speed simulation instruction.

		When the analog is given within the positive and negative values, the system is given zero by default.
P06-47	Torque simulation command dead zone	Set range: 0-10 .000, unit V Set the dead zone voltage value of the torque simulation instruction. When the analog quantity is given within the positive and negative values, the system is given zero by default.

8.2.8 P08-xx Advanced function parameters

parameter code	name	instructions
P08-01	Load rotation convention recognition mode	Set range: 0-1 0: valid 1: Invalid
P08-02	Inertial identification maximum speed	Setting range: 100-2000, unit: rpm Maximum speed of motor during off-line inertia identification
P08-03	Inertial identification and deceleration time	Setting range: 20-800, units: MS Increase and decrease time of motor during identification of off-line inertia
P08-04	Waiting time after completion of single inertia identification	Setting range: 50-10000, units: MS Waiting time after completion of single moment of inertia identification
P08-05	Number of motor turns required to complete a single moment of inertia	This parameter is automatically generated by the rotation circle values based on P08-02, P08-03, P08-04 setting conditions
P08-11	Adaptive trap mode selection	Set range: 0-4 Set range: 0-4

		The third and fourth trap parameters are no longer automatically updated and are saved as current values. But it allows manual input 1: An adaptive trap is effective, the parameters of the third trap are automatically updated, and non-manual input is not available. 2: 2 adaptive traps are effective, third and fourth trap parameters are automatically updated, non-manual input 3: Detection of resonance frequency only 4: Clear the third and fourth trap parameters and restore to factory settings
P08-13	Adaptive trap vibration detection threshold	This parameter sets the sensitivity of the adaptive trap vibration detection, and the smaller the parameter value, the more sensitive the detection sensitivity.
P08-20	Torque command filter constant	Setting range: 0-25 .00, unit: MS Torque instruction filter time constant, when there is a howling in the motor operation, this value can be set properly.
P08-25	Disturbing torque compensation gain	Set range: 0-100 .0 Disturbance torque observation is worth gain coefficient. The larger the value, the stronger the disturbance moment ability, but the action noise may also increase.
P08-26	Disturbing torque filter time constant	Setting range: 0-25 .00, unit: MS The larger the value, the stronger the filtering effect, can suppress the action noise. However, the phase delay caused by the over-meeting affects the effect of disturbing power moment suppression.
P08-30	Trap filter 1 frequency	Set range: 50-5000, in Hz Central frequency of trap 1 When set to 5000, the trap is invalid

P08-31	Slip Filter 1 Width	Set range: 0-20 Trap width level of trap 1 The ratio of width to the center frequency
P08-32	Trap Filter 1 Depth	Set range: 0-99 Trap depth level of trap 1 Relationship between input and output for the center frequency of a trap The larger this parameter, the smaller the depth of the trap wave, the weaker the effect
P08-33	Trap filter 2 frequency	same as P08-30
P08-34	Trap filter 2 width	Same as P08-31
P08-35	Trap filter 2 depth	Same as P08-32
P08-36	Trap filter 2 frequency	Same as P08-30
P08-37	Trap filter 3 width	Same as P08-31
P08-38	Trap filter 2 depth	same as P08-32
P08-39	Trap filter 4 frequency	same as P08-30
P08-40	Trap filter 2 width	same as P08-31
P08-41	Trap filter 2 depth	same as P08-32

8.3 List of monitoring items

Show serial number	Show items	instruction	Unit
d00.C.PU	Position command pulse sum	This parameter can monitor the number of pulses sent by the user to the servo drive to confirm whether there is a throwing pulse phenomenon	Command unit

d01.F.PU	Position feedback pulse sum	This parameter can monitor the number of pulses fed back by the servo motor. The unit is the same as the user input instruction unit	Command unit
d02.E.PU	Number of position deviation pulses	This parameter can monitor the number of pulses with delayed position during servo system operation. The unit is the same as the user input instruction unit	Command unit
d03.C.PE	Location given pulse sum / Longmen Motor Feedback Pulse	This parameter monitors the number of pulses the user sends to the servo drive. Unit: When using an absolute value motor, each circle is calculated as 131072 bit. Using the incremental encoder motor, each circle is calculated according to the number of encoder lines * 4.	Encoder unit / Command unit
d04.F.PE	/Position feedback pulse sum /	This parameter can monitor the number of pulses fed back by the servo motor. Unit: When using an absolute value motor, each circle is calculated as 131072 bit. Using the incremental encoder motor, each circle is calculated according to the number of encoder lines * 4.	Encoder unit / Command unit
d05.E.PE	Position deviation pulse number / Dragon pulse bias	This parameter can monitor the number of pulses with delayed position during servo system operation. Unit: When using an absolute value motor, each circle is calculated as 131072 bit. Using the incremental encoder motor, each circle is calculated according to the number of encoder lines * 4.	Encoder unit / Command unit
d06.C.Fr	Pulse command input frequency	This parameter monitors the input frequency of the external pulse command	KPPS
d07.C.SP	Speed Control Command		rpm

d08.F.SP	Motor speed	This parameter can monitor the speed of servo motor during operation	rpm
d09. C.tQ	Torque command	This parameter can monitor the torque of servo motor during operation	%
d10. F.tQ	Torque feedback	This parameter can monitor the torque of servo motor feedback during operation	%
d11.AG.L	Average torque	This parameter can monitor the average torque of the servo motor in the past 10 seconds	%
d12.PE.L	Peak torque	This parameter can monitor the peak torque of the servo motor after it is powered	%
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 regenerative resistor	%
d16.I.Io	Enter IO status	DI1-DI4 This parameter monitors the input port state of CN1. The upper vertical bar represents the high level(optical coupling off), and the lower vertical bar represents the low electric flat light coupling). Corresponding to the input port corresponds to the operating panel from right to left 4 vertical bars corresponding to DI1-DI 4 respectively	
d17.o.Io	Output IO state	DO1-DO3 This parameter monitors the output port state of CN1. The upper vertical bar represents optical coupling, the lower vertical bar represents optical coupling cut-off, and the corresponding relationship with the output port is that the operating panel corresponds to DO1-DO3 from right to left 3 vertical bars respectively.	Binary

d18.AnG	Motor mechanical angle	This parameter can monitor the mechanical angle of the motor and rotate 1 circle to 360 degrees.	0.1degree
d19.HAL	Motor UVW phase sequence	This parameter can monitor the phase sequence position of the incremental encoder motor	
d20.ASS	Absolute value encoder single circle value	0xffff This parameter monitors the feedback value of the absolute encoder and rotates it to 0xffff.	0-0xFFFF
d21.ASH	Absolute value encoder multi-loop value	This parameter can monitor the number of loops of the multi-loop absolute encoder motor	
d22.J-L	Inertial ratio	This parameter can monitor the real-time inertia of the load carried by the motor	%
d23.dcp	Main loop voltage(AC value)	This parameter monitors the voltage value of the main loop	V
d24.Ath	Drive Temperature	This parameter monitors drive temperature	centigrade
d25.tiE	Cumulative running time	This parameter monitors drive running time in seconds	
d26.1.Fr	1 Resonance frequency 1	This parameter can monitor the resonance frequency 1	Hz
d28.2.Fr	2 Resonance frequency 2	2 This parameter can monitor the resonance frequency	Hz
d30.Ai1	（V_REF） Simulator Directive 1 Input Voltage(V_REF)	This parameter can monitor the analog instruction(V-REF) input voltage value of the speed ring.	0.01V
d31.Ai2	（T_REF）Simulator Directive 2 Input Voltage(T_REF)	This parameter can monitor the analog instruction(T-REF) input voltage value of the torque ring.	0.01V

8.4 Auxiliary functions

No.	show items	Function	operation
1	AF_JoG	JOG operate on a trial basis	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_JoG, press the ENT button, and enter Jog working mode. The default Jog speed is 30 rpm. 2. Press the Up button, and the motor is turning at a speed of 30r/min; When the Down button is pressed, the motor is reversed at a speed of 30r/min. 3. Press the ENT button to enter the speed editing menu. Edit the speed through the combination of Up keys, Down keys and Left keys. After editing, press the ENT button and re-enter Jog mode. This set speed will not be saved after exiting Jog mode. 4. Press the M button to exit Jog mode.
2	AF_run	Force enable operation speed mode	1. Press the M button of the operating panel, switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_run, press the ENT button, and enter the working mode. 2. Press Up button, the motor is turning, then long press Up button, the motor speed will continue to increase; Press Down button, the motor reverse, long press Up button, the motor speed will continue to increase. 3. Press the M button to exit this mode.
3	AF_oF1	（VCMD）Simulator input 1 automatic zero drift	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_of1, press the ENT button, and clr. Ai1 will be displayed. 2. Press the ENT button long until the finsh flicker occurs, which

		calibration(VCMD)	completes the automatic calibration of the analog input 1(speed simulation) zero drift. 3. Press the M button to exit this mode.
4	AF_oF2	（TCMD）Simulated input 2 automatic zero drift correction(TCMD)	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_of 2, press the ENT button, and CLR. Ai2 will be displayed. 2. Press the ENT button long until the finsh flicker occurs, which completes the automatic calibration of the analog input 1(torque simulation) zero drift. 3. Press the M button to exit this mode
5	AF_oF3	U, W current. Automatic zero drift correction	Same as AF_oF1 Note: The servo must be turned off when performing this function, otherwise the finsh scintillation page will not appear and the Auto-Calibration will not be complete.
6	AF_En0	Absolute value encoder troubleshooting	The auxiliary function must be operated in a non-energy state. The operation steps are as follows: 1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_EN0, press the ENT button, and clrr will be displayed. 2. Press the ENT button long until the finsh scintillation occurs, which completes the absolute value encoder troubleshooting. 3. Press the M button to exit this mode.
7	AF_En1	Absolute value encoder multiple loop value zero	。 The auxiliary function must be operated in a non-energy state. The operation steps are as follows: 1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_En1, press the ENT button, and clr. ASH will be displayed. 2. Press the ENT button long until the finsh scintillation occurs, that is, the absolute value encoder multi-loop value is cleared. 3. Press the M button to exit this mode.

8	AF_ini	Restore factory parameters	The auxiliary function must be operated in a non-energy state. The operation steps are as follows: 1. Enter the restore factory settings interface: Press the M button of the operation panel, switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_ini, press the ENT button, and 0 to 5 Press the ENT button to confirm. 2. Select Drive Type: Operation Up/Down Button Select Drive Type 3.8 r0A The corresponding drive code, long press the ENT button, appear progress bar, until the occurrence of finsh flicker, complete the restoration of factory settings. 3. After restoring the factory, it is necessary to restart the power. After restarting, use AF_oF3 for U, W current Automatic zero drift correction.
9	AF_Err	Fault shows	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_Err, press the ENT button, and display the past 8 historical fault information. The number 0 on the left represents the last failure that occurred. 2. Press the Up button to show past failures one by one. Press the ENT button to show the time of failure. The time coordinates refer to d25.tiE. 3. Press the M button to exit this mode. Note: There may be a 30-minute deviation in the recording time of a failure that occurs during multiple Reconnections within 30 minutes.
10	AF_uEr	Version Display	1. Press the M button of the operating panel, switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_uER, press the ENT button, and display the servo information. 2. Press the M button to exit this mode.
11	AF_unL	Operation permission settings	1. Press the M button of the operating panel, switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_unL, press the ENT button, and edit the operating rights. 0: All parameters are locked and can not be changed; 1: Lock P00-XX parameters, other

			changeable; 2: Can be changed without locking. Set 0, 1 values, the power drop can be saved. Set 2, power loss is not saved. 2. Press the M button to exit this mode.
12	AF_ Io	Force output port level	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_Io, press the ENT button to edit. Corresponding to output port for operation panel display from right to left vertical bar corresponding to DO1-DO3 respectively 2. Press the M button to exit this mode. The output port returns to the original output state.
13	AF_J-L	Load inertia ratio measurement	1. Press the M button of the operating panel to switch to the auxiliary mode AF_xxx, operate the Up/Down button to AF_J-L, press the ENT button, and the inertia ratio can be measured. 2. Press UP button or DOWN button for a long time. The electric power will run back and forth in the maximum speed set by P08-02, the acceleration and deceleration time set by P08-03, the waiting time of P08-04, and the number of laps set by P08-05 until there is a load inertia ratio. 3. Press the M button to exit this mode. 4. Record measurements and write measurements to P01-04(moment of inertia ratio) parameters

Chapter 9- Error & Alarm and Troubleshooting

9.1 Error and alarm table

Alarm type	Serial no.	Content
Hardware error	AL.051	EEPROM abnormal
	AL.052	Programmable logic configuration error
	AL.053	Initial failure
	AL.054	System abnormal
	AL.060	Selection error
	AL.061	Matching error
	AL.062	Parameter storage error
	AL.063	Over current
	AL.064	Short circuit with output ground when power on self checking
	AL.066	Low power supply
	AL.070	AD sample error 1
	AL.071	Current sample error
	AL.100	Parameter combination error
	AL.101	AI setting error
	AL.102	DI assignment error
	AL.103	DO assignment error
	AL.105	Gear setting error
	AL.106	Frequency pulse ouput setting abnormal
	AL.110	Reset is needed ater resetting parameter
	AL.120	Invalid alarm for ON
	AL.401	Short voltage
	AL.402	Over voltage
	AL.410	Over-load (max. load instantly)
	AL.411	Over-load for driver
	AL.412	Over-load for motor (max. load constantly)

	AL.420	overspeed
	AL.421	out of control
	AL.422	highspeed error
	AL.425	AI sample over voltage
	AL.435	Impulse current limit resistor over-load
	AL.436	DB over-load
	AL.440	case over-heating
	AL.441	障 motor over-heating
	AL.500	overspeed for frequency pulse output
	AL.501	position error
	AL.502	Position error between close-loop encoder and motor
	AL.505	P command input pulse abnormal
	AL.510	Gateway synchronication error
	AL.550	Inertia identification failure
	AL.551	Returning overtime
	AL.552	Angle identification failure
encoder failed	AL.600	Encoder output power supply short-curcuit
	AL.610	Incremental encoder off line
	AL.611	Incremental encoder Z signal lose
	AL.620	Bus encoder off line
	AL.621	Read-write motor encoder EEPROM parameter abnormal
	AL.622	Motor encoder EEPROM date verification error
	AL.640	Bus encoder overspeed
	AL.641	Bus encoder overheating
	AL.643	Bus encoder battery low voltage error
	AL.644	Bus encoder multi-turn error
	AL.645	Bus encoder multi-turn overflow error
	AL.646	Bus encoder communication error 1
	AL.647	Bus encoder counting error 2
	AL.648	Bus encoder communication error 3
	AL.649	Bus encoder communication error 4

	AL.650	Bus encoder communication error 5
	AL.651	Bus encoder communication 6
	AL.652	Bus encoder multi-turn multi error
warn	AL.900	position error
	AL.901	Servo ON position error
	AL.910	motor over-load
	AL.912	driver over-load
	AL.925	external regenerative release resistor undersized
	AL.930	Absolute encoder battery alarm
	AL.941	Reset is needed after resetting parameter
	AL.942	Write EEPROM frequent alarm
	AL.943	Serial communication abnormal
	AL.950	Over stroke alarm
	AL.951	Absolute encodedr angle initialization alarm
	AL.971	Short-voltage alarm

9.2 Error and alarm cause and troubleshooting

AL.051：EEPROM abnormal

Error & alarm cause	Error & alarm checking	troubleshooting
servo unit EEPROM abnormal	Checking wiring	Reset after correct connection, replace driver in case error still exits

AL.052：programmable logic configuration error

Error & alarm cause	Error & alarm checking	troubleshooting
Host MCU power-on initianization abnormal Serial baud rate setting too high	Checking wiring Checking serial port communication baud rate P00-21	Decrease serial port baud rate Replace driver in case error still exists

AL.053： initialization failure

Error & alarm cause	Error & alarm checking	troubleshooting
Host MCU power-on initianization failure	Checking wiring Reset	Replace driver in case error still exists

AL.054： system abnormal

Error & alarm cause	Error & alarm checking	troubleshooting
Host MCU runs abnormal	Checking wiring Reset	Replace driver in case error still exists

AL.060： Model selection error

Error & alarm cause	Error & alarm checking	Troubleshooting
Parameter setting does not match with real hardware	Checking parameter setting and hardware Motor rating current is bigger than driver output current	Setting parameter correctly, please contact factory in case error still exists

AL.061： model matching error

Error & alarm cause	Error & alarm checking	Troubleshooting
Servo driver does not match with servo motor	Checking if the servo driver work with servo motor	Replace the servo driver in case it’s not matching with the servo motor

AL.063： over-current

Error & alarm cause	Error & alarm checking	Troubleshooting
Servo driver power module over-current	If short-circuit between U.V.W connection If short-circuit between B1 & B3	Correct wiring Replace driver in case error still exists

AL.066：low-voltage for servo driver

Error & alarm cause	Error & alarm checking	Troubleshooting
Power supply low voltage	Checking wiring Measure if the L.N voltage is less than 140VAC	Correct wiring Replace driver in case error still exists

AL.071： current sampling error

Error & alarm cause	Error & alarm checking	Troubleshooting
Current sensor sampling data errro	Check wiring	Correct wiring Replace driver in case error still exists

AL.100： parameter combination abnormal

Error & alarm cause	Error & alarm checking	Troubleshooting
Parameter setting error	Checking parameter P03-07	Setting parameter correctly Replace driver in case error still exists

AL.102： assignment error

Error & alarm cause	Error & alarm checking	Troubleshooting
At leat 2 input port function selection is the same	Checking port input function selection parameter	Setting parameter correctly Reset driver

AL.103：DO assignment error

Error & alarm cause	Error & alarm checking	Troubleshooting
At leat 2 input port function selection is the same	Checking port input function selection parameter	Setting parameter correctly Reset driver

AL.105： electronic gear setting error

Error & alarm cause	Error & alarm checking	Troubleshooting
Wrong settting for electronic gear ratio	Checking electronic gear ratio P03-10, P03-11	Setting electronic gear ratio correctly
Gantry output pulse setting too small	Making gantry motor’s pulse per rotation P03-52 more than 128	Settting gantry motor’s pulse per rotation (ppr) correctly

AL.106： division frequency pulse output setting error

Error & alarm cause	Error & alarm checking	Troubleshooting
Division frequency pulse output parameter setting Is out of the range	P03-22，P03-23，P03-25 Checking division frequency pulse output setting parameter	Setting division frequency pulse output parameter correctly Incremental encoder P03-22≤P03-23 Busfield encoder P03-25<65535 Reset driver

AL.110： reset after setting parameter

Error & alarm cause	Error & alarm checking	Troubleshooting
Reset after setting parameter	Reset the drvier	Reset the driver

AL.120： servo ON invalid alarm

Error & alarm cause	Error & alarm checking	Troubleshooting
Servo ON excute assist function R,S,T voltage port unpowered	Checking wiring and input voltage	Checking wirking Reset the driver

AL.401： under voltage

Error & alarm cause	Error & alarm checking	Troubleshooting
Major loop input voltage is lower than rating voltage or no input voltage	Checking major loop input R,S,T is correct or not, and what’s the voltage?	Ensure correct connection, using correct power source or serial connect regulator

AL.402： over voltage

Error & alarm cause	Error & alarm checking	Troubleshooting
Major loop input voltage is more than rating voltage	Measuring major loop input voltage correct or not with voltmeter	Using correct power source or serial connect regulator
Driver hardware error	Over voltage alarm still exists with correct input voltage	Please return the driver to distributor or factory for repair
No connection with regeneration resistor or wrong regeneration resistor	Make sure P00-30 is 0 or 1	Setting and connect external regeneration resistor correctly

AL.410：）over-load (instant max. load)

Error & alarm cause	Error & alarm checking	Troubleshooting
Motor blocked when power on	Checking if there is mechanical blocking	Adjust mechanical structure
Driver hardware error	Alarm still exists after ensuring correct mechanical structure	Please return to distributor or factory for repair

AL.412：motor over-load (constantly max. load)

Error & alarm cause	Error & alarm checking	Troubleshooting

Constantly running under over-loading status	Monitor under d13.0L.	Change motor or reduce load
Wrong parameter setting for control system	1, right or wrong mechanical system 2, acceleration over-speed 3, right or wrong gain parameter setting	1, adjust control loop gain 2, extend ace/dec setting time
Wrong motor wiring	Checking U,V,W wiring	Correct wiring

AL.420： over-speed

Error & alarm cause	Error & alarm checking	Troubleshooting
Input speed command is too high	Checking the input signal right or wrong with signal detector	Adjust input signal frequency
Wrong setting for over-speed decision parameter	Checking if P04-05 (over-speed alarm) setting right or wrong	Setting P04-05 (over-speed alarm value) correctly

AL.421： out-of-control checking

Error & alarm cause	Error & alarm checking	Troubleshooting
Motor wire U,V,W wrong connection	Checking wiring	Connect wire correctly
Wrong motor parameter setting	Checking P00-05 and encoder parameter right or wrong	Setting paremeter correctly

AL.440： case over-heating

Error & alarm cause	Error & alarm checking	Troubleshooting
Internal driver temperature is higher than 95℃	Checking if the heating radiation good enough	Improve heating environment, please return it to factory if the alarm still exists

AL.501： over position error

Error & alarm cause	Error & alarm checking	Troubleshooting
Over-position parameter setting too small	Setting P03-15 parameter correctly	Increase P03-15 parameter value
Gain setting is too small	Setting gain parameter reasonably	Setting gain parameter correctly

Internal torque limit setting too small	Setting internal torque limitation correctly	Adjust internal torque limitation correctly
External over-load	Checking external load	Deduce load or replace with bigger power motor

AL.505： input pulse error

Error & alarm cause	Error & alarm checking	Troubleshooting
Input pulse frequency is higher than rated input frequency	Measuring if input pulse frequency higher than rate frequency by using frequency detector	Setting pulse frequency correctly

AL.551： home over-time

Error & alarm cause	Error & alarm checking	Troubleshooting
Home returning is over-tme	Checking P03-68 reasonable or not	Setting P03-68 correctly

AL.600： encoder ouput power short-circuit error

Error & alarm cause	Error & alarm checking	Troubleshooting
Wrong encoder power wiring	Checking if encoder +5V and GND reversal connection or not	Correct connection

AL.610： incremental encoder off-line

Error & alarm cause	Error & alarm checking	Troubleshooting
HallU, HallV, HallW Incremental encoder Hall U,V,W signal error	Checking encoder wiring	Correct connection

AL.620： busfield encoder off-line

Error & alarm cause	Error & alarm checking	Troubleshooting
Busfield encoder communication failure	Checking encoder wiring	Correct connection

AL.621：EEPROM EEPROM error

Error & alarm cause	Error & alarm checking	Troubleshooting
Encoder read & write error	Checking encoder wiring	Correct connection

AL.640： busfield encoder over-speed

Error & alarm cause	Error & alarm checking	Troubleshooting

Busfield encoder speed exceeds 6000rpm	Checking encoder wiring Ensure correct twisted pair connection	Reduce speed Pleae return driver to factory for repair if error still exists with correct wiring

AL.642, AL.643：fieldbus encoder battery error

Error & alarm cause	Error & alarm checking	Troubleshooting
External battery is low when fieldbus encoder set as multi-layer absolutely	3.0V Ensuring encoder external battery voltage more than 3.0V	Change battery

AL.645：Field-bus encoder multi-layer over-flow error

Error & alarm cause	Error & alarm checking	Troubleshooting
Fieldbus encoder rotation exceed range	Monitor rotation by d21.ASH, cannot rotate in one direction long time	Remove multi-layer by command AF_En1

AL.647： field-bus encoder counting error

Error & fault cause	Error & fault checking	Troubleshooting
Separate type encoder mounting position over-deviation	Checking encoder	Mounting encoder correctly

AL943： serial port communication error

Error & alarm cause	Error & alarm checking	Troubleshooting
Serial communication big interference Serial baut rate too high	Checking wiring Checking serial baut rate parameter P00-21	Adding filter Reduce serial port baud rate

Chapter 10- Communication setting

10.1 Modbus communication parameter setting

Code	Name	Description
P00-21	RS232 baud rate	Setting range: 0-3, default: 2 The baud rate communicated with PC 0：9600 1：19200 2：57600 3：115200
P00-23	Slave address	Setting range: 0-255, default: 1 Setting according to equipment application
P00-24	Modbus baud rate	Setting range: 0-7, default: 2 0：2400 1：4800 2：9600 3：19200 4：38400 5：57600 6：115200 7：25600
P00-25	Checking way	Setting range: 0-3, default: 1 0: no checking, 2 bits stop-position 1: even checking, 1 bit stop-position 2: odd checking, 1 bit stop-position 3: no checking, 1 bit stop-position
P00-26	Modbus communication respond delay	Setting range: 0-100, default 0 response according to standard communication in default status, response to setting time according to setting parameter

10.2 Modbus communication support read & write parameter setting

Supporting writing parameter table

Address ref. no.	Address 10 decimal system	Address Hexadecimal system	Address Octal system	Remark
P03-09	309	135	465	Pulse per rotation (ppr)
P03-10	310	136	466	Electronic gear numerator
P03-11	311	137	467	Electronic gear denominator
Eeprom data	2050	802	4002	To be written data
Eeprom control	2051	803	4003	Address: 0-11 bits It’s write when 12bit is 1 It’s read when 13bit is 1

Remark: the above writing parameter is temporary modification, it would not be saved after power off.

supported reading parameter table

Add ref. no.	Address Decimal system	Address Hexadecimal system	Address Octal system	Remark
P03-09	309	135	465	Pulse per rotation (ppr)
P03-10	310	136	466	Electronic gear numerator
P03-11	311	137	467	Electronic gear denominator
Eeprom reading date	2050	802	4002	Reading data
Eeprom reading address	2051	803	4003	Data matching address
Position setting value	2106/2107	83A/83B	4072/4073	It’s high 16 bit for address 2106 It’s low 16 bit for address 2107

Position feedback value	2108/2109	83C/83D	4074/4075	It’s high 16 bit for address 2108 It’s low 16 bit for address 2109
Position deviation value	2110/2111	83E/83F	4076/4077	It’s high 16 bit for address 2110 It’s low 16 bit for address 2111
Velocity control command	2113	841	4101	Unit: 1rpm/min
Running speed	2114	842	4102	unit：1rpm/min
Torque command	2115	843	4103	unit:0.1%
Torque feedback	2116	844	4104	unit:0.1%
Over-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	Convert to 16 bits binary after reading data, high 3 bits is HAL, low 8 bits is input port status, mid 5 bits is output port status.
Motor mechanical angle	2123	84B	4113	Unit:0.1 degree
Position feedback (absolute data)	2125/2126	84D/84E	4115/4116	Former high latter low, high is cycle number, low is single cycle value, each cycle 65536BIT
Main circuit voltage	2128	850	4120	unit:V
Resonance frequency 1	2131	853	4123	unit:hz

Resonance frequency 2	2132	854	4124	unit:hz
Velocity loop analog voltage	2133	855	4125	unit:0.01V
Torque loop analog voltage	2134	856	4126	unit:0.01V

External command digital given table

Command address / Control mode	address Decimal	Address hex	Address Octal	Remark
Position loop digital given value	2003/2004	7D3/7D4	3723/3724	Max. Support 2^32 digital given Decimal value 131072=1 cycle
Velocity loop digital given value	2002	7D2	3722	Speed (rpm) = decimal value/5
Torque loop digital given value	2002	7D2	3722	Decimal 4096 = holding torque

10.3 Modbus communication protocol overall summary

10.3.1 Preface

Nexus monitor use AEG Mod icon Modbus protocol RTU transfer communicate with other device, this communication is also suitable for RS-232 and RS-485.

RS-232 communication require one Nexus monitor to connect with another device one by one, which use Nexus monitor channel 1 only.

RS-485 support multi Nexus monitor to connect with one net in double wire connection, it can be 115200 baud, port 1-4 available.

10.3.2 Communication package

Communicate between one Modbus slave and multi Nexus slave, master send a “request package” to specified slave to initiate all of communication, slave feedback with a “reply package”. communication package consists of 8-bits in series as following:

- slave address, 1 bit
- function code, 1 bit
- data, N bits, high the former, low the latter
- CRC (RTC error detect code), 2 bits
- Dead time, 3.5 bits transmission time

Single communication package can send 127 register maximum.

10.3.3 Slave address and sending request

Every slave in the field-bus has his own special address, to feeback the request address by master only. There are the same address between return to master and request package, which can be programmed range from 0 to 255. Salve address 0 is a transmission command, permitting master immediately send the same package to all of the devices.

All of the slave obey this package command without response. Transmission request only useful for function 6 to 10, indicate preset single register and multi register separately, as shown on table 1.3 & 1.4.

10.4 Function number

A package function serial number indicates request slave which motion to be executed, Nexus support following Modbus function

Table 1.1, function

function serial number		description
hex	1 decimal	
03H	3	Read holding register
06H	6	Preset single register
10H	16	Preset multi register

10.4.1 Function 03: read holding register

This function permits master read one or multi parameter (data register) from one Nexus, this data register is 16 bits, transmitted by “Big Endian” format. High bit read first, low bit read later.

BIG-ENDIAN is the low bit saved in memory low side, high bit saved in memory high side.

Master send a package to define a register number for slave initiating and reading, slave feedback with a package, which include the requested parameter value, this value is within original request indicating range.

In the following example, the master apply a value between two registers sent by slave 01, initial register is 00001, slave feedback with 3031H and 3037H from register 00001 and 00002.

：master sending format

Slave address function number data initial address reading data number CRC

：slave sending format

Slave address function number bit number each data value CRC

table 1.2 function 03 example

Master package definition	Hex address	Slave package definition	Hex address
Slave address	01H	Slave address	01H
Function number	03H	Function number	03H
Data initial address high byte	00H	Byte number	04H
Data initial address low byte	01H	Data 1 high byte	30H
Register number high byte	00H	Data 1 low byte	31H
Register number low byte	02H	Data 2 high byte	30H
CRC low byte	95H	Data 2 low byte	37H
CRC high byte	CBH	CRC low byte	F1H
		CRC high byte	2AH

10.4.2 function 06: adjust single register

This function permits master change the single register in slave Nexus, the register is 16 bytes, high byte transfer first, low byte transfer later. In the following example, the master save address is 0001H in 01H Nexus register 57346 (E002).

master sending format

Slave address function data initial address date CRC

slave sending format

Slave address function data initial address date CRC

table 1.3 function 6 example

Master package definition	Hex address	Slave package definition	Hex address
Slave address	01H	slave address	01H
Function	06H	Function	06H
Data initial address high byte	E0H	Date initial address low byte	E0H
Data initial address low byte	01H	Data initial address low byte	01H
Data high byte	00H	data high byte	00H
Data low byte	01H	Data low byte	01H
CRC low byte	2EH	CRC low byte	2EH
CRC high byte	0AH	CRC high byte	0AH

10.4.3 Function 10: adjusting register

This function permit master change the constant register in Nexus, data register is 16 byte, high byte transfer first, low byte transfer later.

In the following example, master save address is 01H Nexus slave register 57345 value 0001H, 57346 value 0001H, 57347 value 0001H.

：master sending format

Slave address function data initial address modify data number the first data.....CRC

slave sending format

Slave address function data initial address modify data number .....CRC

10.4.4 Data initial address

0000H-FFFFH hex range:

0001—65535 decimal range

For example, for some Scada software, in order to save the register value, the address format should be 4(xxxxx), xxxxx is the decimal address.

table 1.4 function 10 example

Master package definition	Hex address	Slave package definition	Hex address
Slave address	01H	Slave address	01H
function	10H	function	10H
Data initial address high byte	E0H	Data initial address high byte	E0H
Data initial address low byte	01H	Data initial address low byte	01H
Setting number high byte	00H	Setting number high byte	00H
Setting number low byte	03H	Setting number low byte	03H
Byte number	06H	CRC low byte	E6H
Data 1 high byte	00H	CRC high byte	08H
byte	01H		
Data 2 high byte	00H		
Data 2 low byte	01H		
Data 3 high byte	00H		
Data 3 low byte	01H		
CRC CRC low byte	4DH		
CRC high byte	46H		

10.5 deadtime

It's regarded as date receiving over If Nexua slave do not receive data from master within 3.5 bits sending time (it's about 7ms in 4800 baud rate, it's about 300ms in 115200 baud rate). If the delay between the two bytes during the transmission of the master is more than this time, the slave considers the dead time. Therefore, the conclusion from the dead time is that all unaddressed slaves should pay attention to new packets from the master.

10.6 Response from exception program

When executing the master command, if the slave encounters an illegal command or other problems, it will send an exception program response packet to the master. The exception response packet contains an error code to indicate the type of error.

The following table is the error code and corresponding error type

Table 1-5 Error code and type

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

In the following example, the master device requests the slave at address 00H to send the value in register 00256, and the slave sends an error response message, indicating that it is busy.

Table 1.6 Exception program response example

Host contains meaning	Hex address	Slave meaning	Hex address
address	01H	address	01H
function code	03H	function code	03H
Data start address high byte	01H	error code	06H
Data start address low byte	00H	CRC low byte	C1H
Register Number High Byte	00H	CRC high byte	32H
Register Number Low Byte	01H		
CRC low byte	85H		
CRC high byte	F6H		

Chapter 11- Special Function Description

11.1 Return to home position function

11.1.1 Description

Home position: the Mechanical start point, can standard for origin switch or motor Z axis signal position, set by P03-61

Zero Point: the target location point, Can be expressed as origin + offset (set via P03-69/P03-70). While P03-69/P03-70 set as 0, the zero point coincides with the origin.

The return-to-origin function is the position control mode. When the servo enable is ON, the servo motor will actively find the zero point and complete the positioning function after the home position return function is triggered.

11.1.2 Servo basic settings and instructions

P03-60	Home point return enable control	Set rang: 0-6 Default:0 Set the home point return mode and trigger signal source 0：Turn off the home point return function 1： The origin return function is enabled by the DI input origin return enable signal. 2：。Start input signal enable electrical zero return function by DI input origin return, 3：Start the home position return immediately after power-on 4：Return to home position immediately 5：Start electrical zero return command 6：Set this point as home position.
P03-61	OPR Mode	Set Range: 0-9 Default : 0 Set the control signal source for the zero return direction, deceleration point, and origin of the homing operation 0: Positive zero return, deceleration point, origin is the origin switch Reverse zero return, deceleration point, origin is the origin switch

		Positive zero return, deceleration point, origin is the Z signal of motor Reverse zero return, deceleration point, origin is the Z signal of motor Positive zero return, deceleration point is the origin switch, origin is the Z signal of motor Reverse zero return, deceleration point is the origin switch, origin is the Z signal of motor Positive zero return, deceleration point, origin is forwarder over travel switch Reverse zero return, deceleration point, origin is reverse overtravel switch Positive zero return, deceleration point is forwarder over travel switch, origin is the Z signal of motor Reverse zero return, deceleration point is reverse overtravel switch,origin is the Z signal of motor.
P03-65	Searching for the origin switch speed _ high speed	Set range: 0-3000, Default 100 Search for the high speed value of the deceleration point signal when the zero point is set to zero When electric returns to zero, the motor always runs at P03-65
P03-66	Searching for the origin switch speed _ low speed	Set range: 0-1000, Default: 10 Search for the low speed value of the deceleration point signal when the zero point is set to zero The speed setting should be low enough to prevent mechanical shock while power off.
P03-67	Search home point switch acceleration and deceleration time	Set time for the home point return while motor speed starts from 0 to 1000 rpm. Unit: ms.
P03-68	Search the longest time limit of the home point	Limits total time for returning to the home point, will alarm AL.551 if time is over it. (Home point return overtime failure.)

P03-69	Mechanical home point offset H	Set the absolute position of the motor after the return-to-origin. Total offset calculation method: Offset = (P03-69) * 65535 + (P03-70)
P03-70	Mechanical home point offset L	
P06-01	DI1 input port function selection	DI1 sets as 1, servo ON.
P06-05	DI3 input port function selection	DI1 set as 3, forwarder over travel signal input
P06-07	DI4 input port function selection	DI4 set as 4, reverse over travel signal input
P06-09	DI5 input port function selection	DI5 set as 21, the home point switch signal
P06-11	DI6 input port function selection	DI6 set as 22, home point return start signal

11.1.3 Return-to-origin precautions

If the deceleration point signal is valid and the origin signal is valid without sufficient deceleration, the final positioning may be unstable. Full consideration should be given to

The required displacement of the speed, and then set the deceleration point and the origin signal input position. The acceleration/deceleration time (P03-67) when searching for the origin and the speed_high speed (P03-65) when searching the home switch also affect the positioning stability, so it should be taken into consideration when setting.

11.2 Absolute encoder operation

11.2.1 Function

Using a servo motor with an absolute encoder, an absolute value detection system can be built by the host device. With the absolute value detection system, it is no longer necessary to perform the home position return operation every time while turn on the power. This function reads the absolute encoder lap number and position

data based on MODBUS communication, and the host device performs processing control to realize absolute encoder related functions.

11.2.2 Basic settings and description based on MODBUS communication servo

A system using an absolute encoder is required to initialize the number of revolutions (AF-En0 absolute encoder multi-turn value clear to zero “0”) when it is put into use. Therefore, in the case where initialization is required for the first time the power is turned on, an alarm related to the absolute encoder occurs. By setting (initializing) the absolute encoder, after the initialization of the revolution data, the alarm associated with the absolute encoder will be cleared.

CODE	Description	Data setting.
P00-23	Subordinate address	Set range: 0-255, default 1 According to device requirement
P00-24	Modbus Communication baud rate	Set rang: 0-7 Default 2 0：2400 1：4800 2：9600 3：19200 4：38400 5：57600 6：115200 7：25600
P00-25	Examination	Setting range: 0-3, Default 1 0: no examination, 2 position is stop position. 1: Even parity, 1 position is Stop position 2: Odd parity, 1 position is stop point
P00-07	Encoder option	Setting range: 0-3, default 3 0, 1: incremental encoder 2: Single-turn absolute encoder 3: Multi-turn absolute encoder

11.2.3 COMUNICATION ADDRESS BASED ON MODBUS

Address / number	decimal	Hexadecimal	Address: Octal	remark	
（position feedback (absolute data)	2125/2126	84D/84E	4115/4116	Front high level back lower level: high level standards for cycles, lower level stands for single cycle value. 65536bit per cycle.	

11.2.4 Absolute encoder alarm treatment

Alarm #	Alarm reason	Alarm checking	Treatment action
AL.640	Bus encoder over speed	Appears at first time	Clear up Alarm via AF-EN0 (Details refer to chapter 8.4)
AL.642 AL.643	Bus encoder is multiple turns Outside battery voltage lower.	Check voltage of outside battery to encoder, should be higher than 3.0V	Ex-change battery. Clear up alarm by AF-EN0(Details refer to chapter 8.4)
AL.644 AL.645	32767 Read multi-cycle data anomalies, or multi-cycle data is greater than 32767	check multi-cycle data of d21.ASH(Refer to 8.3)	Clear up multi-cycle data by AF-EN1(refer to 8.4), if multi-cycle data is greater than 32767
AL.930	Absolute encoder battery failure	check battery voltage	change battery. Clear up alarm by AF-EN0(refer to 8.4)