

VEC-VC120 Series AC Servo Drive

User Manual

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◎V1.10

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Chapter 1 safety reminder

This chapter describes important matters that users must observe, including product identification, storage, transportation, installation, wiring, operation, and inspection.

1.1 Safety Notes

●Turn off the power for more than 5 minutes before disassembling and installing the driver, otherwise it may cause electric shock due to residual voltage.

●Do not disassemble or install the driver when the servo unit is powered on, otherwise it may cause electric shock, stop the product or burn it out.

●Please never touch the inside of the servo drive, otherwise it may cause electric shock.

●When the power is turned on and for a period of time after the power is cut off, the heat sink of the servo drive, the external braking resistor, the servo motor, etc. may be high temperature, please do not touch, otherwise it may cause burns. To prevent inadvertent contact with hands or parts (such as cables, etc.), take safety measures such as installing a cover.

●Please use the power supply specification that conforms to the product for the power supply of the servo drive, otherwise it may cause the product to burn out, electric shock or fire.

●Between the power supply and the main circuit power supply of the servo drive, be sure to connect a magnetic contactor and a non-fuse circuit breaker. Otherwise, when the servo drive fails, the large current cannot be cut off, resulting in a fire.

●The ground terminal of the servo drive must be grounded, otherwise it may cause electric shock.

●Unless you are a professional, do not set up, disassemble, or repair the product, as this may result in electric shock or injury.

●Please never modify this product, otherwise injury or mechanical damage may result.

●Do not damage or pull the cable too hard, do not subject the cable to excessive force, do not place it under heavy objects or cause it to be pinched, otherwise it will cause malfunction, damage, and electric shock.

●When the servo motor is running, please never touch its rotating parts, otherwise you may be injured.

●Do not use this product near places where it will be splashed with water, corrosive environments, flammable gas environments and combustibles, otherwise it

may cause electric shock or fire.

●Please install the servo drive, servo motor and external braking resistor on incombustible materials, otherwise it may cause fire.

●In the servo driver and servo motor, do not mix flammable foreign objects such as oil and grease, and conductive foreign objects such as screws and metal pieces, otherwise it may cause a fire.

●When installing it on the supporting machine and starting to run, please put the servo motor in a state where it can be stopped at any time in advance, otherwise it may cause injury.

●In the state where the servo motor and the machine are connected, if an operation error occurs, it will not only cause mechanical damage, but may also lead to personal accidents.

●Install an external emergency stop device to ensure that the power is turned off and operation is stopped immediately when an error occurs.

●Please use a noise filter, etc. to reduce the influence of electromagnetic interference, otherwise it will cause electromagnetic interference to the electronic devices used near the servo unit.

●Servo unit and servo motor should be used in the specified combination.

1.2 Precautions for storage

●Do not place too much of this product on top of one another, as this may cause injury or malfunction.

●Please store in the following environment:

• Places without direct sunlight;

• Places where the ambient temperature is within the range of -20℃ to +65℃;

• The relative humidity is in the range of 0% to 95%, and there is no condensation;

• Places without water droplets, steam, dust and oily dust;

• Places without high-heating devices;

• Non-corrosive, flammable gas and liquid places;

• Places that are not easy to be splashed with water, oil, medicines, etc.;

• Places that will not be exposed to radioactive radiation;

• Strong and vibration-free place;

• A place without electromagnetic noise interference.

Storage in an environment other than the above may result in product failure or damage.

1.3 Precautions for transportation

●When operating the servo unit and servo motor, be careful of sharp parts such as the corners of the equipment, otherwise injury may result.

●Do not place too much of this product on top of one another, as this may cause injury or malfunction.

● This is a precision device, please do not drop it or apply strong impact to it, otherwise it will cause malfunction or damage.

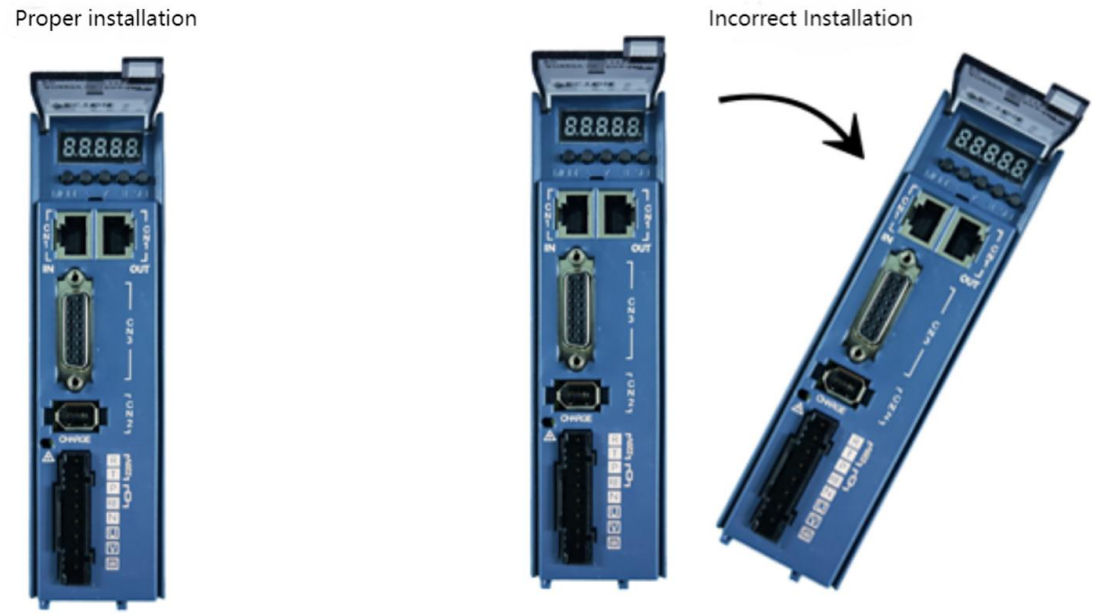
●Do not apply shock to the connector part, otherwise it will cause poor connection or malfunction.

1.4 Notes on installation

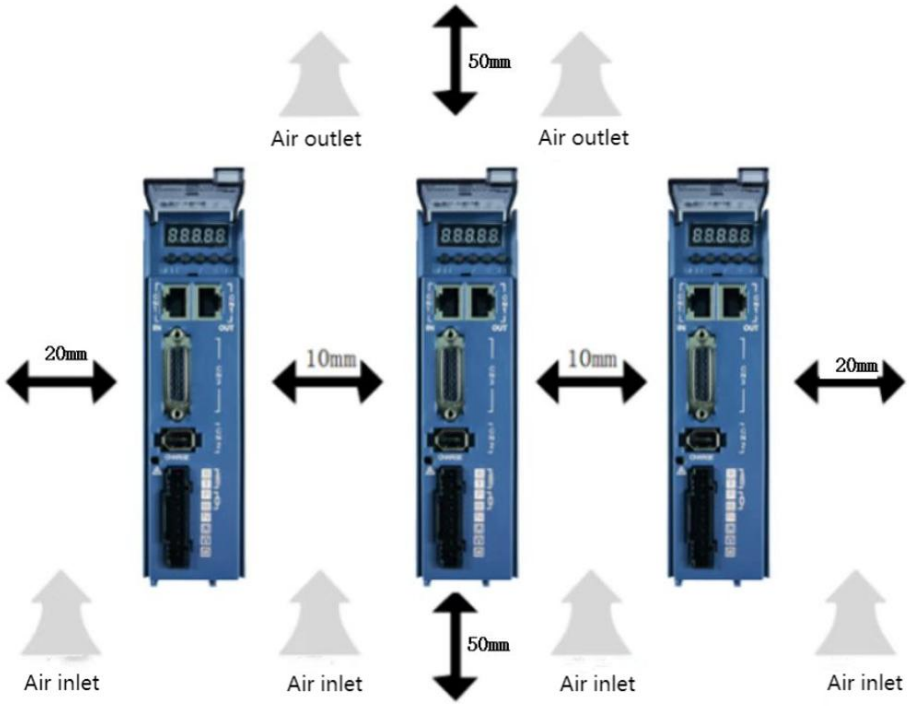
●Before installation, please be sure to carefully read the product user manual and safety precautions.

●Please install the drive on a dry and sturdy platform. During installation, ensure adequate ventilation and heat dissipation circulation, and maintain proper grounding.

●Please install in the specified direction to prevent malfunctions.



● During installation, ensure that the servo drive maintains the specified clearance distance from the inner surfaces of the electrical cabinet and other equipment; otherwise, it may cause fire or malfunctions.



● When installing, do not block the air inlet and air outlet, and do not allow foreign objects to enter the product, otherwise it may cause malfunction or fire due to the aging of the internal components.

● Do not place heavy objects on or on top of this product, as this may result in injury.

● Please install in the following environment:

- Places without direct sunlight;
- Locations where the ambient temperature is in the range of 0℃ to 55℃;
- The relative humidity is in the range of 0% to 95%, and there is no condensation;
- Places without water droplets, steam, dust and oily dust;
- Places without high-heating devices;
- Non-corrosive, flammable gas and liquid places;
- Places that are not easy to be splashed with water, oil, medicines, etc.;
- Places that will not be exposed to radioactive radiation;
- A firm and vibration-free place;
- A place without electromagnetic noise interference.

Installation in an environment other than the above may result in product failure or damage.

1.5 Wiring Precautions

● Wiring or inspection work must be performed by qualified technical personnel;

otherwise, it may cause electric shock or product malfunction.

●Do not change the wiring while the power is on, otherwise electric shock or injury may result.

●Please check the wiring and power supply carefully. The output circuit may be short-circuited due to incorrect wiring or the application of different voltages.

●When wiring, do not pass the power cable and the signal cable through the same pipe, and do not bundle them together. The distance between the two should be more than 30cm to avoid interference.

●The ground terminal of the driver must be connected to the ground to avoid leakage and reduce the interference to the system, and the diameter of the ground wire should be the same or larger than that of the power supply wire.

●For the wiring length, the maximum length of the command input line is 3m, and the maximum length of the encoder line is 20m.

●Please use twisted-pair shielded cables for signal cables and encoder cables, and the shielding layer is grounded at one end.

●The U, V, W terminals of the driver and the U, V, W terminals of the motor should be connected one by one according to their names. If they are connected incorrectly, the motor cannot run normally.

●Please turn off the power supply for more than 5 minutes, and wait until the CHARGE indicator light turns off before proceeding with the inspection.Even if the power is turned off, high voltage may still remain inside the servo drive. Therefore, within 5 minutes after the power is turned off, do not touch the power terminals, otherwise it will cause electric shock.

●Do not turn on/off the power frequently. When it is necessary to repeatedly turn on/off the power continuously, please control it to less than once a minute. Since the power supply part of the servo driver has a capacitor, a large charging current will flow (charging time 0.2 seconds) when the power is turned ON/OFF. Therefore, if the power is turned on/off frequently, the performance of the main circuit components inside the servo drive will be degraded.

●Do not power on when the terminal block screws or cables are loose, otherwise it may cause fire.

●In the following places, please take appropriate shielding measures, otherwise it may cause damage to the machine:

- Places where there is interference due to static electricity;
- Places where strong electric or magnetic fields are generated;
- places where radiation exposure may occur;
- Places with power lines nearby.

●After completing the wiring, ensure that no residual screws or wires remain inside the machine; otherwise, subsequent use may cause damage to the equipment.

1.6 Runtime considerations

● During the test run, in order to prevent accidents, please run the servo motor with no load (not connected to the transmission shaft), otherwise it may cause injury.

● When it is installed on the matching machine and starts to run, please set the user parameters that match the machine in advance. If the operation is started without parameter setting, it may cause loss of control or malfunction of the machine.

● To avoid accidents, please install a limit switch or stopper at the end of the moving part of the machine, otherwise it will cause damage to the machine or injury to personnel.

● Do not make extreme changes to the parameter settings, otherwise it will cause unstable movement, mechanical damage or injury.

● When the power is turned on or the power is just cut off, the heat sink, external braking resistor, motor, etc. of the servo drive may be in a high temperature state. Please do not touch it, otherwise it may cause burns.

● When using a servo motor on a vertical axis, please install a safety device to prevent the workpiece from falling in the state of alarm, overtravel, etc. In addition, please set the stop setting of the servo lock when overtravel occurs, otherwise the workpiece may drop in the overtravel state.

● Do not enter the operating range of the machine during operation, otherwise injury may result.

● Do not touch the servo motor and the moving parts of the machine during operation, otherwise injury may result.

● During operation, ensure that no foreign objects fall into the equipment; otherwise, it may cause damage.

● Install a safety system to ensure safety even in the event of a signal line disconnection or other failure. For example, when the forward over-travel switch (P-OT) and reverse over-travel switch (N-OT) signals are disconnected at the factory settings, a safety action is performed.

● When turning off the power, be sure to set the servo OFF status.

● Do not turn on/off the power frequently. After starting the actual operation, the interval between power ON/OFF should be more than 1 hour, otherwise the components inside the servo unit will be aged prematurely.

● When an alarm occurs, reset the alarm after eliminating the cause and ensuring safety, and restart the operation. Otherwise, injury may occur.

● Do not use the brake of the brake motor for normal braking, otherwise it may cause malfunction.

1.7 Maintenance and Inspection Precautions

● Do not change the wiring while the power is on. Doing so may result in electric shock or injury.

● Please have professional technicians perform wiring or inspection operations, otherwise it will cause electric shock or product failure.

● Please wait at least 5 minutes after the power is turned off before performing the inspection. Even if the power is turned off, high voltage may still remain inside the servo drive. Therefore, within 5 minutes after the power is turned off, do not touch the power terminals, otherwise it will cause electric shock.

● When replacing the servo drive, please back up the user parameters of the servo drive to be replaced before replacing, and transfer the backup to the new servo drive, and then restart the operation, otherwise the machine may be damaged.

Chapter 2 Product Information

2.1 Component Description

2.1.1 External components of the VC120 (single-phase 220V) servo drive

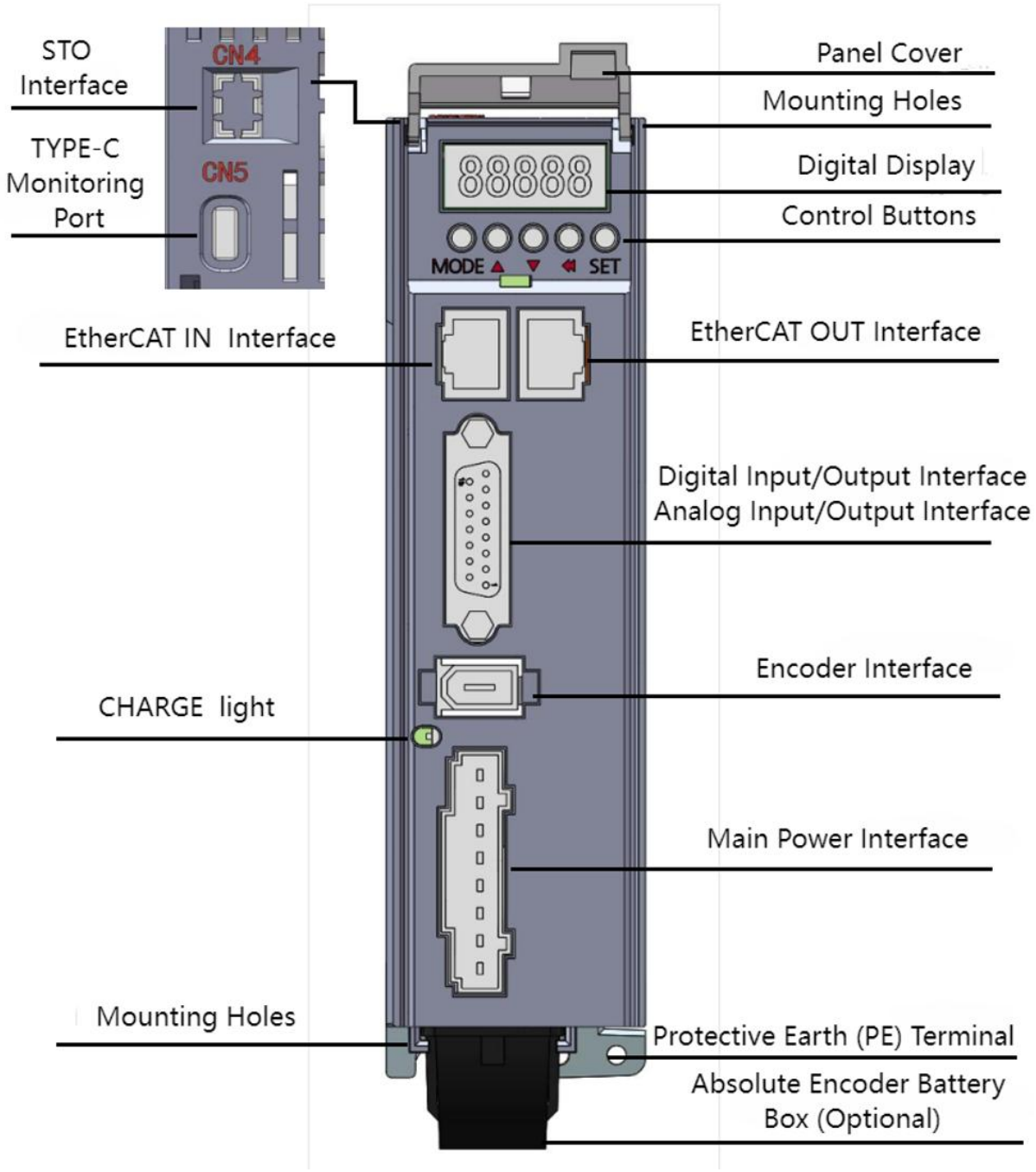


Fig 2-1 VC120 Servo drive

2.1.2 VC120 (3 phase 380V) servo drive form factor

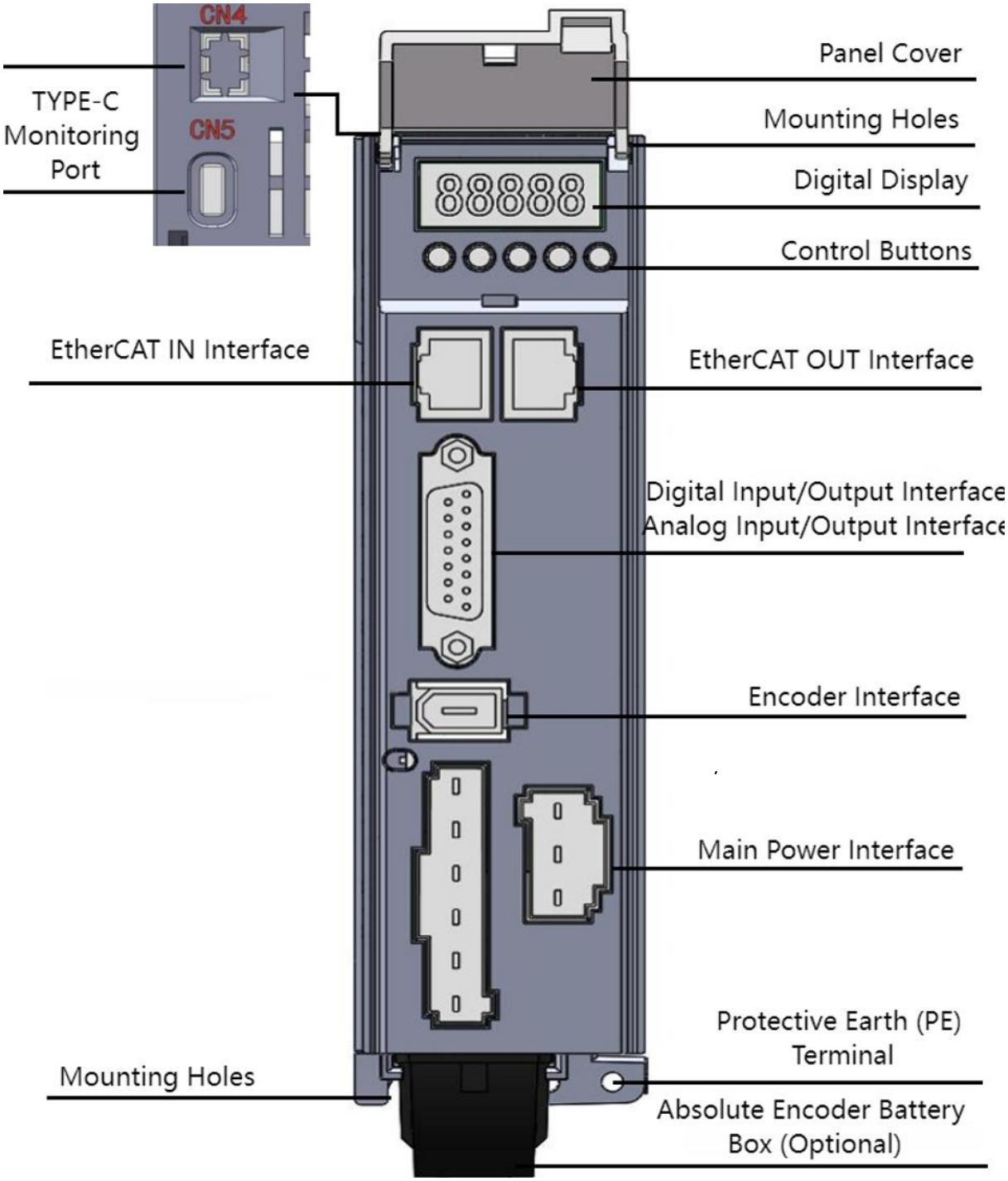


Fig 2-2 VC120 Servo drive

2.1.3 VC120 Servo drive mounting dimensions

1 Product size（unit ： mm）

1）Adaptation current（A）3-6（Single220V）

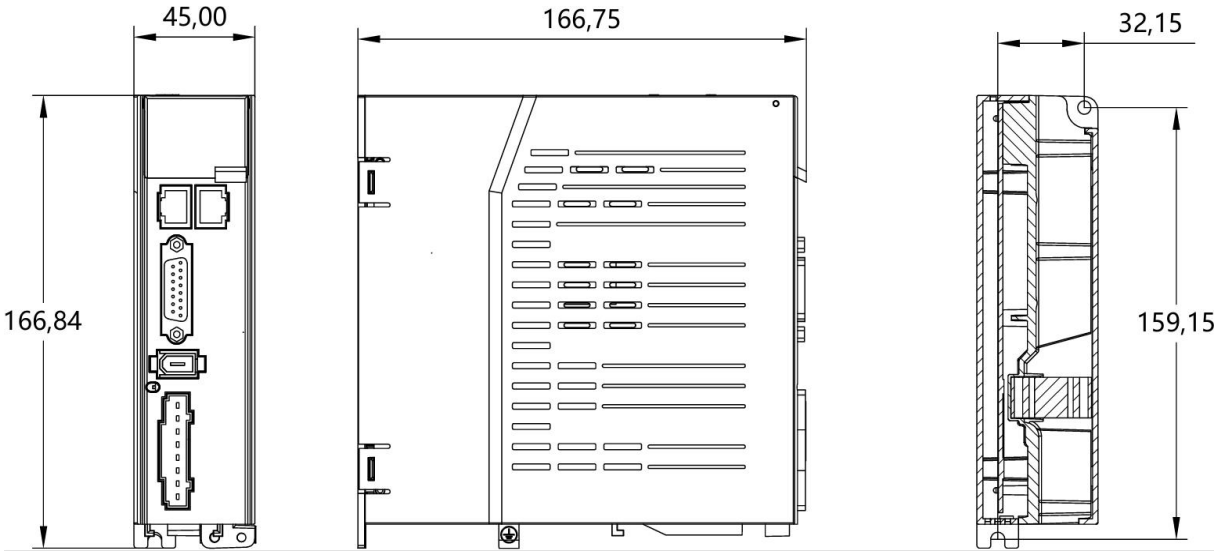


Fig 2-3 VC120 Servo drive dimensions

2）Adaptation current（A）3.8（triphasic380V）

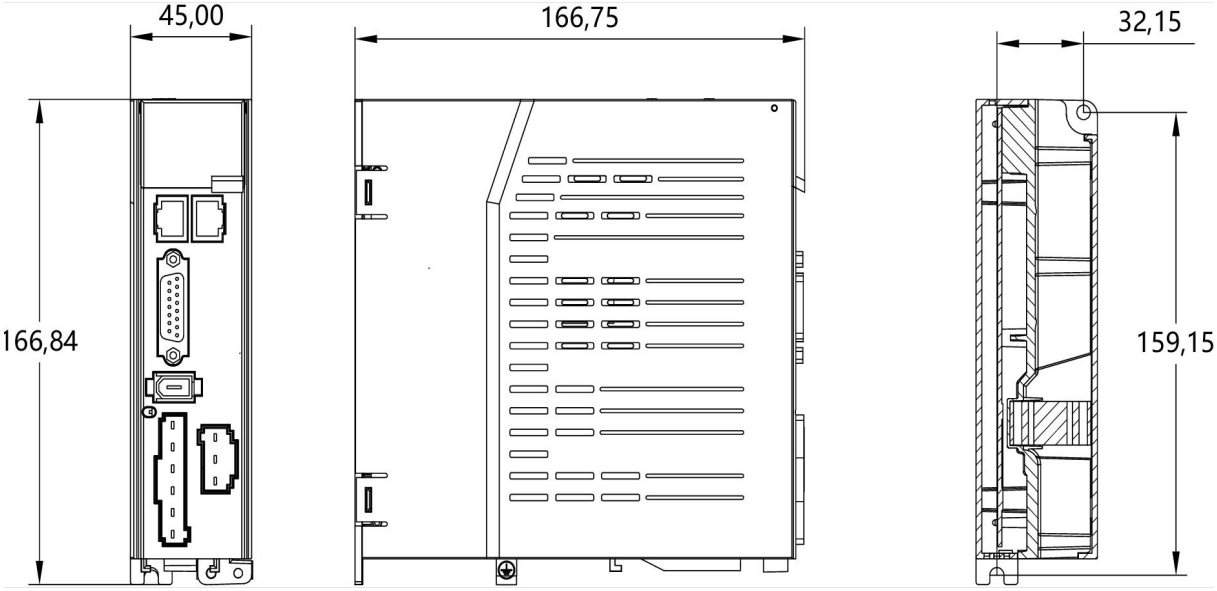


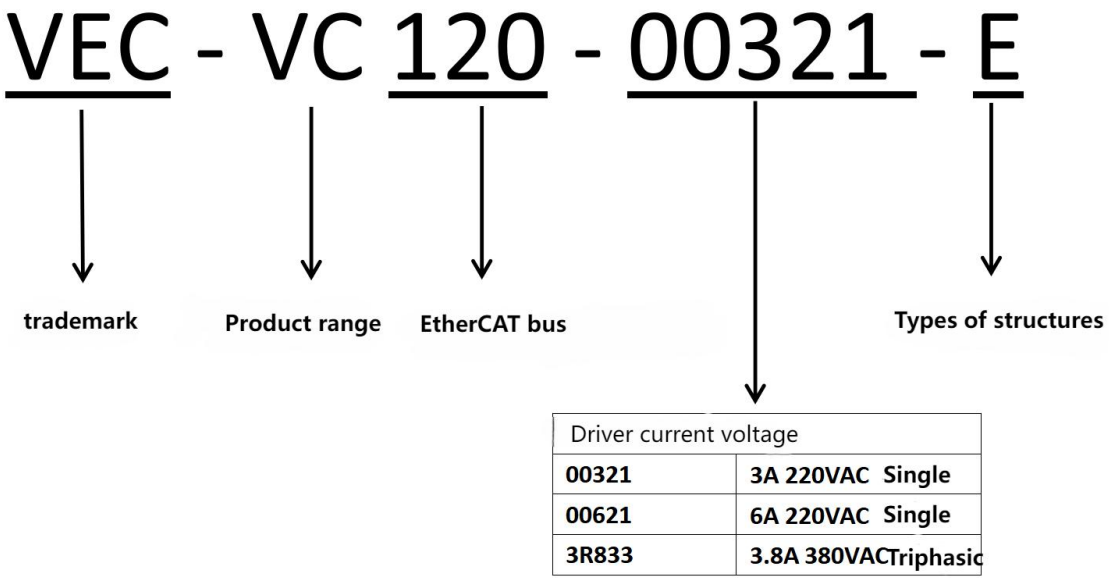
Fig 2-4 VC120 Servo drive dimensions

The mounting hole needs to be fixed with M4 screws

2.2 Nameplate description

2.2.1 VC120 Servo drive nameplate

VC120 Servo drive nameplate description：



2.2.2 Motor nameplate

80ME1-MR7530A23F1-B*

80	Square flange size（mm）		
F	Cooling method	Mark	Cooling method
		F	Air cooling
		Default	Naturally cold
ME1	Product range	Mark	
		ME	
		MB	
		ME1	
		MD	
M	Moment of Inertia	Mark	Inertia
		L	Low inertia
		M	Medium inertia
		H	High inertia
R75	Power rating	Mark	Specification
		R75	750w
30	Rated speed	Mark	Rated speed
		10	1000RPM
		15	1500RPM
		20	2000RPM
		25	2500RPM

		30	3000RPM			
A	Installation method	Mark	Specification			
		A	IMB5			
		D	IMB3			
		E	IMB35			
23	Voltage level	Mark	Specification			
		23	2	220V	3	Three-phase electricity
F	Brake	Mark	Specification			
		F	Without Brake, With Oil Seal			
		B	Built-in Brake, With Oil Seal			
		A	Without Brake, Without Oil Seal			
		C	With Brake, Without Oil Seal			
1	shaft connection method	Mark	Specifications Description			
		1	Smooth Shaft			
		Default	Keywayed Threaded Hole			
B	Encoder type	Mark	Encoder Signal			
		A	23 bit Single-turn Absolute Optical Encoder			
		B	23 bit Multi-turn Absolute Optical Encoder			
		C1A	17-bit Single-Turn Absolute Magnetic Encoder			
		C2A	17-bit Multi-Turn Absolute Magnetic Encoder			
F1	Encoder Line Count	Mark	Specification			
		F1	1024C/T			
		F2	2500C/T			
		F5	5000C/T			
		F6	6000C/T			
*	Internal Plant Signage	Mark				
		M				
		LA				
		Z				
		D				
		U				
		C				
		N				

2.3 VC120 Servo drive technical specifications

Project	Description
Control mode	➢ Single-Phase Full-Bridge Rectification

		SVPWM drive
Voltage		➢ Input Voltage Range (Single-Phase) AC220V ± 10% 50/60Hz ➢ Input Voltage Range (Three-Phase) AC380V±10% 50/60Hz
Encoder	Encoder feedback	➢ Tamagawa 17-bit Single-Turn Absolute Encoder; ➢ Tamagawa 23-bit Single-Turn Absolute Encoder; ➢ Tamagawa 17-bit Multi-Turn Absolute Encoder: ➢ Tamagawa 23-bit Multi-Turn Absolute Encoder:
Digital Input	Voltage range	15V to 30V
	Maximum frequency	3KHz
Digital Output	Maximum voltage	30V
	Maximum current	50mA
	Maximum frequency	1.5KHz
Analog input	Voltage range	-10V to 10V
	Input impedance	10k Ω
	Maximum frequency	1.5kHz
Analog output	Voltage range	-10V to 10V
DI/DO Interface type		NPN/PNP
Communication method		EtherCAT
Braking method		➢ Dynamic Braking,External Braking Resistor
Fault response		➢ Deceleration Stop, Free Stop
Protection function		➢ Overcurrent, Overvoltage, Undervoltage, Overload, Locked Rotor, etc
position mode	Command input method	internal position planning ➢ Plan according to target position, speed, acceleration and deceleration time ➢ Trapezoidal speed curve ➢ cubic velocity curve ➢ Absolute/relative command mode
	command smooth way	low pass filter/median filter
	Electronic gear ratio	N/M;(M=1~2147483647,N=1~2147483647)
	Torque limit	Internal torque limit Analog torque limit
	Feed forward compensation	Speed feedforward/torque feedforward
	Torque	Fixed torque compensation/analog torque

	compensation	compensation/automatic torque compensation;
speed control mode	way of command input	Pulse frequency/analog input/internal speed planning
	speed control range	1~Maximum speed
	bandwidth	1kHz
	Torque limit	Internal torque limit/analog torque limit
	Command smoothing method	Low-pass filter/median filter
	Feedforward compensation	Torque feedforward
	Torque compensation	Fixed torque compensation/analog torque compensation/automatic torque compensation;
Torque control	Instruction input method	Internal torque given/analog control torque
	Torque compensation	Fixed torque compensation/analog torque compensation/automatic torque compensation;
	speed limit	Internal Speed Limit/Analog Speed Limit
digital input	Up to 4 digital inputs, the function of each digital input can be assigned arbitrarily, the assignable functions include: Enable drive, reset drive, torque command A/B switch, torque command reverse enable, positive torque limit A/B switch, negative torque limit A/B switch, positive speed limit A/B Switch, negative speed limit A/B switch, forward jog, reverse jog, speed command reverse enable,Main speed source A/B switch, speed stop enable, clear position count, zero position fixed in speed mode, multi-speed speed selection 0, multi-speed speed selection 1, multi-speed speed selection 2, multi-speed speed selection 3, position command Prohibit, position command reverse,Electronic gear ratio switch 1, position error reset, zero return, trigger multi-stage position, multi-stage position selection 0, multi-stage position selection 1, multi-stage position selection 2, multi-stage position selection 3, multi-stage position direction selection, return to zero origin switch input, Internal position planning, control mode switching switch 0, control mode switching switch 1,first set of second set of gain switch, reset fault, forward limit switch in position mode, reverse limit switch in position mode, electronic gear ratio switch 2, motor overheat input, emergency stop input, speed mode UPDOWN mode UP signal, Speed mode UPDOWN mode DOWN signal, AI zero drift automatic correction.	

digital output	Up to 3 digital outputs, the function of each digital output can be assigned arbitrarily, the assignable functions include: Drive enabling, speed reaching, decelerating, accelerating, zero-speed, speed overrun, forward running, reverse running, fault output, forward speed limit in torque mode Negative speed limit in torque mode, speed limit in torque mode, positioning completion output, positioning approaching output, origin return completion output, position error too large output software limit signal output, brake signal output, input command valid, always OFF, always ON, torque limit signal output, torque arrival signal, same speed	
fault protection	Software overcurrent, hardware overcurrent, overvoltage, undervoltage, current sensor failure, encoder failure, EEPROM verification failure, phase sampling failure, large current change failure, magnetic encoder failure, current phase sequence learning failure, Z point not scanned during self-learning, and Z point offset not found, over temperature of the drive, no feedback of hall value from the wire-saving encoder when power-on, when the origin is returned to zero, the origin switch INFn.34 is not set,Repeated assignment of INFn.xx, overspeed, position error is too large, no return to zero before absolute point motion, motor overload, software limit, hardware limit, curve planning failure, Forward (reverse) rotation is prohibited, Z point signal is unstable, RPDO reception timeout, motor stall, braking resistor overload, forward travel switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn .44 not assigned to entity DI, lap overflow in absolute value mode, absolute encoder battery failure, inertia learning failure, bus error, motor overheating, DI function code no assignment,AI zero drift is too large, zero return timeout, absolute encoder battery failure, wrong motor rotation direction during absolute encoder self-learning, and absolute encoder battery voltage is too low.	
Installation Environment Requirements	air pressure	86~106kPa
	ambient temperature	0~40 ℃ ,Derating is used when the temperature exceeds 40 ℃ , and derating by 2 % for every 1℃ increase. Up to 50℃.
	environment humidity	0~90%RH（No dew condensation
	IP level	IP20
	vibration	0~4.9m/s^2

2.4 VC120 Drive selection

The parameters of the servo factory default maximum current can be viewed through P05.10~P05.20 parameters. If P05.13 defaults to 300%, it means that the factory default maximum output current of the driver is 3 times the rated current of the driver, but it does not represent the maximum current that the servo can output. If you need to further open the current of the driver, please contact our technical personnel for inquiry.

2.4.1 VC120 Servo drive selection

VC120 Servo drive model	Output rated current（A）	Output maximum current（A）
00321-E	3	9
00621-E	6	18
3R833-E	3.8	11.4

2.5 Meet the standards

This product meets the following CE certification standards:

1. EN 61800-5-1:2007+A1:2017 (Part 5-1 Safety Requirements for Electricity, Heat and Energy of Speed Regulating Electric Drive System), the corresponding national standard is GB12668.501-2013;

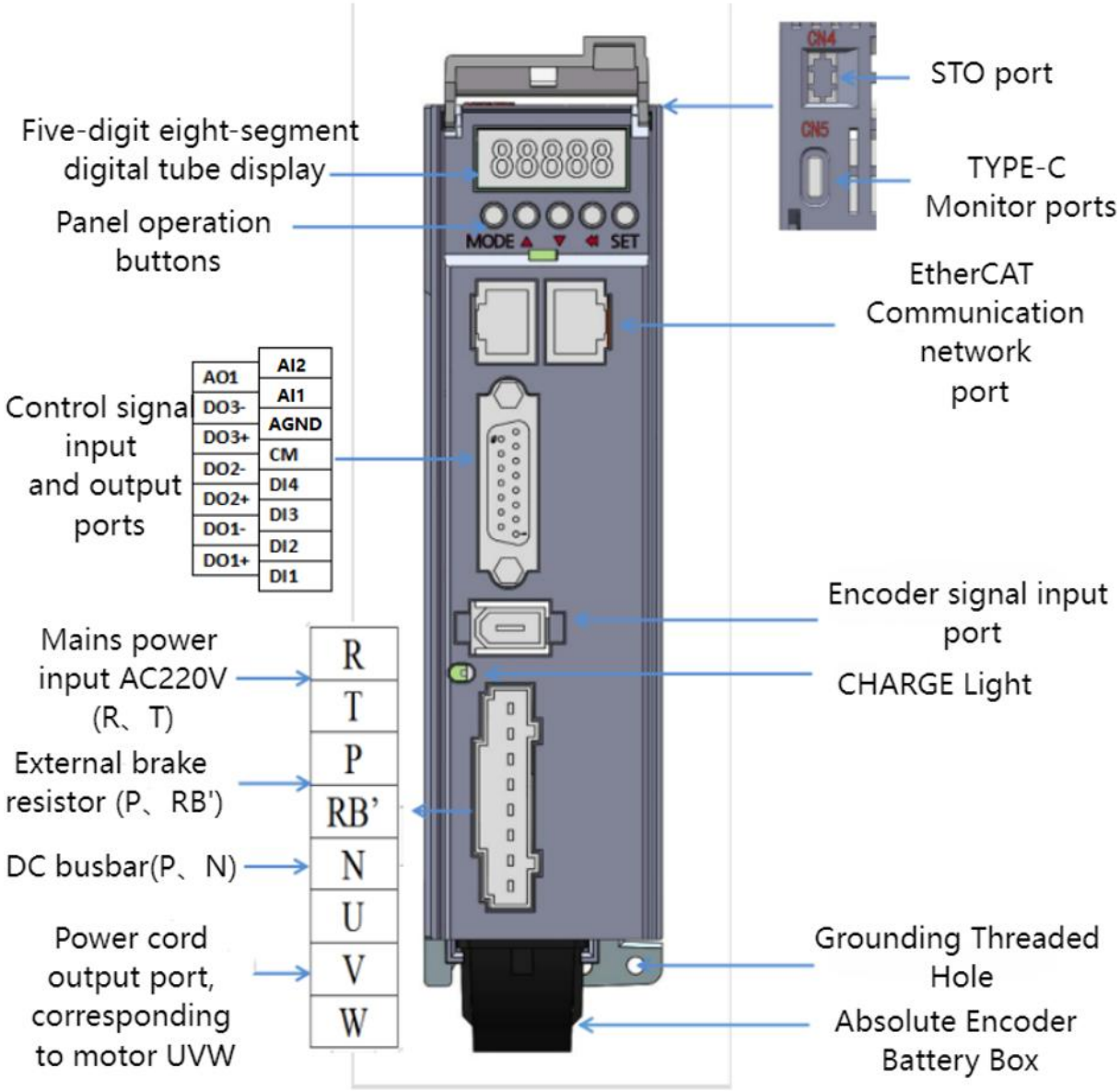
2. EN IEC 61800-3:2018 (Part 3 Electromagnetic Compatibility Standard and Its Specific Test Methods for Speed-governing Electric Drive Systems), the corresponding national standard is GB12668.3-2012.

Chapter3 VC120 Servo drive wiring

This chapter describes the wiring method of VC120 servo drive and the definition of various signals.

3.1 Terminal introduction

3.1.1 VC120 Servo drive (single-phase 220V) terminal distribution



3.1.2 VC120 Servo drive (single-phase 220V) terminal function description

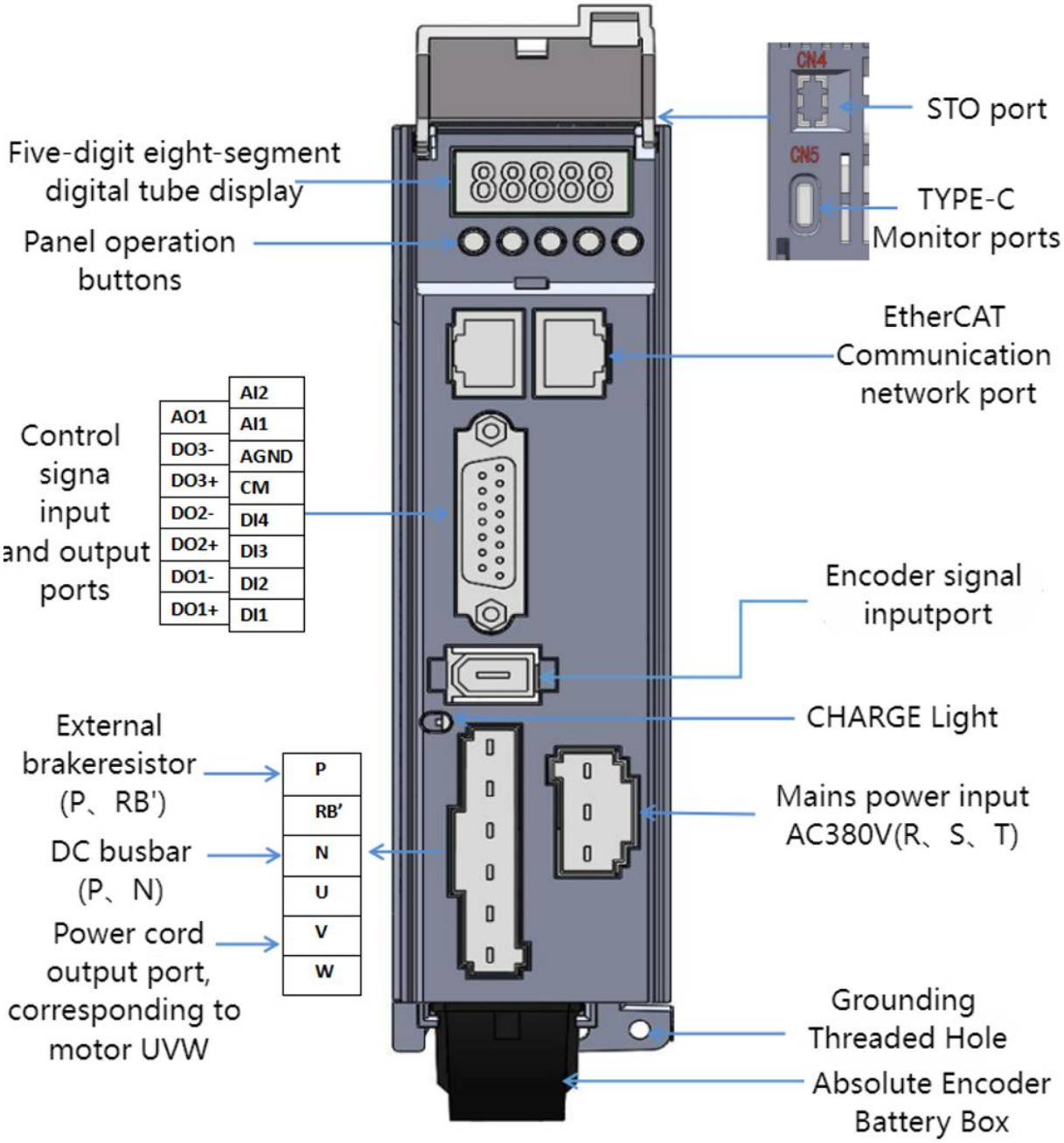
Table3-1 Terminal name and function

Terminal symbol	Name	Function
R、T	The main circuit power input	Single-phase 220V driver: power supply to R, T；
P、N	DC bus terminals	External power-saving module or shared DC bus
RB’	Brake terminals	External brake resistor
U、V、W	Motor terminals	Connect the servo motor and connect with the motor U, V, and W one by one
CN1(IN)	EtherCAT communication input terminals	EtherCAT bus input
CN1(OUT)	EtherCAT communication output terminals	EtherCAT bus output
CN2	Motor encoder interface	Connect the motor encoder signal
CN3	Digital signal control terminals/analog input/output terminals	Digital/analog input/output terminals
CN4	STO connection terminals	Safety torque shutdown
CN5	TYPE-C monitoring interface	Connect with the computer, external monitoring and debugging
⏚	Grounding terminals	Connects to the earth and directly connects to the ground wire of the motor

【Note】You need to wait for the CHARGE light to go out before wiring.

3.1.3 VC120 Servo drive (three-phase 380V) terminal distribution

+-



3.1.4 VC120 Servo Driver (3 Phase 380V) Terminal Function Description

Table3-1 Terminal name and function

terminal symbol	Name	Function
R、S、T	Main Circuit Power Input Terminal	Three-phase 380V Drive: Power Supply Connected to R, S, T

P、N	DC busbar	External power-saving module or shared DC bus
P、RB’	Brake terminal	External braking resistor
U、V、W	Motor terminals	Connect the servo motor and connect with the motor U, V, and W one by one
CN1(IN)	EtherCAT communication input terminals	EtherCAT bus input
CN1(OUT)	EtherCAT communication output terminals	EtherCAT bus output
CN2	Motor encoder interface	Connect the motor encoder signal
CN3	Digital signal control terminals/analog input/output terminals	Digital/analog input/output terminals
CN4	STO connection terminals	Safety torque shutdown
CN5	TYPE-C monitoring interface	Connect with the computer, external monitoring and debugging
⏚	Grounding terminals	Connects to the earth and directly connects to the ground wire of the motor

【Note】Wait until the CHARGE light turns off before proceeding with the wiring operation.

3.2 Overall wiring

3.2.1 VC120 Servo Drive (Single Phase 220V) Wiring Overview

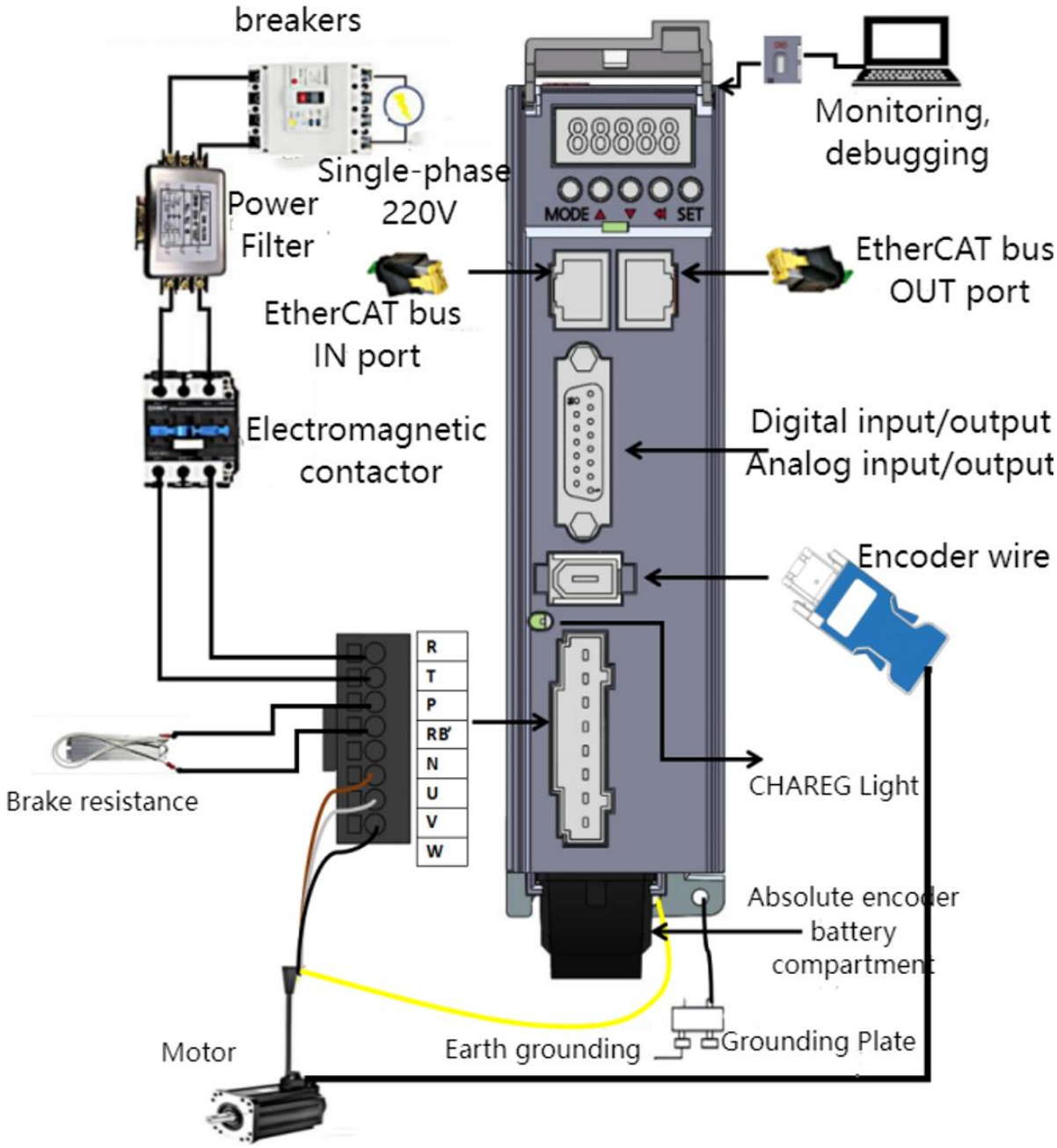


Fig 3-1 VC120 Verview of servo drive wiring

3.2.2 VC120 Servo drive (3-phase 380V) wiring overview

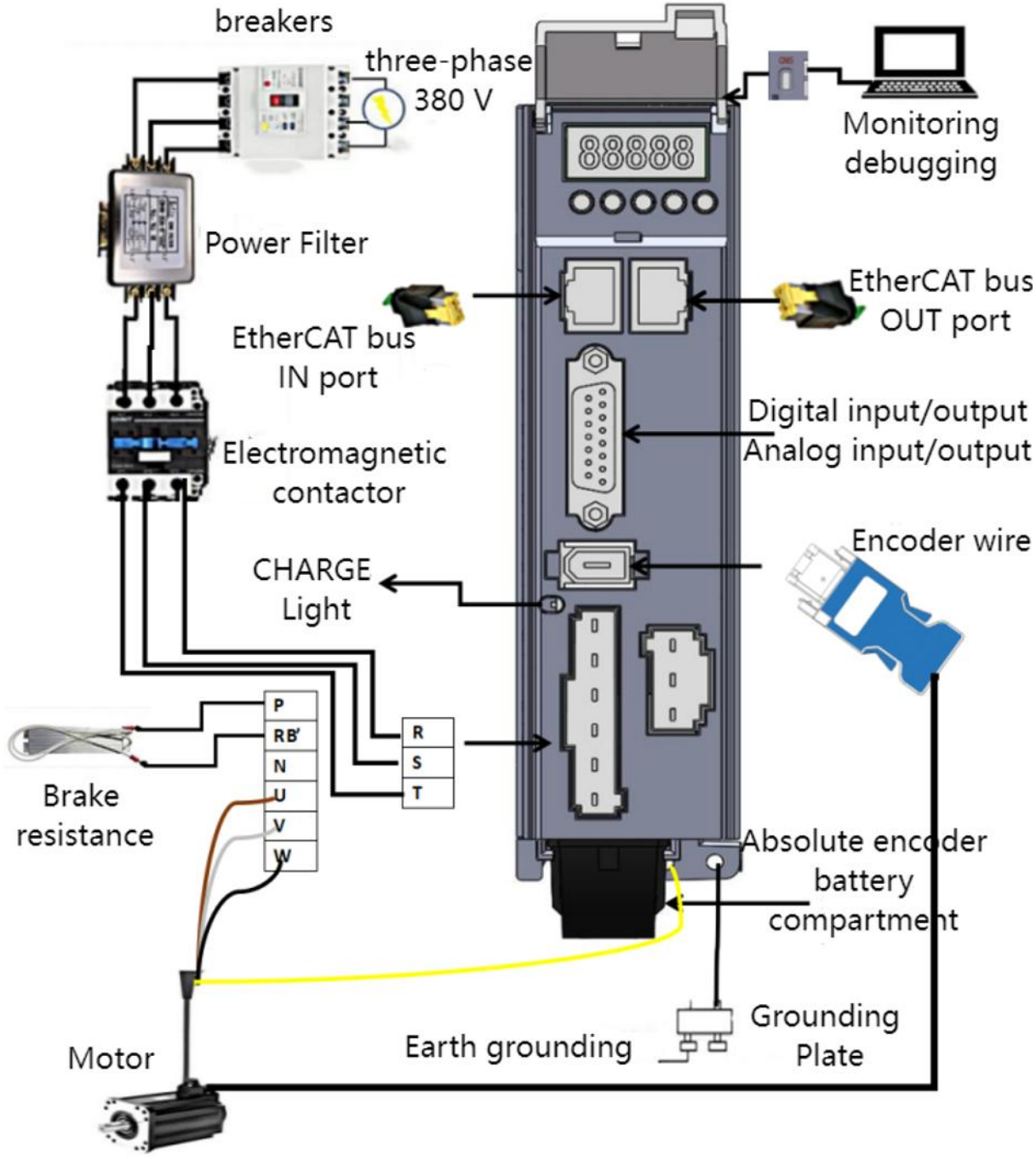


Fig 3-2 VC120 Verview of servo drive wiring

Table 3-2 Functional Description of System Peripheral Components

Component Name	Mounting location	Function description:
Breakers	Between the power	Short circuit breaker: Cuts off the power

	supply and the servo drive input side	supply when downstream equipment overcurrents to prevent accidents.
Electromagnetic contactor	Between the circuit breaker and the servo drive input side	When the drive is powered on and off, it should avoid frequent power-up and closing operations (with an interval of not less than one hour) or direct start-up operations on the drive through the contactor.
Power Filter	Servo drive input side	Reduce the external conduction and radiation interference of the driver; Reduce the conducted interference flowing from the power supply to the drive, and improve the anti-interference ability of the driver.
Brake resistance	0.4KW（3A）、0.75KW（6A）1.5kW (3.8A) drive	0.4KW (3A), 0.75KW (6A), 1.5kW (3.8A) servo drive should be equipped with brake resistor as an option. The motor consumes regenerative energy through the brake resistance when decelerating.
Motor	Drive output side	Please choose the adaptation motor according to the recommendation.

3.2.2 Wiring precautions

(1)Do not connect the input power cable to the P, RB', N, U, V, W terminals of the drive, otherwise the servo drive will be damaged.

(2)The U, V, W terminals of the driver and the U, V, W terminals of the motor should be connected one by one according to their names, and the motor will not run normally if they are connected incorrectly.

(3)The braking resistor cannot be connected to the terminals P and N of the DC bus, otherwise it may cause a fire!

(4)The ground terminal of the driver must be connected to the ground to avoid leakage and reduce the interference to the system, and the diameter of the ground wire should be the same or larger than that of the power supply wire.

(5)When wiring, do not pass the power cable and the signal cable through the same pipe, and do not bundle them together. The distance between them should be more than 30cm to avoid interference.

(6)For signal cables, please use twisted pair shielded cables.

(7)The specifications and installation methods of external power wiring must comply with local regulations and relevant IEC standard requirements.

(8)The command input wires have a maximum wiring length of 3 meters.

(9)Even when the power is turned off, residual high voltage may still be present inside

the servo drive. Therefore, after powering off, wait until the CHARGE indicator light has completely extinguished before accessing the power terminals.

(10)The wiring distance of brake resistance selection should be less than 5m. Failure to do so may result in damage to the servo drive.

(11)Note that there should be no combustible materials around the brake resistance. Avoid overheating of the brake resistor and ignite the surrounding components.

(12)The ground terminal and the power neutral N terminal should not be shared.

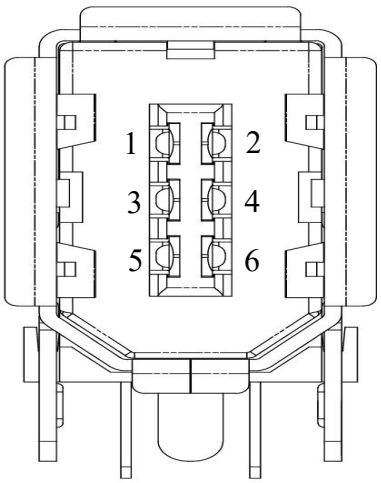
(13)Do not power up when the terminal block screws are loose or cables are loose, as this may cause a fire hazard.

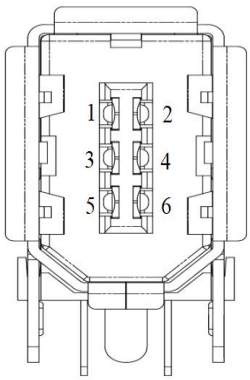
(14)Do not frequently turn the power ON/OFF. If repeated continuous ON/OFF operations are required, limit the frequency to no more than once per minute. Since the power section of the servo drive contains capacitors, a large charging current flows during power-ON (with a charging time of 0.2 seconds). Frequent power cycling can degrade the performance of internal main circuit components and shorten the service life of the servo drive.

(15)Do not install capacitors or surge suppressors on the output side of the drive; otherwise, it may cause malfunction of the drive or damage to the capacitors and surge suppressors.

3.3 Encoder signal wiring

3.3.1 Pin assignment at the encoder connection (CN2).

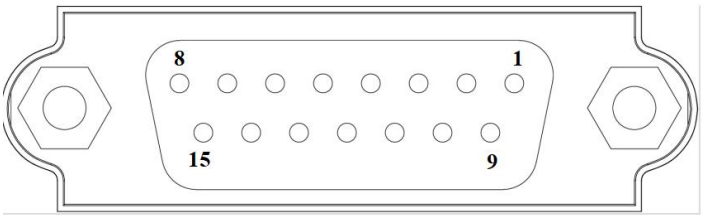


Location and function		Encoder (Female)			
CN2		Pin No.	Signal name	Pin No.	Signal name
		1	5V	2	GND
		3	retain	4	retain
		5	SG+(Absolute Encoder Positive Signal)	6	SG-(Absolute encoder negative signal)
		Enclosure	PE		

3.4 Input/output signal wiring

To facilitate communication with upper-level controllers, the Vectordrive servo drive provides 4 sets of freely configurable digital input terminals and 3 sets of digital output terminals.

3.4.1 Pinout of digital/analog input and output (CN3).



15-pin male connector (header)

3.4.2 Pin definitions of the digital/analog input/output port (CN3)

The definitions of the input/output ports for the servo control signals of the VC120 servo drive are as follows.

Pin No.	Define	Functional Description	Pin No.	Define	Functional Description
1	DI1	Programmable digital	9	DO1+	Programmable digital

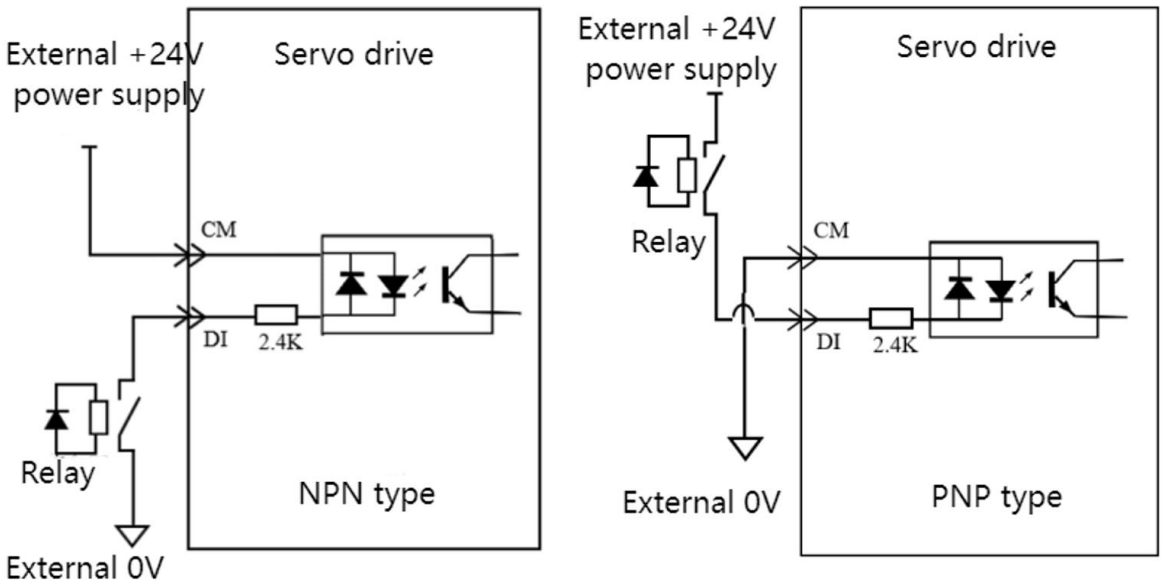
2	DI2	quantity input	10	DO1-	output
3	DI3		11	DO2+	
4	DI4		12	DO2-	
5	CM	The NPN/PNP patch cord public end of the DI	13	DO3+	
6	AGND	Simulated land	14	DO3-	
7	AI1	Analog input channel 1	15	AO1	Analog output channel 1
8	AI2	Analog input channel 2			

3.4.3 Digital input and output type selection:

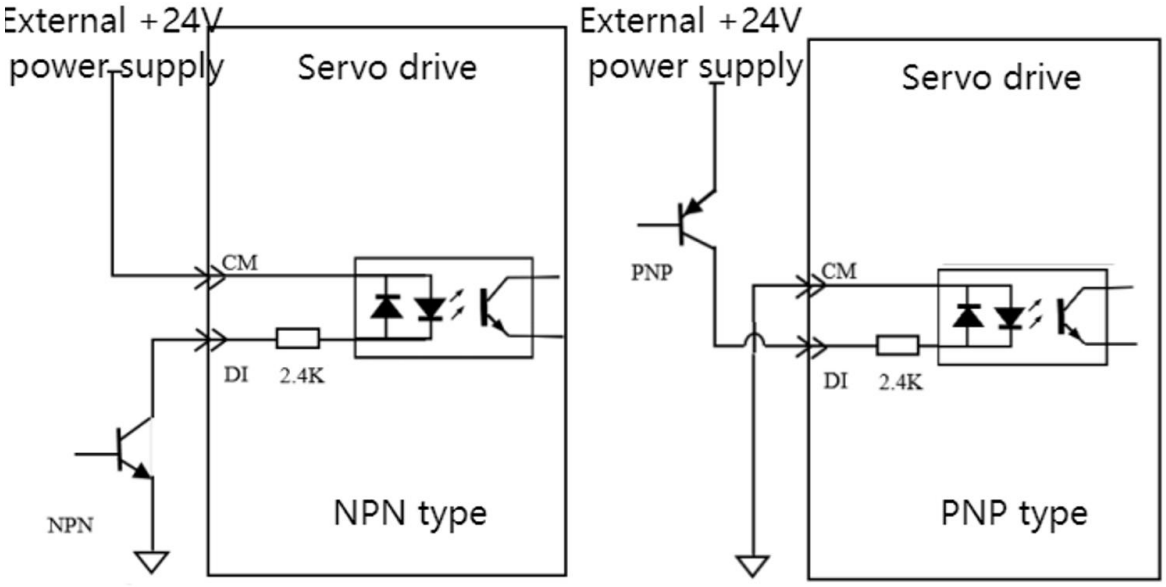
（1）Digital input DI port wiring

The input voltage requirement of DI is 15-30V; the input frequency of DI is up to 3KHZ.

① When the upper unit is a relay output:



② When the upper device is an open-collector output:

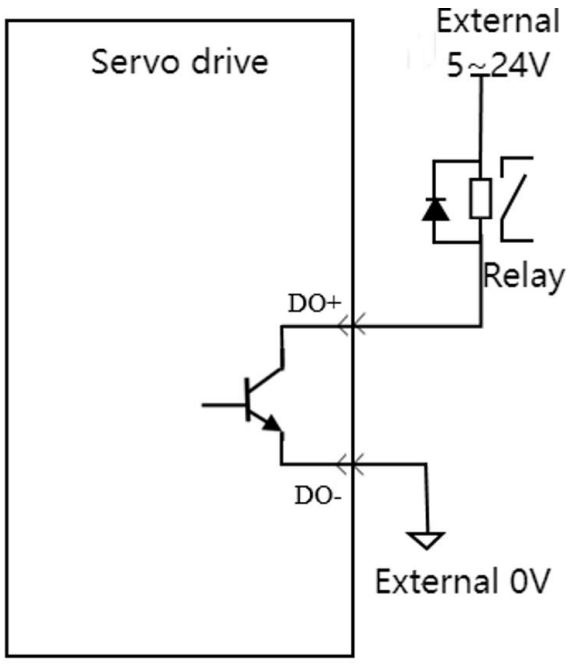


【Note】The 4 DIs do not support the mixing of NPN and PNP inputs

（2）Digital output DO port wiring

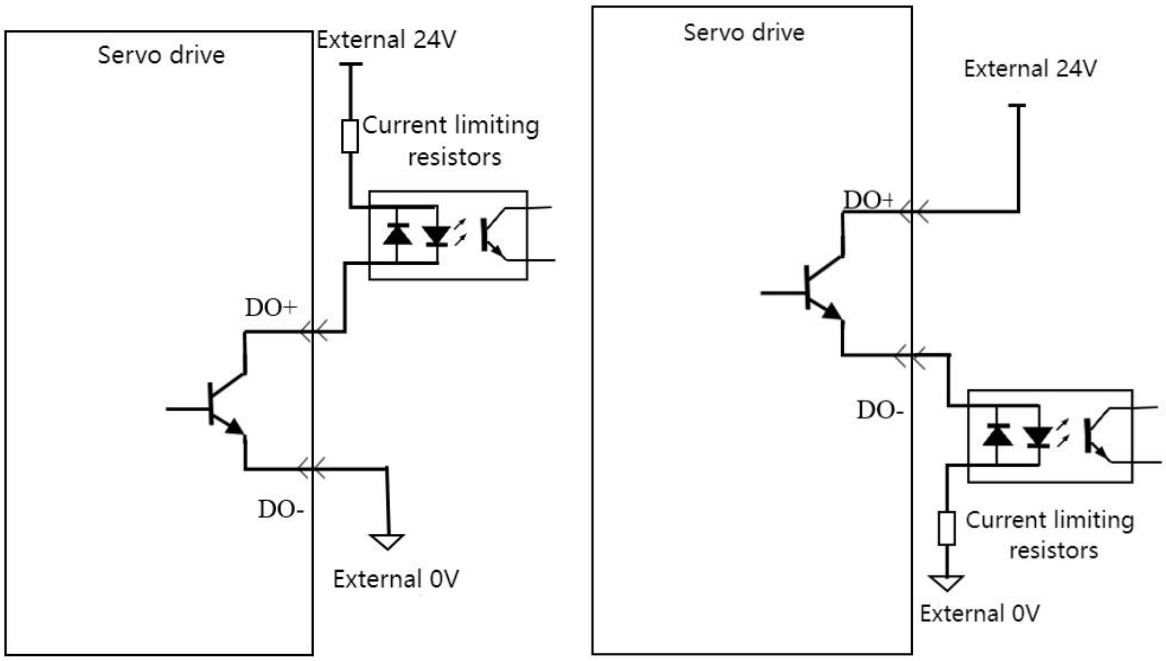
The maximum voltage allowed for DO port is DC30V; DO port allows a maximum output current of 50mA; The output frequency of the DO port is up to 1.5KHZ.

① When the upper unit is a relay input：



【Note】When the upper device is a relay input, be sure to connect the freewheeling diode, otherwise it may damage the DO port。

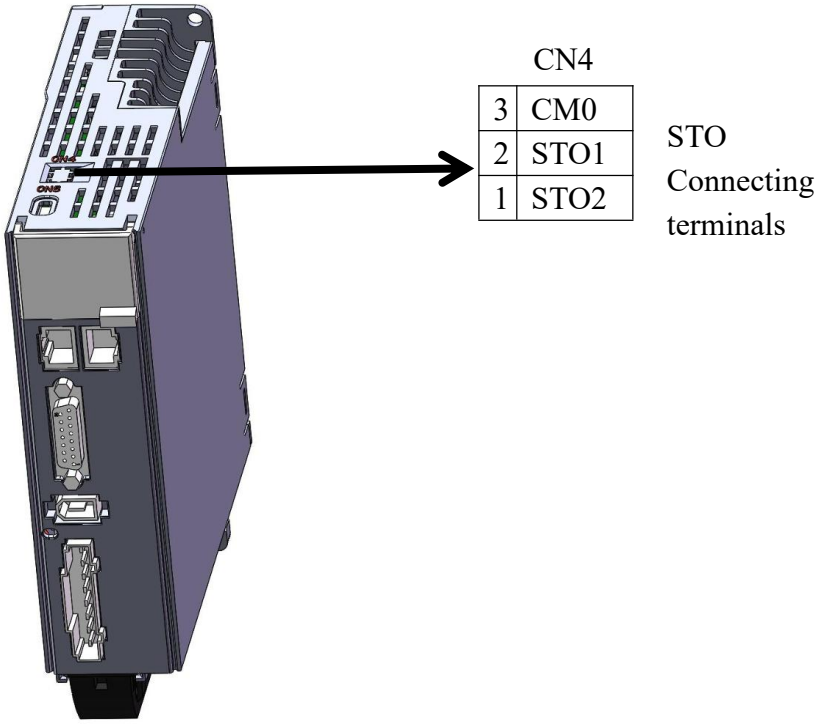
②When the upper device is an optocoupler input：



【Note】When the upper device is an optocoupler input, be sure to connect the current limiting resistor, otherwise it may damage the DO port.

3.5 STO Port (CN4) (Optional)

The STO (Safe Torque Off) function serves as a safety mechanism for torque shutdown. When the safety circuit detects a fault, the STO function immediately cuts off the output current of the drive, causing the motor to stop operating.



3.5.1 STO Connection Terminal (CN4) Pin Assignment and Definition

Table 3.5-1 CN4 Terminal function description

Pin No.	1	2	3
Pin definition	STO2	STO1	CM0
Function description	STO Channel 2 power supply+	STO Channel 1 power supply+	STO Channel power supply-

3.5.2 STO Connecting terminals (CN4) wiring

（1）STO function requires the use of an external 24V switching power supply, +24V to the selected STO channel (1/2 pins), and 0V to CM0 port (3 pins). As shown in the following figure:

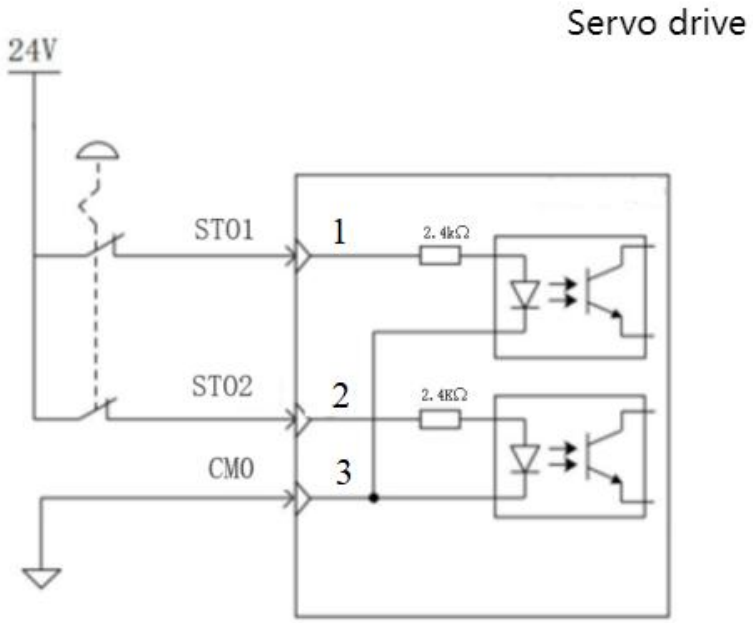
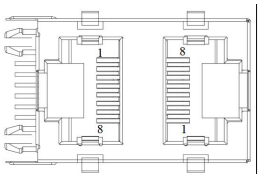


Fig 3-5.1 Schematic diagram of STO terminal (CN5) wiring

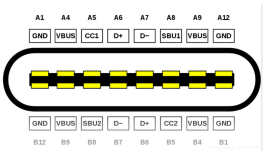
【Note】External power supply index: 24V DC 10%; 70mA。

3.6 EtherCAT communication terminals（CN1）

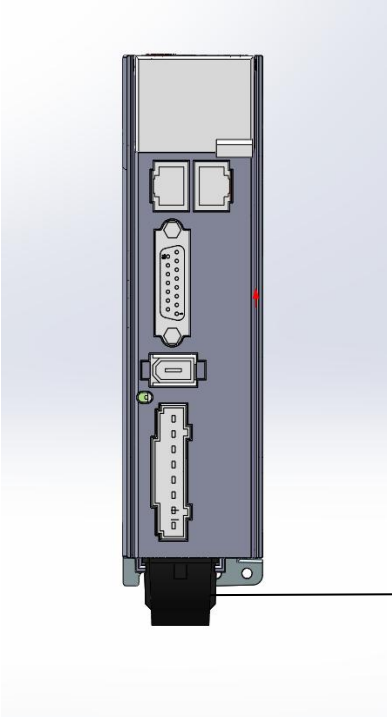
Table 3-6.1 CN1 communication terminal function description

<table>
<tr><th>Location and function</th><th>Terminal shape</th><th>Description</th></tr>
<tr><td>CN1</td><td></td><td>Both interfaces are defined the same.
<table>
<tr><th>Foot position</th><th>Definition</th><th>Description</th></tr>
<tr><td>1</td><td>TX+</td><td>Send signal+</td></tr>
<tr><td>2</td><td>TX-</td><td>Send signal-</td></tr>
<tr><td>3</td><td>RX+</td><td>Receive signal+</td></tr>
<tr><td>4</td><td>NC</td><td>Dangling</td></tr>
<tr><td>5</td><td>NC</td><td>Dangling</td></tr>
<tr><td>6</td><td>RX-</td><td>Receive signal-</td></tr>
<tr><td>7</td><td>NC</td><td>Dangling</td></tr>
<tr><td>8</td><td>NC</td><td>Dangling</td></tr>
</table></td></tr>
</table>

3.7 TYPE-C USB Communication ports（CN5）

<table>
<tr><th>Location and function</th><th>Terminal shape</th><th>Description</th></tr>
<tr><td>CN5</td><td>
</td><td>TYPE-C Pin definition
<table>
<tr><th>Foot position</th><th>Definition</th><th>Description</th></tr>
<tr><td>A1</td><td>GND</td><td>Grounding</td></tr>
<tr><td>A4</td><td>NC</td><td>Dangling</td></tr>
<tr><td>A5</td><td>NC</td><td>Dangling</td></tr>
<tr><td>A6</td><td>D+</td><td>USB signal+</td></tr>
<tr><td>A7</td><td>D-</td><td>USB signal-</td></tr>
<tr><td>A8</td><td>NC</td><td>Dangling</td></tr>
<tr><td>A9</td><td>NC</td><td>Dangling</td></tr>
<tr><td>A12</td><td>GND</td><td>Grounding</td></tr>
<tr><td>B1</td><td>GND</td><td>Grounding</td></tr>
<tr><td>B4</td><td>NC</td><td>Dangling</td></tr>
<tr><td>B5</td><td>NC</td><td>Dangling</td></tr>
<tr><td>B6</td><td>D+</td><td>USB signal+</td></tr>
<tr><td>B7</td><td>D-</td><td>USB signal-</td></tr>
<tr><td>B8</td><td>NC</td><td>Dangling</td></tr>
<tr><td>B9</td><td>NC</td><td>Dangling</td></tr>
<tr><td>B12</td><td>GND</td><td>Grounding</td></tr>
</table></td></tr>
</table>

3.8 Absolute encoder battery mounting



3.8.1 Notes:

(1)If batteries that have been used for a long time or are no longer functional are left inside the machine, issues such as electrolyte leakage may occur. This can not only corrode surrounding components but also pose risks of short circuits due to their conductivity. Therefore, please replace the battery regularly (recommended replacement interval: once every two years).

(2)Do not disassemble the battery, as electrolyte scattering may endanger personal safety.

(3)Do not throw the battery into fire. If the battery is thrown into fire or heated, it may explode.

(4)Avoid short-circuiting the battery and never peel off the battery casing. If the positive (+) and negative (-) terminals of the battery come into contact with conductive materials such as metals, a high current will be generated. This not only weakens the battery power but may also cause excessive heat generation and explosion hazards.

(5)Do not charge this battery.

(6)For disposal of the replaced battery, please follow local regulations.

3.8.2 Battery selection

Battery selection:Please refer to the information in the table below to select the appropriate battery：

Table 3-8.1 Absolute value encoder battery information description

Battery selection specifications	Projects and units	Rating			Article
		Minimum	Typical values	Maximum	
Output specifications: 3.6V 2700mAh	External battery voltage (V)	3.2	3.6	5	When working on standby
	Circuit fault voltage (V)	-	2.6	-	When working on standby
	The circuit draws current (uA)	2.85	3	3.15	-
	The circuit draws current (uA)	-	2	4	Normal operation
		-	10	20	When working in standby, shaft
		-	80	160	When working in standby, shaft
	Ambient temperature for battery use (℃)	0	-	40	It is consistent with the ambient temperature requirements of the motor
	Battery storage ambient temperature (℃)	-20	-	60	

The above is the measurement value at ambient temperature 20℃.

【 Note 】 During normal operation, the absolute encoder can perform single-turn and multi-turn data counting, as well as data transmission/reception. After properly wiring the absolute encoder and powering on the servo drive, a short delay (approximately 5 seconds) is required before the system enters normal operating mode for data transmission/reception. When transitioning from standby mode to normal operation (during power-on), the motor rotation speed must not exceed 10rpm; otherwise, the drive may report an error, requiring a re-power cycle.
Standby mode refers to a state where the servo drive is not powered on but utilizes an external battery supply to maintain multi-turn counting operations. In this mode, data transmission/reception is suspended.

3.8.3 Battery theoretical life

The following calculations only take into account the current consumption of the encoder and do not take into account the consumption of the battery itself. Assumptions: Drive normal operating time T1 during the day, motor spin time T2 after drive power down, motor shutdown time T3 after power loss (in hours H). For example:

Table 3-8.2 Absolute encoder battery theoretical life

Project	Work and rest schedule 1	Work and rest schedule 2
The number of days in a year under different working conditions（day）	320	45
T1（hour H）	8	0
T2（hour H）	0.1	0
T3（hour H）	15.9	24

Consumption capacity for one year= (8H *2uA + 0.1H*80uA + 15.9H*10uA)*320 + (0H *2uA + 0H*80uA +24H*10uA)*45 ≈ 69mAH

Theoretical battery life = battery capacity / 1 year of consumption capacity = 2700mAH/69mAH = 39.13years

3.9 Wiring suggestions and anti-interference countermeasures

3.9.1 Wiring Recommendations

For the safety and stability of the product, please pay attention to the following matters when wiring:

1. For the cables related to the command input and encoder wiring, please select the shortest distance wiring.

2. The ground wire should be as thick as possible (above 2mm^2).

●All parts of the system (servo driver, servo motor, noise filter, host controller, switching power supply, HMI, etc.) must be grounded, and must be grounded at one point.

●The recommended grounding resistance is 100Ω or less.

●Use shielded cables for motor cables.

3.Do not bend or strain the cable.

●The core wire diameter of the signal cable is only 0.2mm or 0.3mm, please use it carefully.

4.To prevent radio frequency interference, please use a noise filter.

●Install a noise filter on the input side of the power cord when using it near a home or worrying about radio frequency interference.

5.In order to prevent malfunction caused by noise, the following processing methods can be adopted:

●Install the host device and noise filter as close to the servo driver as possible.

●Install surge suppressors on the coils of relays and AC contactors.

●When wiring, please separate the strong current line and the weak current line, and keep an interval of more than 30cm, do not put them in the same pipe or bundle them together.

●Do not share the power supply with electric welding machines, electrical discharge

machining equipment, etc. Even if the power supply is not shared, install a noise filter on the input side of the wire when there is a high-frequency generator nearby.

6.Protect the power cord with a wiring circuit breaker or fuse.

●Be sure to use a circuit breaker or fuse for wiring in order to prevent cross-electric shock in the servo system.

3.9.2 Anti-interference countermeasures

1. Servo motor housing ground

Be sure to connect the ground terminal "" of the servo motor directly with the ground terminal "" of the servo drive. In addition, connect the ground terminal "" of the driver to the ground. Otherwise, when the servo motor is mechanically grounded, the switching disturbance current will flow from the main circuit of the drive through the parasitic capacitance of the servo motor.

2. When there is interference on the command input cable

When there is interference on the command input line, please connect the 0V line of the input line to the ground, the main circuit wiring of the motor passes through the metal conduit, and connect the conduit and the junction box to the ground.

● Please perform the above grounding treatment and ground all of them at one point.

3. Anti-interference wiring example

(1)Digital E total servo 220V

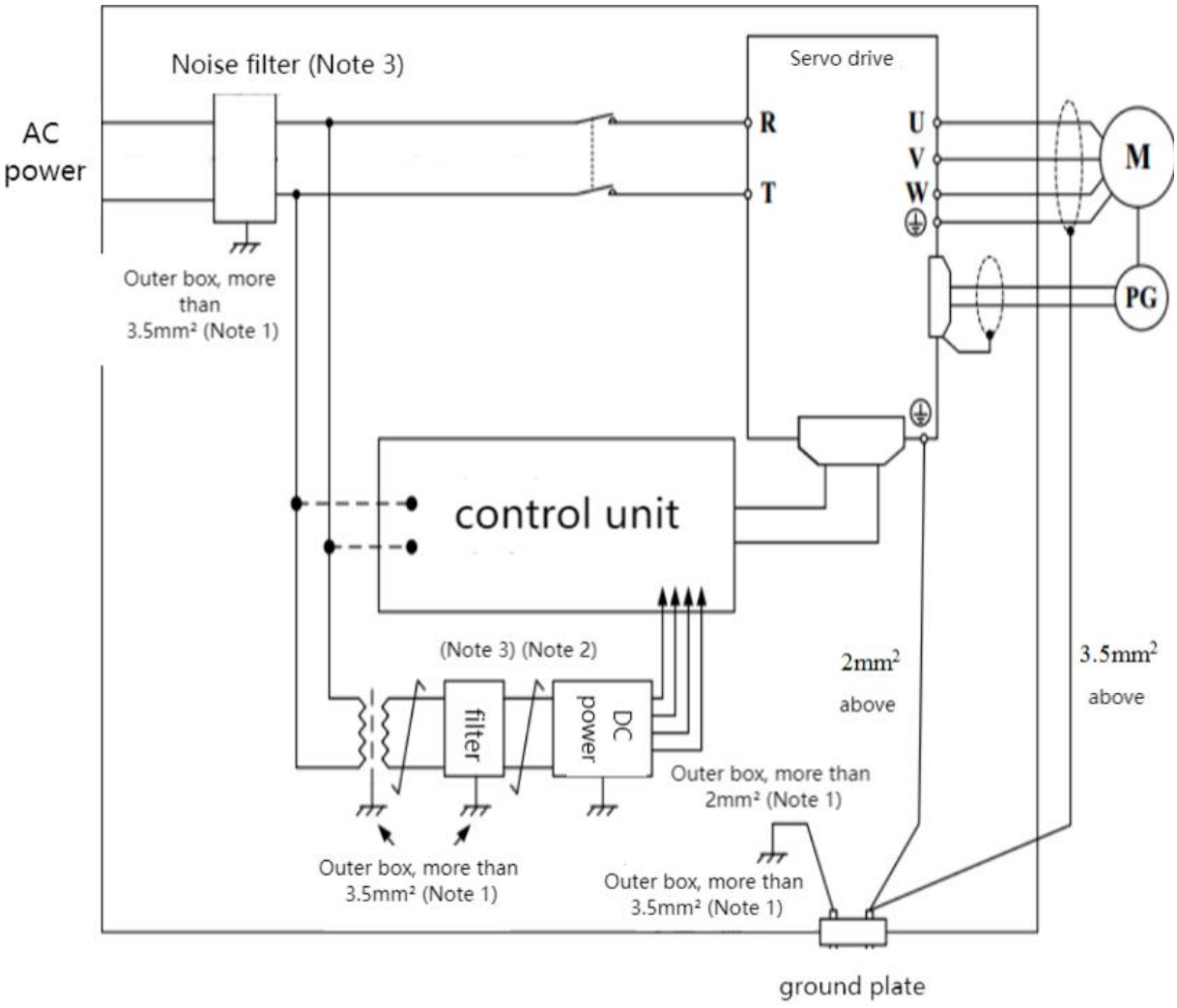


Fig3-9.1 Schematic diagram of anti-interference wiring

(2) Digital E total servo380V

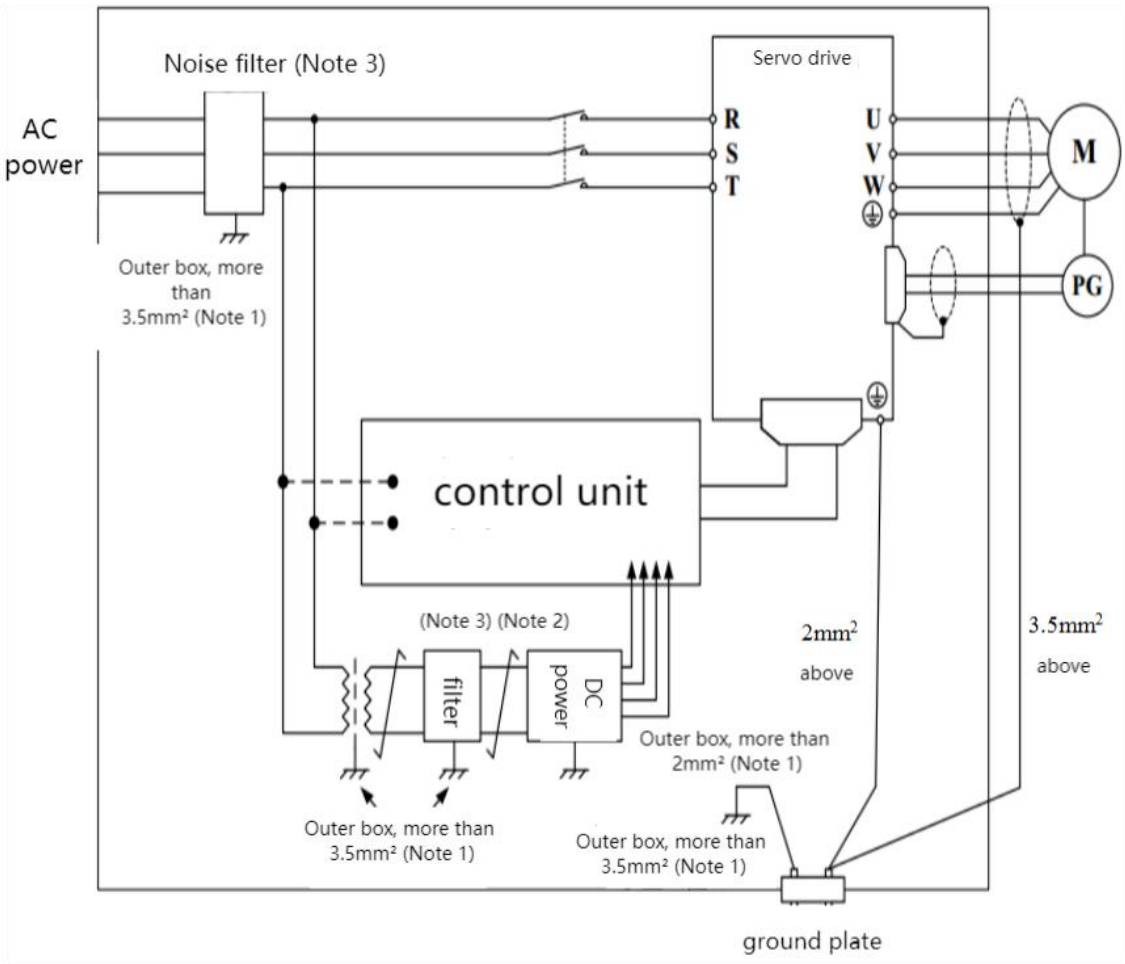


Fig3-9.2 Schematic diagram of anti-interference wiring

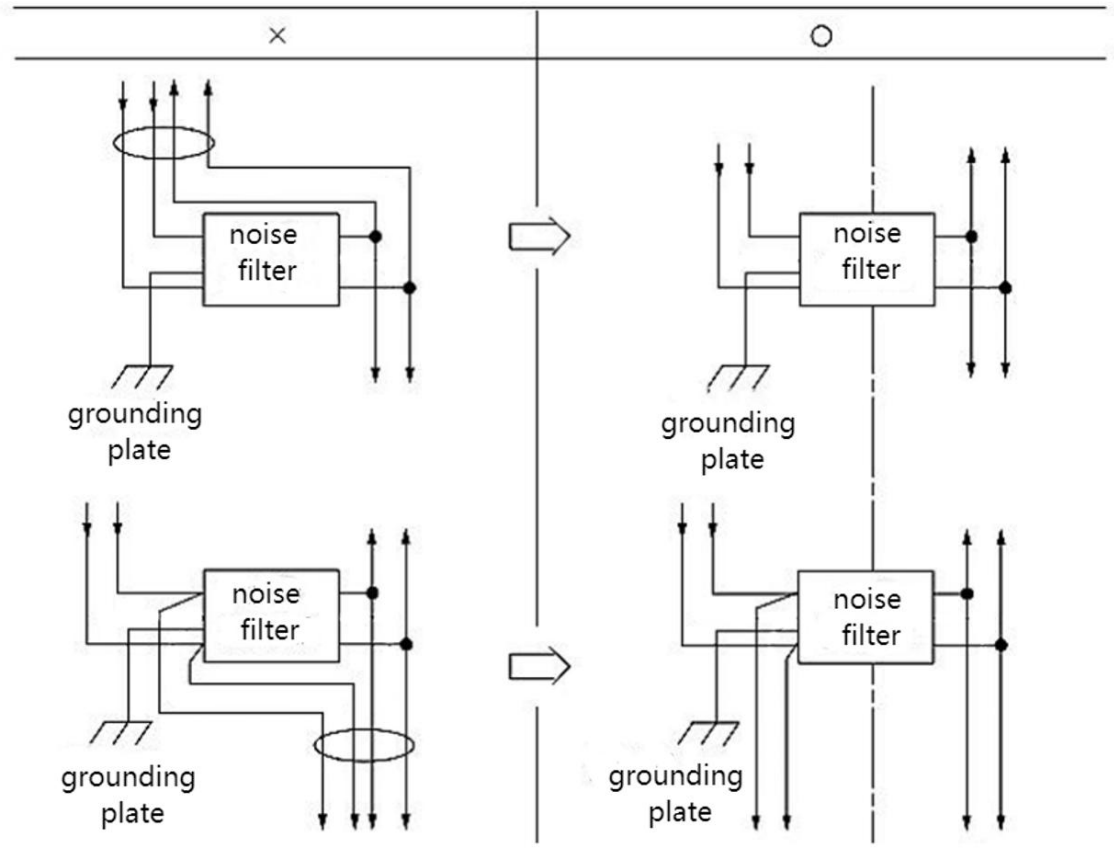
Note 1： Please use a thick wire of 3.5mm2 or more for the connection wire of the outer box used for grounding (braided copper wire is recommended).

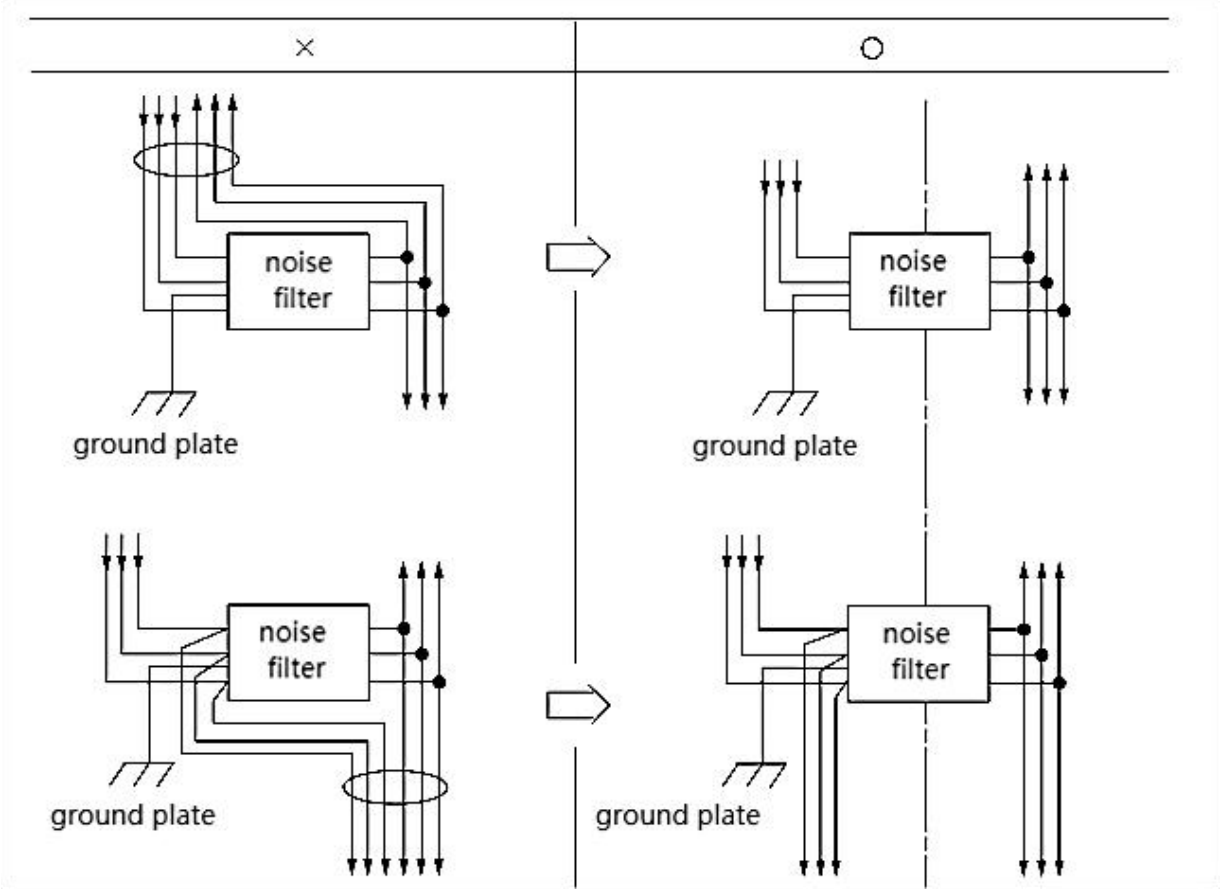
Note 2： When using a noise filter, please observe the precautions described in the following "How to use the noise filter".

4.How to use the noise filter

In order to prevent the interference of the power line and reduce the influence of the servo drive on other equipment, please select a noise filter that can make the servo system meet the IEC/EN 61800-3 electromagnetic compatibility standard according to the power of the servo drive, and observe the The following notes:

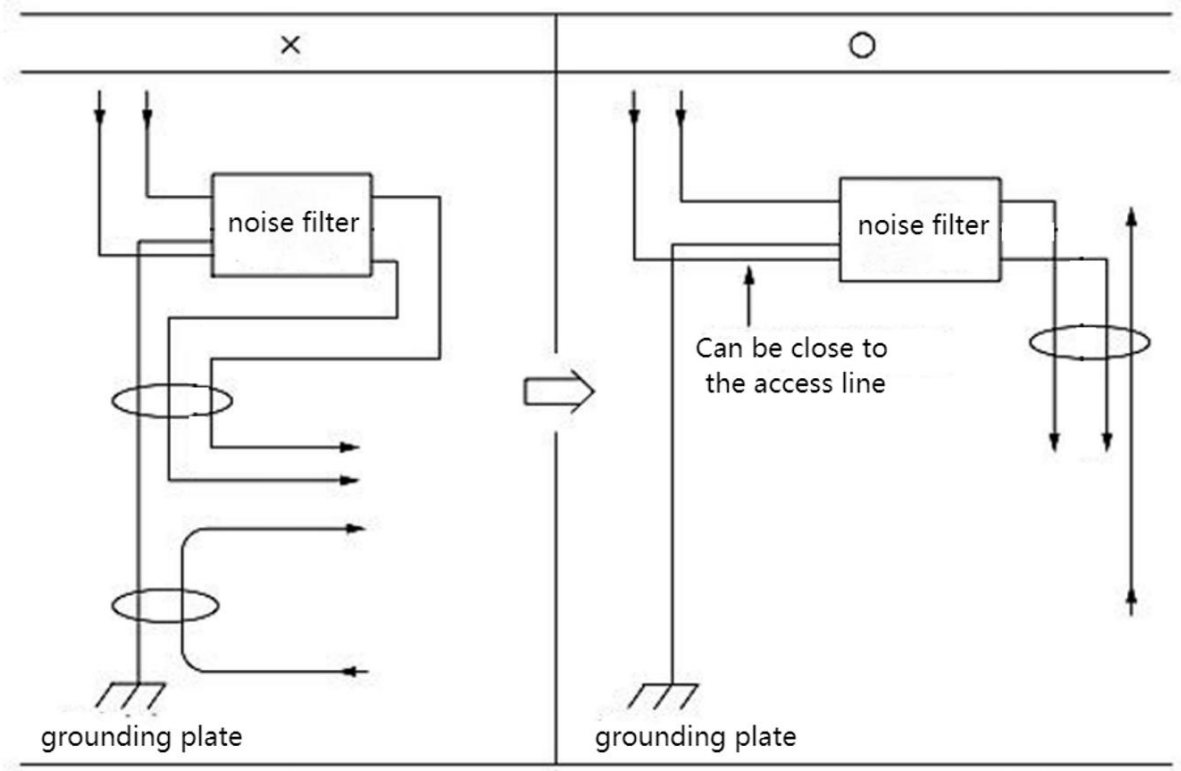
● Please separate the input wiring and output wiring of the noise filter, do not put them in the same bushing, and do not bundle them together.

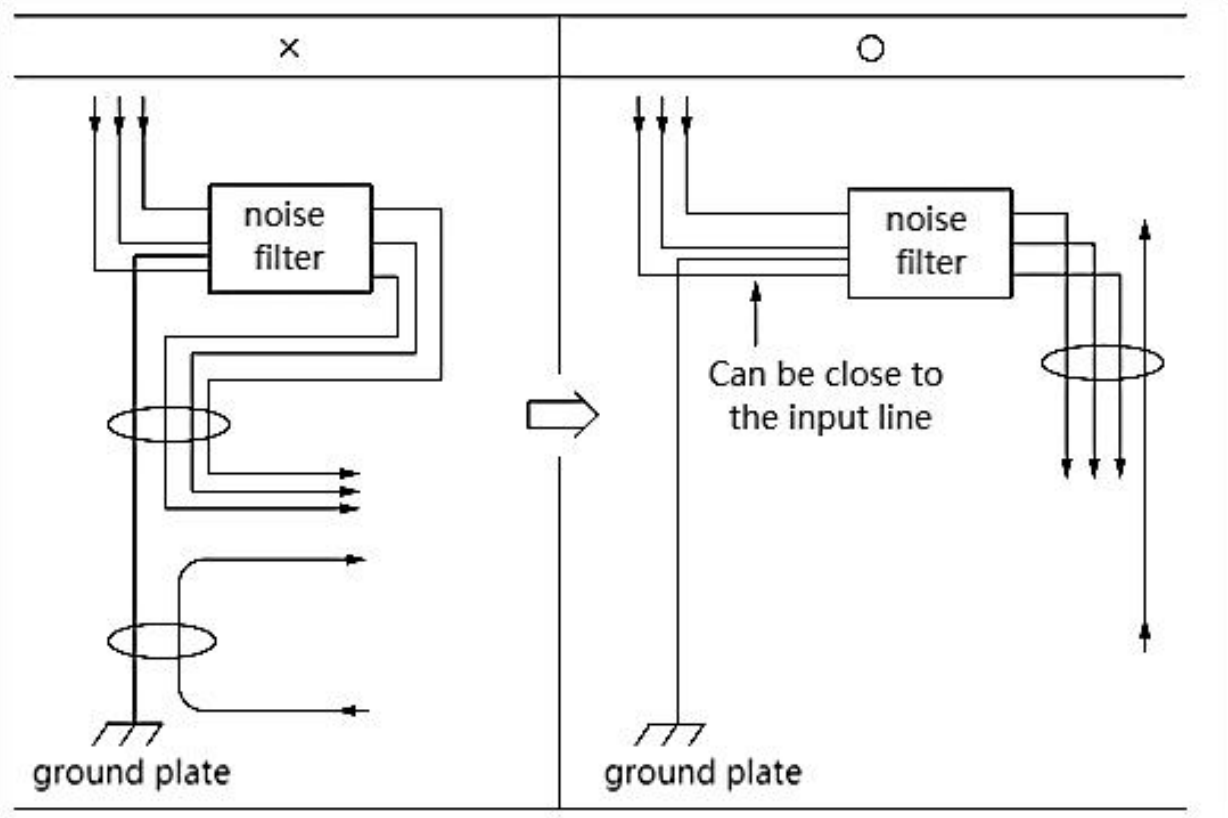




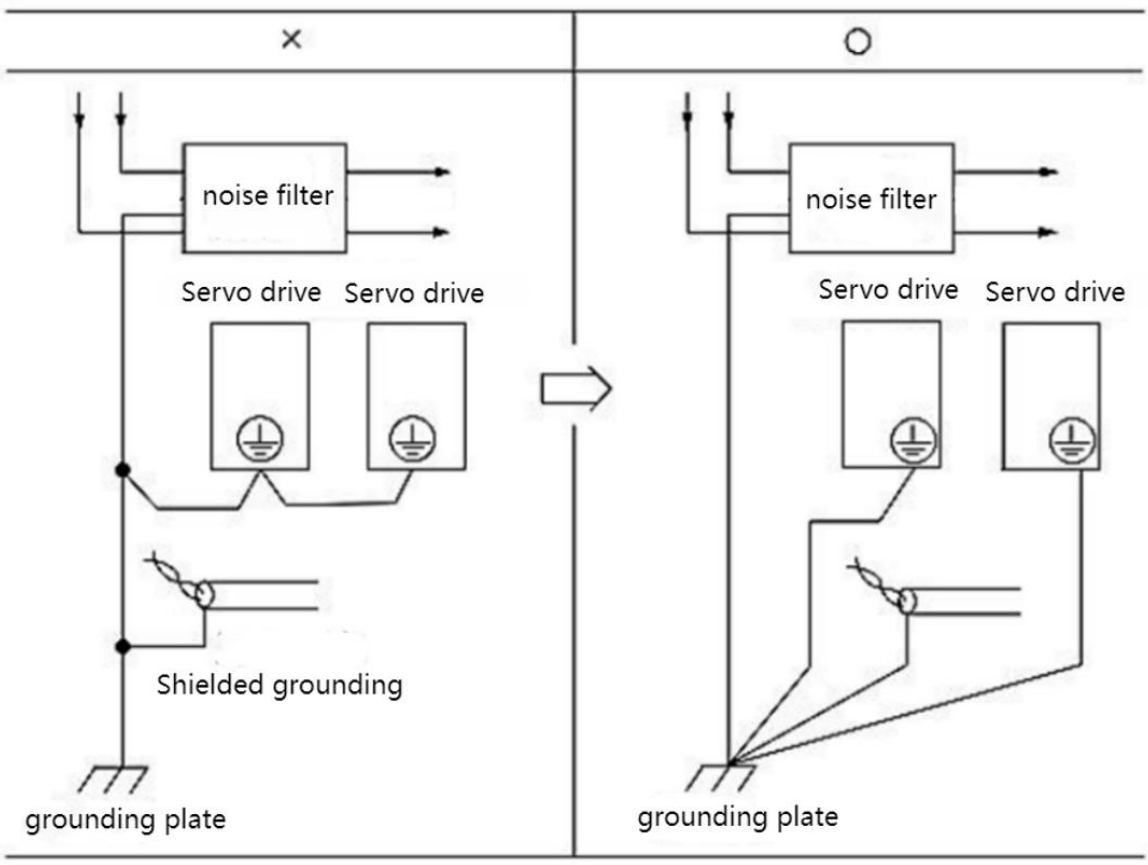
● Please separate the ground wire of the noise filter from the output wiring, do not put

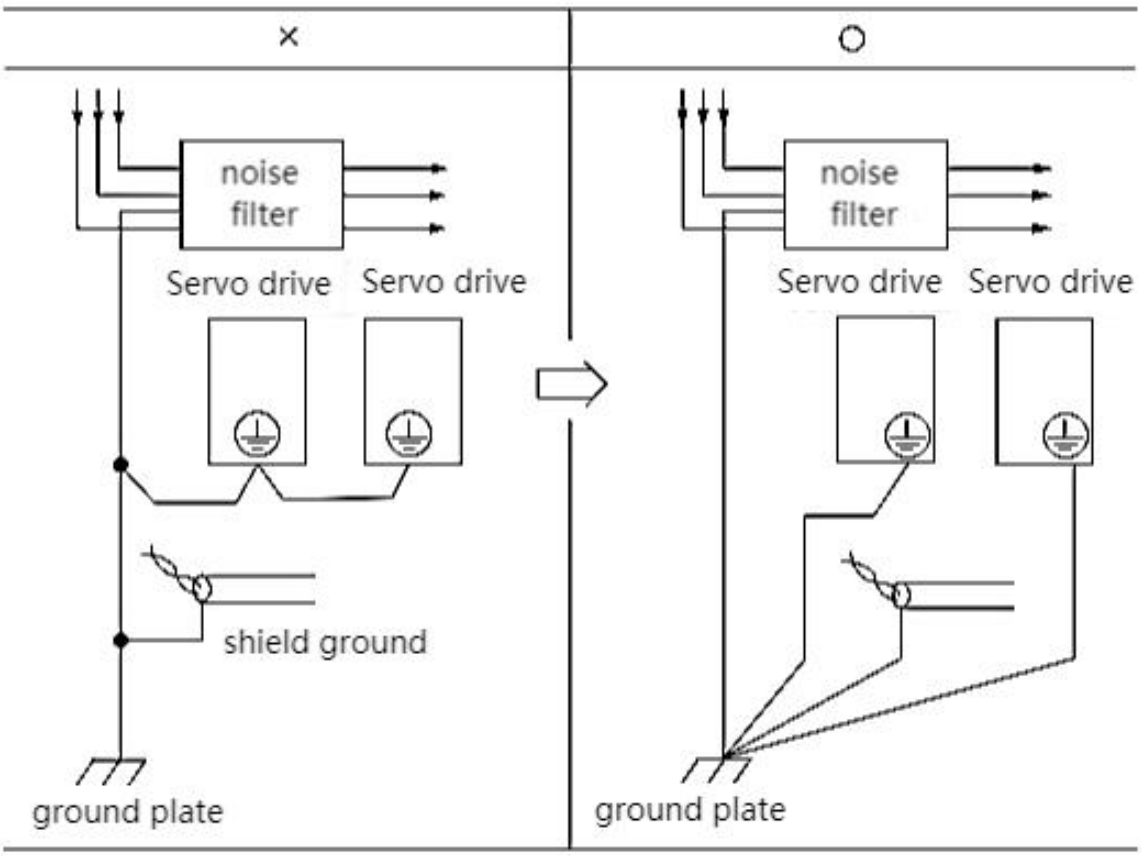
them in the same casing, and do not bundle them together.





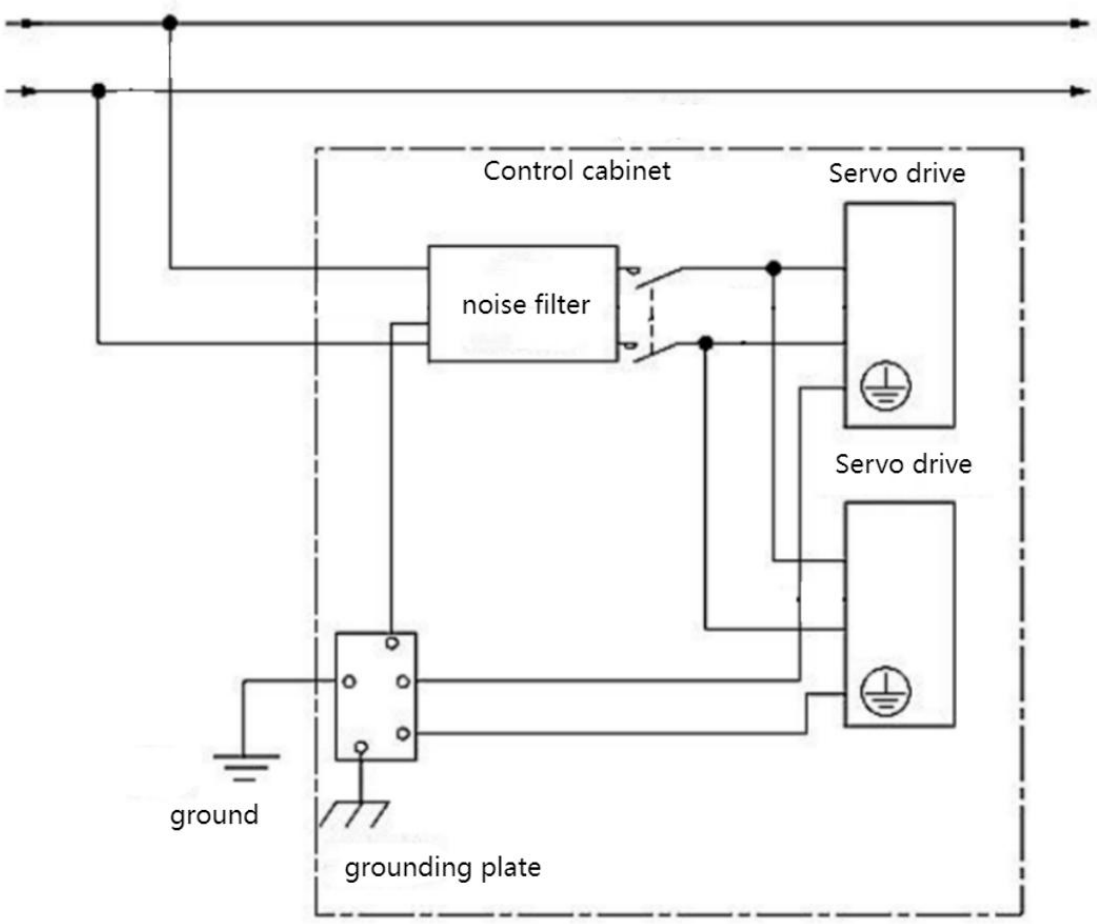
● Please connect the ground wire of the noise filter to the ground plane separately. Do not connect other ground wires.

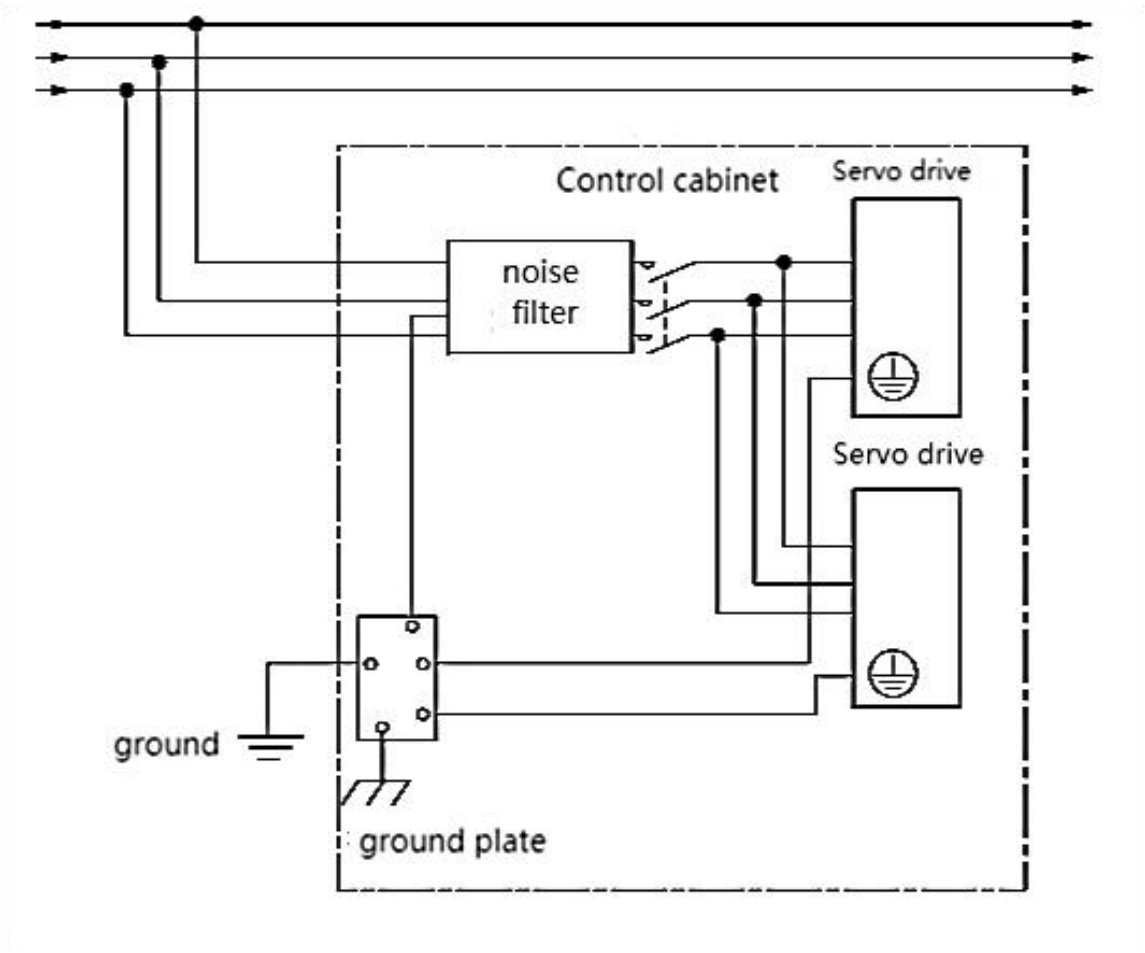




●When the noise filter and the servo drive are installed in the same control cabinet,

please connect the ground wire of the noise filter and the ground wires of other devices in the control cabinet to the grounding plate of the control cabinet, and then ground.

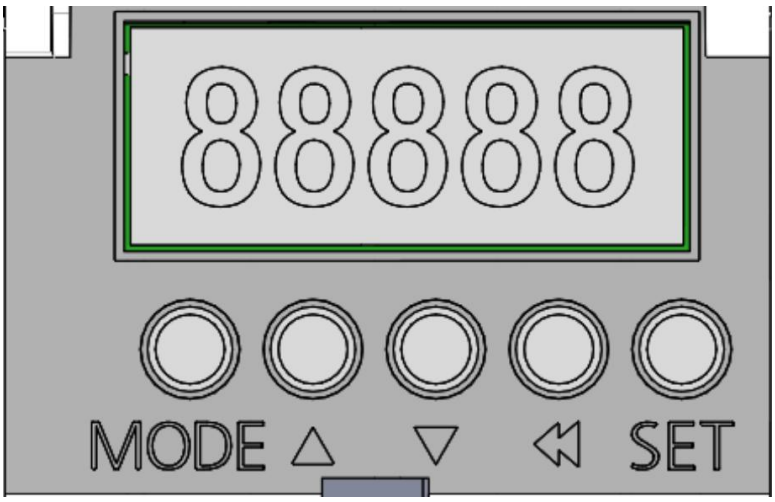



Control cabinet
Servo drive
noise
filter
Servo drive
ground
ground plate

Chapter 4 Panel Display and Keyboard Operation

4.1 Introduction to panel composition

4.1.1 E Structure Servo Driver Panel



The panel contains 5 buttons and 5 digital tubes. The general functions of the 5 buttons are shown in the table below.

button name	Button function
Mode	Mode switch, return to the previous menu
▲Increase	Increase the value of the blinking digit of the LED nixie tube
▼decrease	Decrease the value of the blinking digits of the LED nixie tube
◀◀Displacement	Move the flashing bit of the LED digital tube to the left; check the high-order value of the data whose length is greater than 5 digits; reset the fault; execute the Fn function
SET	Read/write parameter value, enter Fn function page

4.2 Panel operation mode

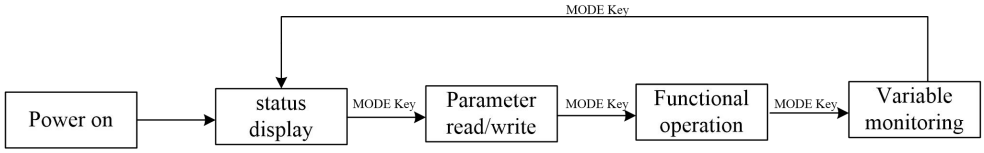
4.2.1 VC120 Servo drive panel

There are 4 operation modes in total: status display, parameter read/write, variable monitoring, and function operation.

Mode of operation	Mode introduction
status display	The panel can display the drive's status, such as reset (displayed as "rst" on the panel), ready (displayed as "rdy"), running

	(displayed as "run"), and fault (Er.xxx). It can also monitor specific operational variables during operation (e.g., speed, bus voltage, etc.), show the connection status of the network port, and indicate whether the DI/DO (Digital Input/Output) functions are active
Parameter read/write	Read and write all parameters
Variable monitoring	Monitor a certain variable or IO state of the drive
Functional operation	Perform specific functions such as jogging test runs, parameter factory resets, drive resets

Each mode is switched by the MODE button.

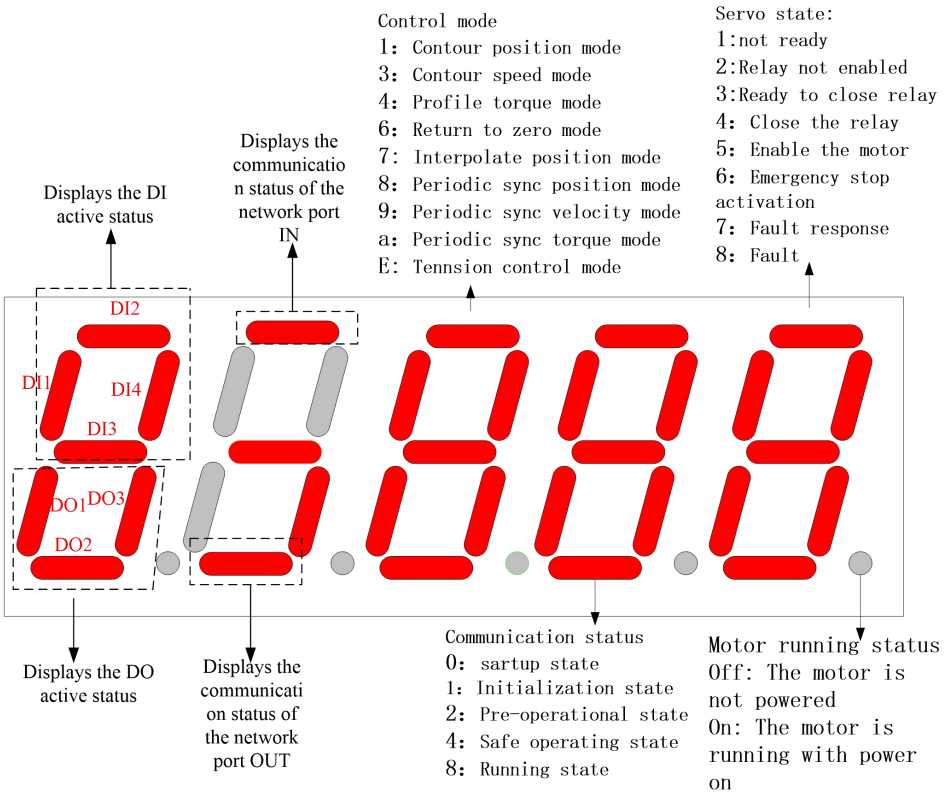


4.2.1 Status display in servo bus mode

This mode displays the status of the drive, and there are several statuses in total.

Status name	Status introduction	Panel display
Reset state	The driver enters this state after power-on initialization or re-reset and restart.	t011
Ready state	The servo drive is initialized and enters the ready state when there is no fault in the hardware detection.	t884
Running state	When the driver is enabled, the motor is powered on	t885.
Fault state	The drive reports a fault, and the panel displays the reported fault code	Er.xxx

In the non-fault state of the status display, the panel can be set to display a specific variable through P02.05.



4.2.2 Status display in servo local mode

This mode displays the status of the drive, and there are several statuses in total.

Status name	Status introduction	Panel display
Reset state	The driver enters this state after power-on initialization or re-reset and restart.	rSt
Ready state	The servo drive is initialized and enters the ready state when there is no fault in the hardware detection.	rdy
running state	When the driver is enabled, the motor is powered on	run
fault state	The drive reports a fault, and the panel displays the reported fault code	Er.xxx

In the non-fault state of the status display, the panel can be set to display a specific variable through P02.05.

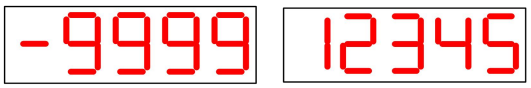
4.3 Parameter read and write

When entering the parameter read/write mode for the first time, Pxx.yy is displayed. Among them, xx is the parameter group, and yy is the parameter number in the group. The parameters of the driver are divided into 0~13 groups, and each group can accommodate up to 99 16-bit parameters. There are four types of parameters, namely unsigned 16-bit parameters, signed 16-bit parameters, unsigned 32-bit parameters, and signed 32-bit parameters. The range of values for the unsigned 16-bit parameter is 0 to 65535. The value range for signed

16-bit parameters is -32767 to 32767. The value range of the unsigned 32-bit parameter is 0 to 4294967295. The value range for signed 32-bit parameters is -2147483647 to 2147483647.

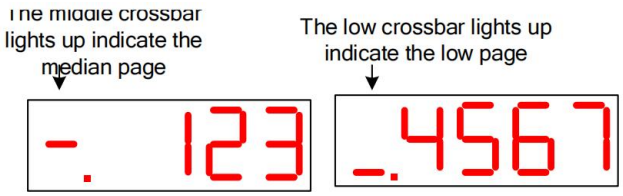
4.3.1 Display rules for numbers of different lengths

Negative numbers less than 4 digits and positive numbers less than 5 digits can be displayed through 5 digital tubes. Such as -9999 and 12345 are displayed as follows.

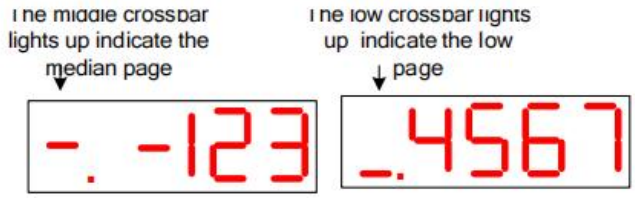


Negative numbers with more than 4 digits or positive numbers with more than 5 digits are displayed on the 2nd or 3rd page. The switching between pages is realized by long pressing the "◄◄" (shift) key. The leftmost nixie tube of each page identifies the number of pages displayed at this time. The high horizontal bar is lit to represent the high page, the middle horizontal bar is lit to represent the middle page, and the low horizontal bar is lit to represent the low page.

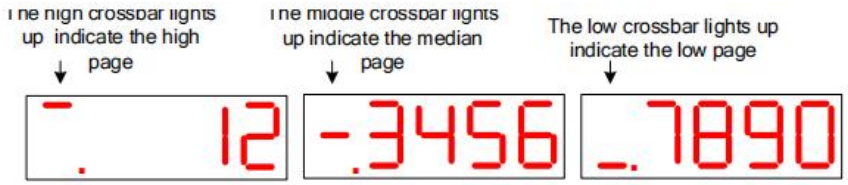
For example, 1234567 is displayed as follows.



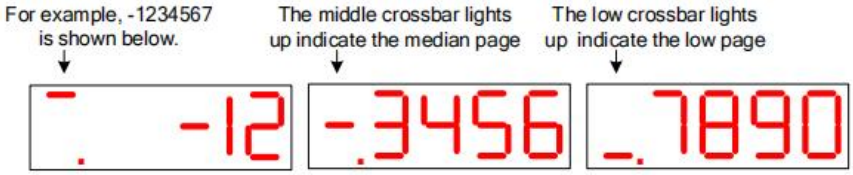
For example, -1234567 is displayed as follows.



1234567890 is displayed as follows.



-1234567890 is displayed as follows.



4.3.2 Parameter setting steps

For example, the process of setting P00.02 to 4000 is as follows.

① Press the MODE button to switch the mode to the parameter reading and writing mode, and the keyboard displays P00.00 at this time;

② Combined with "▲" (increase), "◄◄" (shift), "▼" (decrease) three keys to modify the parameter number to P00.02;

③ Press the SET key, first read the value of P00.02;

④ Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three keys to set the parameter value to 4000;

⑤ Press the SET key to write the set parameter value into P00.02.

For data displayed on multiple pages, you can automatically shift to other pages by "◄◄" (shift), or you can directly shift to other pages by long pressing "◄◄" (shift).

4.4 Functional operation

Currently the servo supports the following functions.

Function No.	Function
Fn000	Reset the drive
Fn001	Jog test run
Fn002	Parameter reset to factory value
Fn005	Learn motor pole pairs and encoder parameters
Fn006	Single parameter gain adjustment
Fn007	Learning load inertia
Fn009	Restore all factory parameters except P00 and P01 parameter groups
Fn010	Backup all parameters
Fn011	Restoring backed up parameters
Fn014	Clears the revolution value of the absolute encoder
Fn016	Current loop PI parameters of self-learning synchronous motor
Fn017	magnetic pole alignment
Fn018	Fully Automatic Gain Adjustment

4.4.1 Fn000 reset drive function

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn000;

3、Press the SET key, the drive will be reset directly.

Note: In any state, pressing the "▲" (increase) and "▼" (decrease) keys simultaneously for 2 seconds can reset the drive.

4.4.2 Fn001 Jog test run function

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn001;

3、Press the SET key, at this time the drive is enabled and the digital tube displays the motor speed in real time.

4、Press the "▲" (increase) key to increase the Jog speed by 10rpm, press the "▼" (decrease) key to reduce the Jog speed by 10rpm, press the "◄◄" (shift) key to set the Jog speed to 0; long Press the "◄◄" (shift) key to change the speed increase rate to 500rpm.

5、After the Jog trial run, press the MODE button to exit the Jog mode, and the servo is disabled at this time.

Note: When the drive is enabled, the jog test operation function is invalid.

4.4.3 Fn002 Restore all parameters to factory defaults

All parameters are restored to factory defaults, and the drive will restore its related parameters according to the set motor model P00.06 and drive level P01.15. If Er609 is reported, it means that the drive level P01.15 is set incorrectly, and the servo does not have the drive parameters of this drive level temporarily. If Er610 is reported, it means that the motor model P00.06 is set incorrectly, and the servo does not have the motor parameters of this motor model. When Er609 or Er610 is reported, if you need to forcefully restore a group of drive parameters, you can set P10.33=32767 to shield the above errors, and then restore the factory defaults.

The operation steps are as follows:

1、Confirm the motor model P00.06 and drive grade P01.15. Motor models and drive level can be found on the VECObserve Complete Matching page. As shown below.

2、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

3、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn002;

4、Press the SET key to display rECY;

5、Long press the "◄◄" (shift) key;

6、If the recovery is successful, it will display donE, and if it fails, it will display Err.

Notice:

***When the drive is enabled, the function of parameter restoring to factory default is invalid.**

***When power on, if you press the "▲", "▼", "◄◄" keys at the same time, the parameters can also be restored to the factory values.**

4.4.4 Fn005 Learn related parameters of synchronous motor encoder

When using motors other than our company, it is necessary to learn the encoder parameters.

Before self-learning, set the self-learning maximum current limit P02.36 (this value is generally set to 50% of the ratio of motor rated current/drive rated current), motor maximum speed P00.03, motor rated speed P00.02, motor Rated current P00.01, drive rated current P01.03.

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn005;

3、Click SET to display SEL1; (Self-Learn1)

4、Press the "◄◄" (shift) key to start self-learning. After the self-learning is completed, it will automatically turn off the enable or report a fault. The main learning parameters are as follows: P00.05 Motor pole pairs, P00.71 Z point offset, P00. 11 Motor encoder resolution, P00.72 Encoder AB phase sequence.

If the overcurrent Er.100 is reported during the learning process, parameters P02.36 (maximum current limit of self-learning), P07.01 (current loop proportional gain) and P07.02 (current loop integral gain) can be appropriately reduced.

Note: When the driver is enabled, this function is invalid.

4.4.5 Fn006 Single parameter gain adjustment

Single parameter gain adjustment refers to adjusting one parameter to achieve the purpose of adjusting servo rigidity. Before single-parameter gain adjustment, the servo load inertia ratio P07.29 must be accurately obtained. For the method of obtaining the load inertia ratio, refer to Fn007.

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn006;

3、Click SET to display the value of rigidity level P07.28;

4、Press the "◄◄" (shift) key, the motor starts to rotate forward and reverse;

5、By pressing "▲" or "▼", gradually increase or decrease the value of the rigidity level until the rigidity of the servo meets the actual application. Under normal circumstances, the rigidity level can be gradually increased until the motor has abnormal noise, and then reduce the rigidity level by 1-2.

Note: This function is invalid when the drive is enabled.

For VC322 series servo, every time the rigidity level is adjusted, the parameters will not be automatically saved in the servo. If the adjustment is completed, the user needs to

manually long press the "◄◄" (shift) key to save the adjusted rigidity level in the servo.

4.4.6 Fn007 Learning load inertia

The load inertia is the most important parameter of the servo system. Only when the inertia is matched can the servo perform optimally.

（1）VC322 servo learns load inertia function

Before learning the load inertia, please set the acceleration and deceleration time P07.33 (generally set to 300-2000, the larger the inertia ratio, the larger the value). The servo can automatically learn the load inertia through Fn007. During the learning of load inertia, the motor will rotate forward for 3 cycles and then reverse for 3 cycles. The acceleration and deceleration time is P07.33. If the load can only move in one direction, you need to set P02.03 to prohibit forward rotation or reverse rotation. The load inertia that is successfully learned will be placed in P07.29.

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn007;

3、Click SET to display SEL4; (Self-Learn 4)

4、Press the "◄◄" (shift) key to start self-learning, and automatically disable after self-learning is completed. If the learning is not successful, it will report a failure.

If overcurrent Er.100 is reported during the learning process, P07.01 (proportional gain of current loop), P07.02 (integral gain of current loop), P07.03 (proportional gain of speed loop), P07.04 can be appropriately reduced (speed loop integral gain).

If the load inertia is very large, low frequency oscillation may occur during self-learning. At this time, it is necessary to manually increase P07.03 and reduce P07.04 before self-learning.

Notice:

1. **When the drive is enabled, this function is invalid.**
2. **When the load inertia is large, low-frequency oscillation may occur in self-learning, and it is necessary to manually increase P07.03 and decrease P07.04, and then self-learn.**
3. **When the load inertia is small, reduce the inertia self-learning acceleration and deceleration time P07.33.**
4. **When the machine vibrates, the position loop gain P07.05 needs to be reduced.**

4.4.7 Fn009 restores all factory parameters except P00 and P01 parameter groups

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn009;
3、Click SET to display -rECy; (-Recovery)
4、Long press the "◄◄" (shift) key;
5、If the recovery is successful, it will display donE, and if it fails, it will display Err.

4.4.8 Fn010 backup all parameters

The operation steps are as follows:
1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;
2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn010;
3、Click SET to display bcuP; (backup Parameter)
4、Long press the "◄◄" (shift) key;
5、If the backup is successful, it will display donE, and if it fails, it will display Err.

Note: The drive backup parameters are stored in another address area of the drive memory.

4.4.9 Fn011 restore the parameters that have been backed up

The operation steps are as follows:
1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;
2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn011;
3、Click SET to display rESto. (restore)
4、Long press the "◄◄" (shift) key;
5、If the restoration is successful, it will display donE, and if it fails, it will display Err.

4.4.10 Fn014 clears the absolute value encoder circle value (only for Nikon 24-bit encoder)

The operation steps are as follows:
1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;
2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn014;
3、Click SET to display CLrEn. (Clear Encoder);
4、Press the "◄◄" (shift) key; clear the absolute encoder turns.

4.4.11 Fn016 Current loop PI parameters of self-learning synchronous motor

The operation steps are as follows:

1、Press the MODE button to switch the mode to the functional operation mode, at this time the first two digits of the digital tube display Fn;

2、Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to Fn016;

3、Click SET to displaySELC。

4、Press the “◄◄” （shift）key;Start Learning Current Loop PI Gains.

4.4.12 Fn017 Magnetic pole alignment

Typically, after the encoder is coaxially connected to the rotor, due to the randomness of installation, there is an initial phase angle between the encoder's zero position signal and the rotor's magnetic field zero point. Therefore, calibration must be performed after encoder installation before use. The initial phase angle value is random and unknown after installation. We can make the servo drive output a stable current, causing the motor rotor to rotate to the magnetic pole zero point and lock in place, which can be defined as the rotor's zero position.

Once the motor position is defined as the rotor's zero position, manually rotate and adjust the encoder so that its zero position aligns with the rotor's zero position, completing the motor encoder zero position signal adjustment.

The Fn017 function enables the servo drive to output a current that locks the rotor at the magnetic pole zero point. After the motor rotor rotates to the magnetic pole zero point and locks, simultaneously rotate the encoder position to align its zero point with the rotor's zero point. At this point, the locked spindle position is the motor encoder's zero position.

The operation steps are as follows:

1、Press the MODE key to switch the mode to function operation mode; at this time, the first two digits of the digital display show "Fn".

2、Use the "▲" (increase), "◄◄" (shift), and "▼" (decrease) keys to set the displayed value on the digital display to "Fn017".

3、Press the SET key; the drive will display "dCJ".

4、Press the "◄◄" (shift) key; the motor rotor will rotate to the magnetic pole zero point. The drive's current can be set via parameter P02.36. The number of magnetic pole zero points is generally determined by the motor's number of pole pairs. The drive displays the current encoder position corresponding to the magnetic pole zero point.

5、Manually rotate the encoder directly until the drive displays a value of "0"; at this point, the encoder is at its zero position. Lock the motor and encoder in place. The encoder zero point now aligns with the motor rotor zero point, completing the adjustment of the motor encoder zero position signal.

6、Press the MODE key to exit the Fn017 function.

4.4.13 Fn018 Fully Automatic Gain Adjustment

The fully automatic gain adjustment works by having the motor learn under different speeds or varying rigidity (softer or stiffer) conditions, ultimately deriving gains that prevent oscillation in all scenarios.

1、Press the MODE key to switch the mode to function operation mode; at this time, the first two digits of the digital display show "Fn".

2、Use the "▲" (increase), "◄◄" (shift), and "▼" (decrease) keys to set the displayed value on the digital display to "Fn018".

3、Press the SET key; the drive will display "Rutot".

4、Press the "◄◄" (shift) key to initiate the fully automatic gain adjustment.

Note:

1、Parameter P02.03 can be used to set the direction for motor learning (normally, it learns in both forward and reverse directions).

2、Parameter P02.43 can be used to limit the number of rotations for motor learning (default is approximately 2 rotations).

4.5 Variable monitoring

Press the MODE key several times to switch the mode to variable monitoring mode, and the first two digits of the digital tube display Un. Combine the "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to the number that needs to be monitored (for example, Un007 is to monitor the DIDO status). Press SET to display the variables to be monitored.

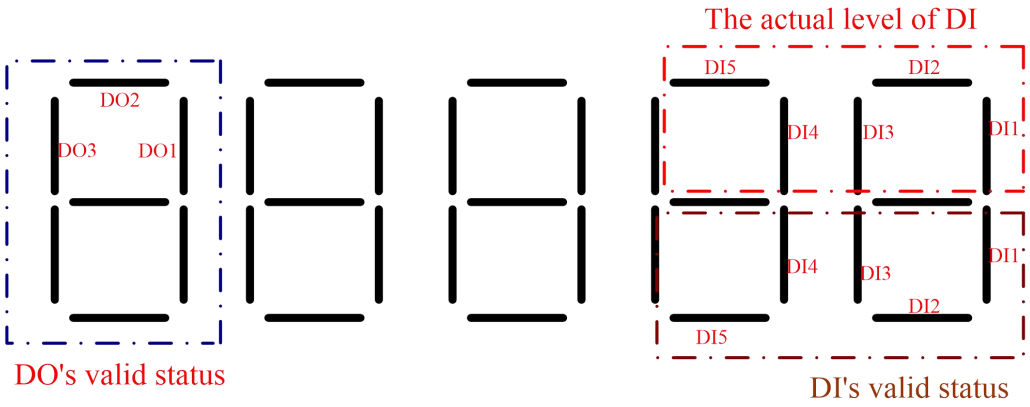
At present, the drive can monitor 13 variables, and the values corresponding to the monitoring numbers are shown in the table below.

Number	Corresponding value
Un000	Motor speed rpm
Un001	Bus capacitor voltage V
Un002	temperature ℃
Un003	Current RMS A
Un004	Command pulse count value
Un005	Motor encoder pulse count value
Un006	Second encoder pulse count value

Un007	DIDO status
Un008	Voltage value of AI1
Un009	Voltage value of AI2
Un010	Voltage value of AI3
Un011	Output motor instantaneous current percentage

It should be noted that, for DIDO status monitoring, the actual level of DI (high level on, low level off), the valid state of DI (valid on, invalid off), DO can be monitored simultaneously on 5 digital tubes Valid state (valid on, invalid off). The meaning of each segment in the digital tube is as follows.

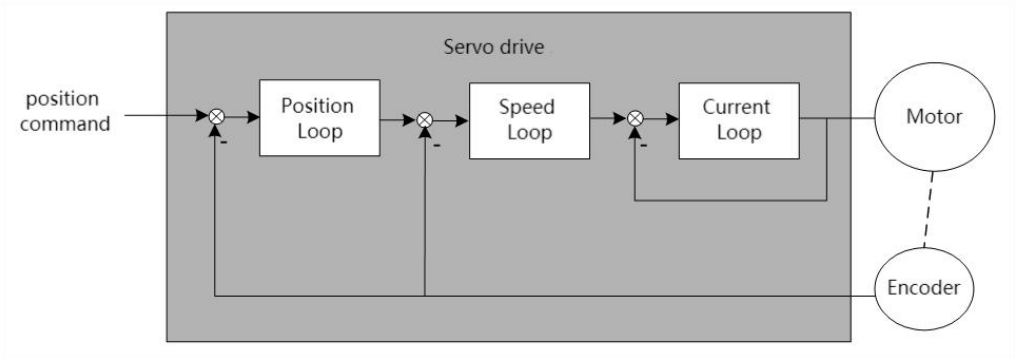
Note that the VC120 has only 3 DOs.



As shown in the figure above, the first digital tube displays the valid states of DO1~DO3, and the state of each DO corresponds to the on-off of the corresponding segment of the digital tube, valid on, invalid off. The upper 3 segments of the last 2-digit digital tubes correspond to the actual levels of DI1~DI5 respectively, high level is on, and low level is off. The lower 3 segments of the last 2-digit digital tubes correspond to the valid states of DI1~DI5 respectively, DIDO is on when valid, and off when invalid.

Chapter 5 VC120 Servo local control mode

Servo system consists of three main parts: servo driver, motor and encoder.



The servo driver is the control core of the servo system. By processing the input signal and feedback signal, the servo driver can control the precise position, speed and torque of the servo motor, that is, the position, speed, torque and mixed control mode. Among them, position control is the most important and most commonly used control mode of servo system.

Each control mode is briefly described as follows:

Position control refers to controlling the position of the motor through position commands. The target position of the motor is determined by the total number of position commands, and the rotation speed of the motor is determined by the frequency of the position command. The position command can be given by the combination of external pulse input, the total number of internal given position commands + speed limit. Through the internal encoder (the servo motor has its own encoder) or the second encoder (full closed-loop control), the servo drive can realize fast and precise control of the mechanical position and speed. Therefore, the position control mode is mainly used in occasions requiring positioning control, such as manipulators, placement machines, engraving, milling and engraving (pulse sequence commands), CNC machine tools, etc.

Speed control refers to controlling the speed of the machine through the speed command. Through digital, analog voltage or communication given speed command, the servo drive can achieve fast and precise control of the mechanical speed. Therefore, the speed control mode is mainly used to control the rotation speed. If you want to use the host computer to achieve speed control, you can input the output of the host computer as a speed command to the servo drive, such as an analog engraving and milling machine.

Torque control refers to controlling the output torque of the motor through the torque command. The torque command is given by digital, analog voltage or communication. The torque control mode is mainly used in devices that have strict requirements on the force of the material, such as some tension control occasions such as rewinding and unwinding devices. The torque given value should ensure that the force of the material is not affected by the change of the winding radius.

Hybrid control mode refers to a working mode realized by DI terminal, which can switch the control mode in real time under the servo running state.

Note: When the EtherCat bus servo does not communicate, it runs to the internal position and the internal speed mode, you need to set P01.46 to 128, that is, set bit7.

5.1 Basic parameter setting

5.1.1 Control mode

The servo drive has 3 basic control modes, namely position mode, speed mode and torque mode. A variety of hybrid control modes can be derived from the 3 basic control modes. Which mode to use can be set by P02.01 parameter.

<table>
<tr><th>Address</th><th>Type</th><th>Mode</th><th>Visit</th><th>Take effect</th><th>Unit</th><th>Default</th><th>Range</th><th>Other</th></tr>
<tr><td>P02.01
201
0x2002_1 H</td><td>S16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~7</td><td>Not</td></tr>
<tr><td colspan="9">Parameter Name：Drive control mode
Description：For selecting the servo drive control mode.
0-position mode
1-speed mode
2-torque mode
3-Position/torque mode IO switching, switch through INFn.36, when the signal is valid, it is torque mode
4-Position/speed mode IO switching, switch through INFn.36, when the signal is valid, it is speed mode
5-Torque/speed mode IO switching, switching through INFn.36, when the signal is valid, it is torque mode
6-Position/torque/speed mode IO switching, through INFn.36, INFn.37 switching
7-Specialized Servo Control Mode
<table>
<tr><th>INFn.37</th><th>INFn.36</th><th>working mode</th></tr>
<tr><td>invalid</td><td>invalid</td><td>Speed Mode</td></tr>
<tr><td>invalid</td><td>valid</td><td>Torque Mode</td></tr>
<tr><td>valid</td><td>xx</td><td>position mode</td></tr>
</table>
</td></tr>
</table>

The relevant input function bits are as follows.

Function bits	Bit description
INFn.36	Control mode toggle switch 0

INFn.37	Control mode toggle switch 1

5.1.2 Servo start and stop

When the servo activates the internal input function bit INFn.01 of the drive through IO or communication, the servo is enabled. After OUTFn.25 is output, the command input command is valid, the position/speed/torque command is accepted, and the servo runs.

The servo will perform stop action under the following three working conditions. One is to stop activating the internal input function bit INFn.01; the second is to stop when a fault occurs; the third is to stop when the emergency stop signal INFn.58 is input. The shutdown modes of the 3 working conditions can be set separately. The shutdown mode is set by P02.13. Refer to “7.1.1 Troubleshooting” for fault shutdown mode, and emergency stop shutdown mode is set by P02.14.

The servo has 5 kinds of stopping methods to choose from. The first is free stop; the second is rapid deceleration to stop, the enable is disconnected after stopping, and the motor is powered off; the third is slow deceleration to stop, the enable is disconnected after parking, and the motor is powered off; the fourth is Quickly decelerate to stop, keep the enable after stopping, the user needs to disconnect the enable signal to disable the enable; the fifth is slow deceleration to stop, keep enable after stopping, the user needs to disconnect the enable signal to disable the enable , otherwise it will remain locked and will not accept any command.

Free parking means that the drive is turned off and the motor is free to stop by friction resistance. Deceleration to stop means that the servo drive drives the motor to decelerate, and the motor remains powered on during this process. The deceleration time of rapid deceleration and stop is set by P02.16. The deceleration time of slow deceleration and stop is set by P02.17. Deceleration time refers to the time it takes to decelerate from the rated speed to zero. The actual deceleration time is determined by the speed at the time of failure and the set deceleration time.

$$\text{Actual deceleration time} = \text{Set deceleration time} \times \frac{\text{The speed at which the failure occurs}}{\text{Rated speed}}$$

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.13	S16	PVT	RW	Immediately	-	0	0~2	Not
213 0x2002_DH	Parameter Name：Select the method of enabling shutdown(Note：VC120 only“0” “2” two works) Description：Set the deceleration mode of the servo motor from rotation to stop and the motor state after stop when the servo is off. 0- Off-enable freewheel stop 1- Turn off enable after fast deceleration and stop 2- Disable enable after slow deceleration and stop							
P02.14	S16	PVT	RW	Immediatel	-	0	0~4	Not

214 0x2002_EH				y				
	Set the deceleration method of the servo motor from rotation to stop and the motor state after stop when the servo is in emergency stop.(Note: Under the bus, modify this parameter to take effect the reset) 0- Off-enable freewheel stop 1- Turn off enable after fast deceleration and stop 2- Disable enable after slow deceleration and stop 3- Quickly decelerate to stop and keep enabled 4- Slowly decelerate to stop and keep enabled							
P02.16 216 0x2002.10H	U16	PVT	RW	Immediatel y	-	500	0~65535	Not
	Parameter Name：Fast stop time Description：Set the stop time when the servo is stopped quickly							
P02.17 217 0x2002_11H	U16	PVT	RW	Immediatel y	-	1000	0~65535	Not
	Parameter Name：Slow stop time Description：Set the stop time when the servo is slow to stop							

5.1.3 Servo braking method

When the motor decelerates, it will feed back energy to the bus capacitor. When the bus capacitor voltage is too large, an overvoltage fault will be reported. Therefore, a braking resistor needs to be connected to the servo to consume the excess bus voltage on the braking resistor. When the capacitor voltage is high, the dynamic braking circuit is activated. For 220V drives, when the DC bus voltage is greater than 380VDC, the dynamic braking circuit is activated; for 380V drives, when the DC bus voltage is greater than 680VDC, the dynamic braking circuit is activated. The user can select the servo braking mode through P02.20 to release the excess voltage on the bus.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.20 220 0x2002-14H	U16	PVT	RW	Immediately	-	2	0~3	Not
	Parameter Name：Activate the energy consumption brake selection Description：When the busbar voltage exceeds the limit voltage, select the way to start the dynamic braking circuit. 0- Dynamic braking never starts 1- Dynamic braking can only be activated when decelerating 2- Ready to activate dynamic braking at any time 3- Braking is only possible when the energy is fed back							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.21 221 0x2002_15H	S16	PVT	RW	Immediately	Ω	0	0~3276.7	Not
	Parameter Name：Braking resistor value							
P02.22 222 0x2002_16H	S16	PVT	RW	Immediately	kw	0	0~3276.7	Not
	Parameter Name：Maximum power of braking resistor Description：The maximum power of the brake resistance is Kw, set to 5-10 times the rated power							
P02.23 223 0x2002_17H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name：Braking resistor heat dissipation coefficient Description：If P02.23 is set to 100%, it means that the time required to drop from the maximum heat to 0 is 10s.							

5.1.4 Command reverse

The speed, torque and position commands can be reversed by setting the register P02.50. P02.50 contains 16-bit binary. When the 0th bit is valid, the position command is reversed; when the 1st bit is valid, the speed command is reversed; When 2 bits are valid, the torque command is reversed.Note： The value of P02.50 can also be used in bus mode, but this only occurs during servo power-on initialization when the value of P02.50 is assigned to 607E.

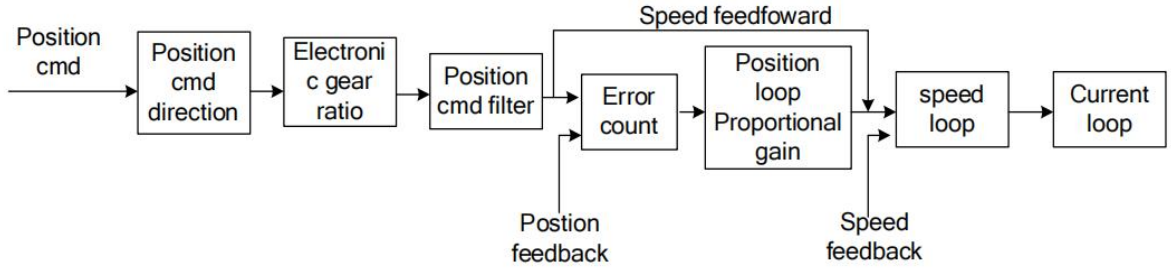
Subsequent modifications to the P02.50 value will not affect 607E, and modifications to 607E will not affect P02.50 either.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.50	S16	PVT	RW	Immediately	-	0	0~7	Not
250 0x2002_32H	Parameter Name：Command reverse Description： 1-Position command reverse； 2-Speed command reversed； 4-Torque command reverse							

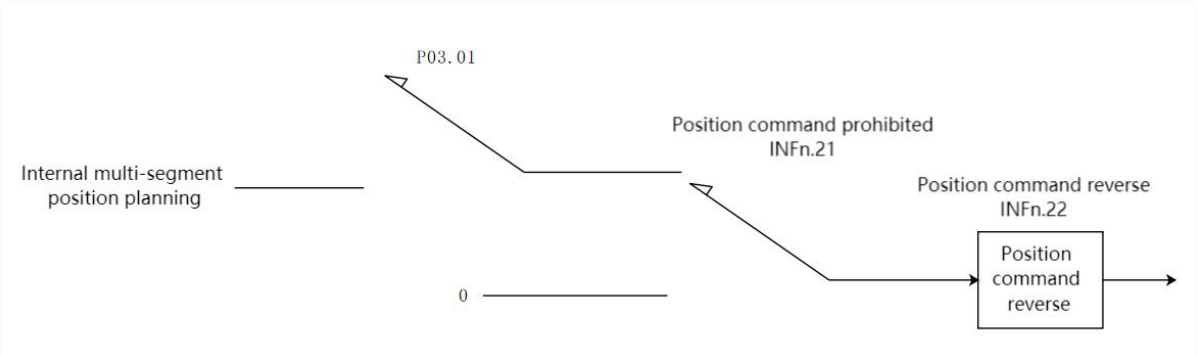
5.2 Position mode

The position mode is a control mode in which the motor position is the control target, and is often used to achieve high-precision positioning. The implementation of the location pattern is shown in the following figure.

Note: Since there is no pulse input port on the VC322 servo hardware, the position command can only be derived from internal position planning, not from external pulses.



5.2.1 Position command source and direction selection



Position commands can be derived from internal multi-segment position planning

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.01	S16	PVT	RW	Immediately	-	0	0~9	Not
301 0x2003_1H	Parameter Name：Position command source Description：In position control mode, it is used to select the source of position command.							

	0-Retain 1- Internal Position Planning 2- Retain 3- Retain 4- Retain 5- Retain 6- Sinusoid 7-Retain 8-Communication location given

Related input function bits.

Title	Bit description
INFn.21	Position Command Inhibition: When active, position commands are prohibited from being input to the servo.
INFn.22	Position Command Inversion: When enabled, the position command is inverted before being input to the servo.

5.2.2 The position command comes from the pulse command

It is derived from the multi-segment position command, which means that the user pre-sets the mechanical position command, speed, acceleration/deceleration time, number of segments and other parameters that need to be run through the parameters, and then triggers the start of the multi-segment position operation, and then the motor moves according to the set rules. Starting and stopping the multi-segment position is realized by operating INFn.27. When P13.92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-segment position; when P13.92=1 , the rising edge of INFn.27 sets the operation of the multi-segment position until the execution of the multi-segment position is completed. The related parameters are listed below. It should be noted that the set position command refers to the mechanical position command.

Note: The position command of the multi-segment position will be multiplied by the electronic gear ratio, which is the position P00.13 of the motor encoder; but the speed setting of the multi-segment position is not affected by the electronic gear ratio.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.01 1301 0x2013_1H	S16	P	RW	Reposition	-	0	0~2	Not
	Parameter Name：Multi-segment position working mode Description：When the position command is sourced from a multi-segment position command, it is used to configure the multi-segment position operation mode. 0- Downtime after a single run 1- Cycle run 2- DI switching run							
P13.02 1302 0x2013_2H	S16	P	RW	Immediately	-	16	0~16	Not
	Parameter Name：Total Segments							

P13.03 1303 0x2013_3H	S16	P	RW	Immediately	-	1	0~1	Not
	Parameter Name：Idle waiting time unit Description： 0- milliseconds 1- second							
P13.04 1304 0x2013_4H	S16	P	RW	Immediately	-	0	0~1	Not
	Parameter Name：Surplus processing method Description： 0- Re-jump to the first segment position command to run 1- Start where the previous segment left off							
P13.05 1305 0x2013_5H	S16	P	RW	Immediately	-	1	0~3	Not
	Parameter Name：Absolute or relative position command settings Description： 0-Absolute position command 1- Relative position command 2-Depend upon INFn40 3-Depend upon P13.96							
P13.10 1310 0x2013_AH	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name：Number of pulse commands at the first segment position							
P13.12 1312 0x2013_CH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the first segment of the multi-segment position command							
P13.13 1313 0x2013_DH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Section 1 acceleration time (ms) Description： Set the time for Segment 1 Position to accelerate from 0 to the rated speed. The actual acceleration time is calculated as: Actual Acceleration Time = (Change in Speed Command / Rated Speed) × Speed Command Acceleration Time.							
P13.90 1390 0x2013_5AH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Section 1 deceleration time(ms) Description：Set the deceleration time for Segment 1 Position to decelerate from the rated speed to 0. The actual deceleration time is calculated as: Actual Deceleration Time = (Change in Speed Command / Rated Speed) × Speed Command Deceleration Time.							
P13.14 1314 0x2013_EH	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 1 Position Free Time Description：The unit of this parameter is determined by P13.03. The waiting time before executing the next segment after Segment 1 displacement has completed.							
P13.15 1315 0x2013_FH	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name：Number of pulse commands at the second segment position							
P13.17	S16	P	RW	Immediately	rpm	500	0~32767	Not

1317 0x2013_11H	Parameter Name：The running speed of the second segment of the multi-segment position command							
P13.18	U16	P	RW	Immediately	ms	500	0~65535	Not
1318 0x2013_12H	Parameter Name：Section 2 Position Free Time Description：The time when the position accelerates from 0 to the rated speed in the second stage.							
P13.91	U16	P	RW	Immediately	ms	500	0~65535	Not
1391 0x2013_5BH	Parameter Name：The deceleration time of the second segment of the multi-segment position command Description：The second stage position decelerates from the rated speed to 0.							
P13.19	S16	P	RW	Immediately	-	1	0~32767	Not
1319 0x2013_13H	Parameter Name：Section 2 Position Free Time Description：After the second stage of the displacement run is completed, the waiting time before running the next stage of the displacement.							
P13.20 1320	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
0x2013_14H	Parameter Name：Number of pulse commands at the third segment position							
P13.22	S16	P	RW	Immediately	rpm	500	0~32767	Not
1322 0x2013_16H	Parameter Name：The running speed of the third segment of the multi-segment position command							
P13.23	U16	P	RW	Immediately	ms	500	0~65535	Not
1323 0x2013_17H	Parameter Name：The acceleration and deceleration time of the third segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the third stage; or deceleration time from rated speed to 0.							
P13.24	S16	P	RW	Immediately	-	1	0~32767	Not
1324 0x2013_18H	Parameter Name：Section 3 Position Free Time							
P13.25 1325	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
0x2013_19H	Parameter Name：Number of pulse commands at the fourth segment position							
P13.27	S16	P	RW	Immediately	rpm	500	0~32767	Not
1327 0x2013_1BH	Parameter Name：The running speed of the fourth segment of the multi-segment position command							
P13.28	U16	P	RW	Immediately	ms	500	0~32767	Not
1328 0x2013_1CH	Parameter Name：The acceleration and deceleration time of the fourth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the fourth stage; or deceleration time from rated speed to 0.							
P13.29	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1329 0x2013_1DH	Parameter Name：Section 4 Position Free Time							
P13.30 1330	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not

0x2013_1EH	Parameter Name：Number of pulse commands at the fifth segment position							
P13.32	S16	P	RW	Immediately	rpm	500	0~32767	Not
1332	Parameter Name：The running speed of the fifth segment of the multi-segment position command							
0x2013_20H								
P13.33	U16	P	RW	Immediately	ms	500	0~65535	Not
1333	Parameter Name：The acceleration and deceleration time of the fifth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 5th stage; or deceleration time from rated speed to 0。							
0x2013_21H								
P13.34	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1334	Parameter Name：Section 5 Position Free Time							
0x2013_22H								
P13.35	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
1335								
0x2013_23H	Parameter Name：Number of pulse commands at the sixth segment position							
P13.37	S16	P	RW	Immediately	rpm	500	0~32767	Not
1337	Parameter Name：The running speed of the sixth segment of the multi-segment position command							
0x2013_25H								
P13.38	U16	P	RW	Immediately	ms	500	0~65535	Not
1338	Parameter Name：The acceleration and deceleration time of the sixth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 6th stage; or deceleration time from rated speed to 0.							
0x2013_26H								
P13.39	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1339	Parameter Name：Section 6 Position Free Time							
0x2013_27H								
P13.40	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
1340								
0x2013_28H	Parameter Name：Number of pulse commands at the seventh segment position							
P13.42	S16	P	RW	Immediately	rpm	500	0~32767	Not
1342	Parameter Name：The running speed of the seventh segment of the multi-segment position command							
0x2013_2AH								
P13.43	U16	P	RW	Immediately	ms	500	0~65535	Not
1343	Parameter Name：The acceleration and deceleration time of the seventh segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 7th stage; or deceleration time from rated speed to 0.							
0x2013_2BH								
P13.44	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1344	Parameter Name：Section 7 Position Free Time							
0x2013_2CH								
P13.45	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
1345								

0x2013_2DH	Parameter Name：Number of pulse commands at the eighth segment position							
P13.47 1347 0x2013_2FH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the eighth segment of the multi-segment position command							
P13.48 1348 0x2013_30H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the eight segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 8th stage; or deceleration time from rated speed to 0.							
P13.49 1349 0x2013_31H	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 8 Position Free Time							
P13.50 1350 0x2013_32H	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name：Number of pulse commands at the ninth segment position							
P13.52 1352 0x2013_34H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the ninth segment of the multi-segment position command							
P13.53 1353 0x2013_35H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the ninth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 9th stage; or deceleration time from rated speed to 0.							
P13.54 1354 0x2013_36H	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 9 Position Free Time							
P13.55 1355 0x2013_37H	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name：Number of pulse commands at the tenth segment position							
P13.57 1357 0x2013_39H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the tenth segment of the multi-segment position command							
P13.58 1358 0x2013_3AH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the tenth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 10th stage; or deceleration time from rated speed to 0.							
P13.59 1359 0x2013_3BH	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 10 Position Free Time							
P13.60 1360	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not

0x2013_3CH	Parameter Name：Number of pulse commands at the eleventh segment position							
P13.62 1362 0x2013_3EH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the eleventh segment of the multi-segment position command							
P13.63 1363 0x2013_3FH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the eleventh segment of the multi-segment position command Description：the acceleration time from 0 to the rated speed in the 11th stage; or deceleration time from rated speed to 0.							
P13.64 1364 0x2013_40H	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 11 Position Free Time							
P13.65 1365 0x2013_41H	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name：Number of pulse commands at the twelfth segment position							
P13.67 1367 0x2013_43H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the twelfth segment of the multi-segment position command							
P13.68 1368 0x2013_44H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the twelfth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 12th stage; or deceleration time from rated speed to 0.							
P13.69 1369 0x2013_45H	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 12Position Free Time							
P13.70 1370 0x2013_46H	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
	Parameter Name;Number of pulse commands at the thirteenth segment position							
P13.72 1372 0x2013_48H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：The running speed of the thirteenth segment of the multi-segment position command							
P13.73 1373 0x2013_49H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：The acceleration and deceleration time of the thirteenth segment of the multi-segment position command Description：the acceleration time from 0 to the rated speed in the 13th stage; or deceleration time from rated speed to 0.							
P13.74 1374 0x2013_4AH	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
	Parameter Name：Section 13 Position Free Time							
P13.75 1375	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not

0x2013_4BH	Parameter Name：Number of pulse commands at the fourteenth segment position							
P13.77	S16	P	RW	Immediately	rpm	500	0~32767	Not
1377	Parameter Name：The running speed of the fourteenth segment of the multi-segment position command							
0x2013_4DH								
P13.78	U16	P	RW	Immediately	ms	500	0~65535	Not
1378	Parameter Name：The acceleration and deceleration time of the fourteenth segment of the multi-segment position command Description：the acceleration time from 0 to the rated speed in the 14th stage; or deceleration time from rated speed to 0.							
0x2013_4EH								
P13.79	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1379	Parameter Name：Section 14 Position Free Time							
0x2013_4FH								
P13.80	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
1380								
0x2013_50H	Parameter Name：Number of pulse commands at the fifteenth segment position							
P13.82	S16	P	RW	Immediately	rpm	500	0~32767	Not
1382	Parameter Name：The running speed of the fifteenth segment of the multi-segment position command							
0x2013_52H								
P13.83	U16	P	RW	Immediately	ms	500	0~32767	Not
1383	Parameter Name：The acceleration and deceleration time of the fifteenth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 15th stage; or deceleration time from rated speed to 0.							
0x2013_53H								
P13.84	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1384	Parameter Name：Section 15 Position Free Time							
0x2013_54H								
P13.85	S32	P	RW	Immediately	User Unit	10000	-2147483647 ~ 2147483647	Not
1385								
0x2013_55H	Parameter Name：Number of pulse commands at the sixteenth segment position							
P13.87	S16	P	RW	Immediately	rpm	500	0~32767	Not
1387	Parameter Name：The running speed of the sixteenth segment of the multi-segment position command							
0x2013_57H								
P13.88	U16	P	RW	Immediately	ms	500	0~65535	Not
1388	Parameter Name：The acceleration and deceleration time of the sixteenth segment of the multi-segment position command Description：The acceleration time from 0 to the rated speed in the 16th stage; or deceleration time from rated speed to 0.							
0x2013_58H								
P13.89	S16	P	RW	Immediately	ms(s)	1	0~32767	Not
1389	Parameter Name：Section 16 Position Free Time							
0x2013_59H								
P13.92	S16	P	RW	Immediately	-	3	0~32767	Not
1392	Parameter Name：Multi-segment position command trigger signal type							

<table>
<tr><td>0x2013_5CH</td><td colspan="8">Description：
BIT0: When BIT0=0, a rising edge of INFn27 triggers the multi-segment position, and a falling edge stops the execution of multi-segment position; when BIT0=1, a rising edge triggers it without stopping.
BIT1: When BIT1=0, if the multi-segment position is sourced from DI, any change in DI automatically triggers the multi-segment position; when BIT1=1, if the multi-segment position is sourced from DI, changes in DI do not automatically trigger it, and it is only triggered when INFn27 is re-triggered.
BIT2: Retain
BIT3: Retain
BIT4: After writing position command 1, a delay of P13.89ms (parameter P13.89) is applied before automatically triggering.
BIT5 Retain
BIT6 Retain
BIT7 Retain
BIT8 Retain
BIT9 Retain
BIT10 Retain
BIT11 Retain
BIT12 Retain
BIT13 Retain
BIT14 Retain</td></tr>
<tr><td rowspan="2">P13.93
1393
0x2013_5DH</td><td>S16</td><td>P</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~1</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Condition for sending the next command
0 - Must wait for the completion of the previous positioning output, then delay the idle time before sending the next position command.
1 - After the previous position command is sent, wait for the idle time and directly send the second position command.</td></tr>
<tr><td rowspan="2">P13.94
1394
0x2013_5EH</td><td>S16</td><td>P</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~4</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Speed source for Segment 1 position command.
Description：
0-FromP13.12
1-FromAI1
2-FromAI2
3-FromAI3(VC120 This feature is not valid)
4-Retain</td></tr>
<tr><td rowspan="2">P13.95
1395
0x2013_5FH</td><td>S16</td><td>P</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~3000</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name： Dynamic Attenuation Coefficient for Multi-Segment Position Speed Command</td></tr>
<tr><td rowspan="2">P13.96
1396
0x2013_60H</td><td>U16</td><td>P</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~65535</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Relative or absolute setting for each segment in Multi-Segment Position Mode
Description：Relative or absolute settings for each segment in Multi-Segment Position Mode, where BIT0 to BIT5 control the absolute or relative mode for segments 1 to 16 (0 = absolute, 1 = relative).</td></tr>
</table>

The absolute position command refers to the position of the size of the position command relative to the origin, and the relative position command refers to the position of the

size of the position command relative to the current position. Therefore, the origin return must be performed before the absolute position command is executed, otherwise a fault will be reported.

For example, suppose that 3 absolute position commands are executed, the size of the first position command is set to 1000, the size of the second position command is set to 2000, and the size of the third position command is set to 0. The zero return operation is performed first, and then the multi-stage position is triggered. The motor first moves forward 1000, then forward 1000, and then reversely moves 2000, and returns to the zero point.

As another example, assuming that three relative position commands are taken, the first position command is set to 1000, the second position command is set to 2000, and the third position command is set to -1000. After triggering the multi-segment position, the motor first moves forward 1000, then forwards 2000, and then reverses 1000.

If you want to use the multi-segment position command, in addition to setting P03.01 and P13.01 first, you also need to configure the DIx function control register and set it to INFn.27 (triggering the multi-segment position function number). Then control the effective level of DIx to trigger the execution of multi-segment position commands at the rising edge, and stop the execution of multi-segment position commands at the falling edge (when P13.92=0). Selecting the segment number is similar, configure the DIx function control register, set the corresponding level, and then trigger.

The relevant input function bits are as follows.

Title	Bit description
INFn.27	Trigger multi-segment position command The rising edge triggers the execution of the multi-segment position command, and the falling edge stops the execution of the multi-segment position command Or only the rising edge triggers the execution of multi-segment position commands, and the falling edge does not act. Specific reference P13.92
INFn.28	Multi-segment position command segment number selection 0
INFn.29	Multi-segment position command segment number selection 1
INFn.30	Multi-segment position command segment number selection 2
INFn.31	Multi-segment position command segment number selection 3
INFn.32	Multi-segment position direction selection, when valid, the position command set for multi-segment position is reversed

Based on the status of INFn28~31.

Multi-segment operation segment number= INFn.31*8 + INFn.30*4 + INFn.29*2 + INFn.28*1 +1

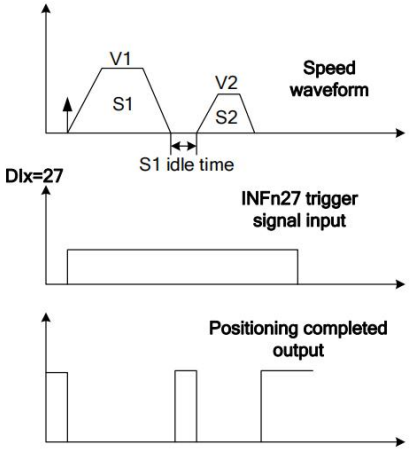
See the table below for details.

INFn.31	INFn.30	INFn.29	INFn.28	Run segment number
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3

0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8
1	0	0	0	9
1	0	0	1	10
1	0	1	0	11
1	0	1	1	12
1	1	0	0	13
1	1	0	1	14
1	1	1	0	15
1	1	1	1	16

5.2.2.1 Stop after a single run

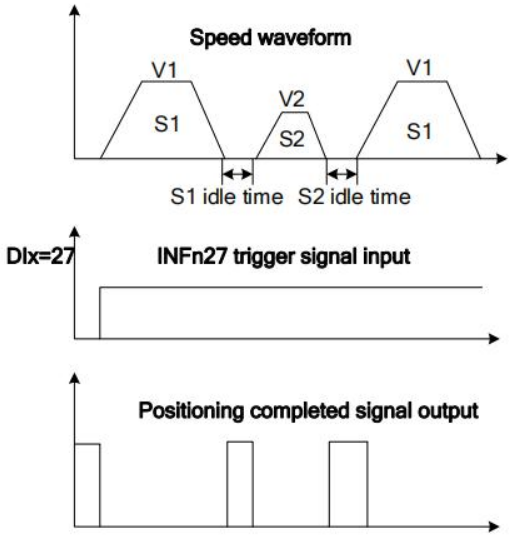
In this mode, the motor runs n positions of position commands, the idle time of each position command can be set independently, and INFn.27 starts/stops running multi-stage position mode (Note: when P13.92=0, the rising edge of INFn.27 starts multi-stage position mode Position running, the falling edge of INFn.27 stops the running of multi-segment positions; when P13.92=1, the rising edge of INFn.27 starts the running of multi-segment positions, and the falling edge does not act). Its running speed curve is as follows. The total number of segments is assumed to be 2.



5.2.2.2 Cycle run

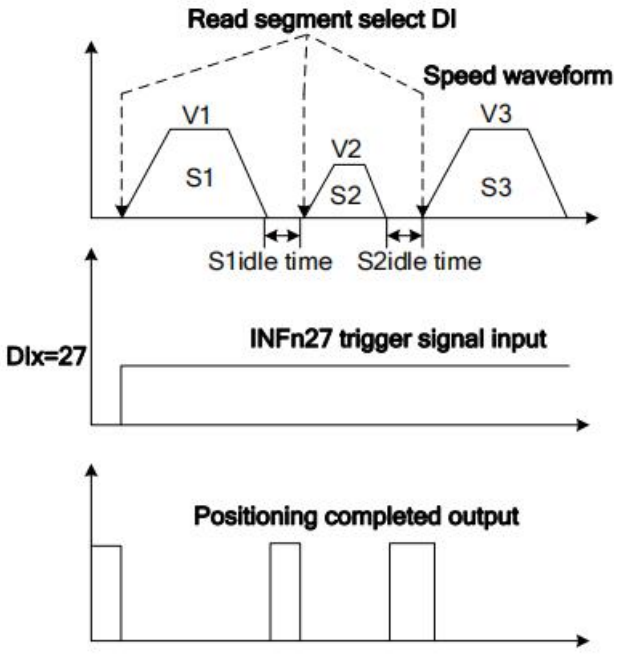
In this mode, the motor automatically jumps to the first position command after running the n-stage position command. The idle time of each position command can be set independently. INFn.27 starts/stops the multi-stage position mode (Note: when P13 When .92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-segment position; when P13.92=1, the rising edge of INFn.27 sets the operation of the multi-segment position, and the falling edge no action). Its running speed curve is as follows. The total number of segments is

assumed to be 2.



5.2.2.3 DI switch

In this mode, once the multi-segment position is triggered, the driver reads the valid status of INFn.31, INFn.30, INFn.29, and INFn.28 to select a certain position command. , and read the valid state of INFn.31, INFn.30, INFn.29, INFn.28 again to select another position command, if the valid state changes, select another position command to run. This is repeated until it is triggered to stop the operation of the multi-segment position, and then the operation is stopped.



5.2.2.4 Absolute or Relative Position Mode

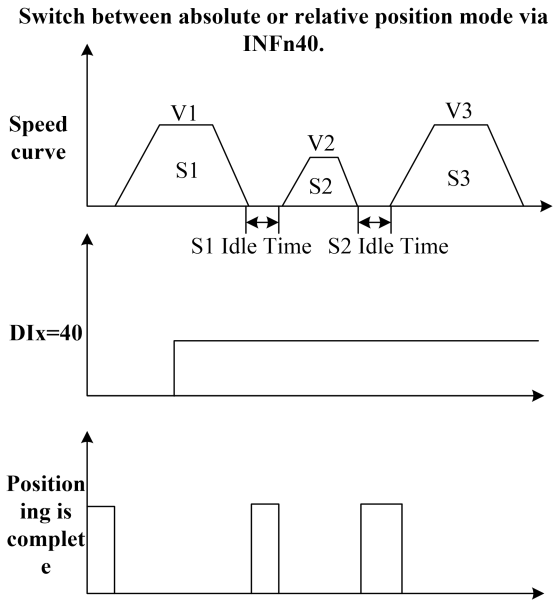
Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P13.05 1305 0x2013_5H	S16	P	RW	Immediately	-	1	0~3	Not
	Parameter Name：Absolute or Relative Position Mode Description： 0-Absolute position command 1- Relative position command 2-Depend upon INFn40 3-Depend upon P13.96							

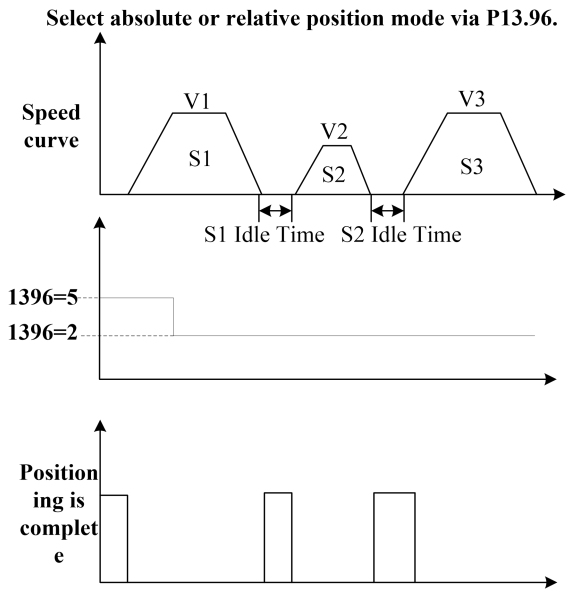
P13.01 has newly added "2 - Depends on INFn40" and "3 - Depends on P13.96".

"2 - Depends on INFn40": The switching between absolute or relative position mode can be triggered via an external IO port (with INFn40 configured in the DI register) or by directly activating INFn40. When INFn40 is activated, it is in relative position mode; otherwise, it is in absolute position mode. The switched mode will take effect for the next segment after INFn40 is activated.

"3 - Depends on P13.96": P13.96 can be used to specify which segment is in absolute or relative mode. For example, if P13.96=5 (converted to binary, it is 101), the first segment runs in relative position mode, the second segment in absolute position mode, and the third segment in relative position mode. If the value of P13.96 is modified during position operation, the switched mode will take effect when running the next segment.



When INFn40 is activated during S1 operation, S1 remains in absolute position mode, while subsequent S2 and S3 will operate in relative position mode.



When P13.96 is set to 5, S1 and S3 will operate in relative position mode, while S2 will run in absolute position mode. If P13.96 is modified to 2 during S1 operation, S1 will continue to run in relative position mode until completion, and the new value of P13.96 will take effect for the next segment. Specifically, S2 will switch from the previous absolute position mode to relative mode, and S3 will switch from the previous relative mode to absolute mode.

5.2.2.5 Homing Instructions Before Operating in Absolute Position Mode of Multi-Segment Position Mode

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.07	S16	P	RW	Immediately	-	1	0~32767	Not
1007 0x2010_7H	Parameter Name：Protection-related settings Description： BIT9:When is set to 0, absolute position commands are prohibited before homing; otherwise, a fault will be triggered. When BIT9 is set to 1, absolute position commands are allowed before homing.							

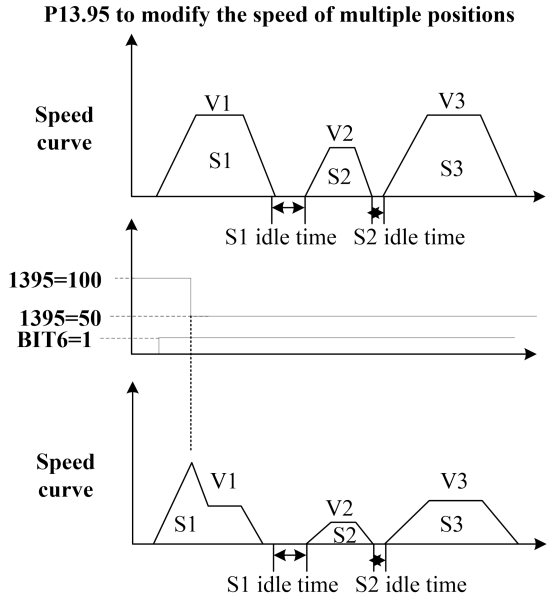
Previously, before operating in absolute position mode of multi-segment position mode, homing had to be completed; otherwise, an ER.205 fault would be triggered. After ARM firmware versions above 19x, through BIT9 of P10.07, it is possible to enable execution of absolute position points in multi-segment position mode without requiring homing.

5.2.2.6 Dynamic Attenuation Coefficient for Multi-Segment Position Speed Command

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.53	U16	PVT	RW	Immediately	-	0	0~65535	Not

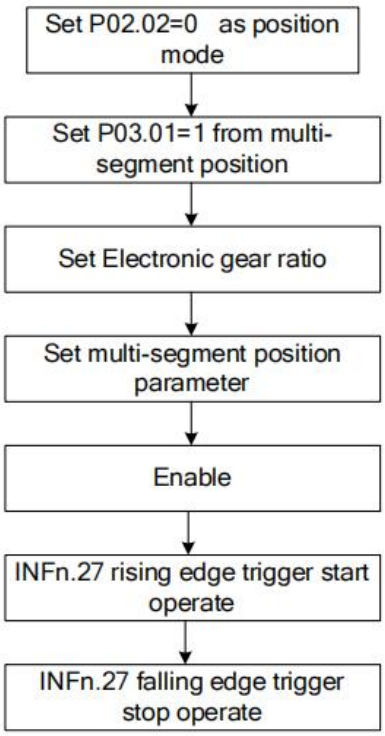
153 0x2001_35H	Parameter Name：Multifunctional parameter 4 Description：After activating BIT6, you can use the P13.95 parameter							
P13.95	S16	P	RW	Immediately	-	0	0~3000	Not
1395 0x2013_5FH	Parameter Name：Dynamic Attenuation Coefficient for Multi-Segment Position Speed Command Description：The speed can be modified in real time while running the position							

In conventional position mode, once triggered, the speed follows the preset planned speed, with no speed change allowed during operation. If speed adjustment midway is required while maintaining the original position command for the entire stroke, the dynamic speed attenuation function can be enabled. This function is enabled via BIT6 of P01.53. When enabled, the operating speed can be attenuated or amplified in real-time based on the original planned speed, while ensuring the final position matches the originally planned position.P13.95 applies to all position segments. If BIT6 of P01.53 is enabled, the operating speed within multi-segment position (whether in absolute or relative position mode) is controlled by P13.95. That is, when this parameter is modified, the speed values in all multi-segment positions will change in real-time with P13.95. Below, I will explain the usage of parameter P13.95 using a diagram.



As shown in the figure above, after enabling BIT6 of P01.53, when reducing the value of P13.95 from 100 to 50 during the operation of the S1 position segment, the speed V1 of the S1 segment will immediately drop to half of its original value ($\frac{1}{2}$ V1). The speeds of the subsequent S2 and S3 segments will also drop to half of their original values ($\frac{1}{2}$ V2 and $\frac{1}{2}$ V3, respectively).

5.2.2.7 The position command comes from the setting steps of the multi-segment position



5.2.3 Electronic gear ratio

Electronic Gear Ratio Setting Method

Set according to numerator and denominator, and calculate the motor encoder position using the following formula. Note: The numerator of the electronic gear ratio cannot be set to 0 in bus mode, and when the servo is powered on, the values of P03.08 and P03.10 will be respectively assigned to 6091h_1 and 6091h_2.

$$\text{User position command} \times \frac{\text{Electronic gear ratio numerator}}{\text{Electronic gear ratio denominator}} = \text{Location of motor encoder}$$

The system is available with two sets of electronic gear ratios, the relevant parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.08 308 0x2003_8H	S32	PV	RW	Immediately	-	0	0~2147483647	Not
	Parameter Name：Numerator of electronic gear ratio 1 Description： Set the numerator of the first set of electronic gear ratio for position command frequency division/multiplication.							
P03.10 310 0x2003_AH	S32	PV	RW	Immediately	-	1000	0~2147483647	Not
	Parameter Name：Denominator of electronic gear ratio 1 Description：Set the denominator of the first set of electronic gear ratio for position command frequency division/multiplication.							
P03.12 312 0x2003_CH	S32	PV	RW	Immediately	-	0	0~2147483647	Not
	Parameter Name：Numerator of electronic gear ratio 1 Description：Set the numerator of the second set of electronic gear ratio for position command frequency division/multiplication.							
P03.14 314 0x2003_EH	S32	PV	RW	Immediately	-	0	0~2147483647	Not
	Parameter Name：Denominator of electronic gear ratio 2 Description：Set the denominator of the second set of electronic gear ratio for position command frequency division/multiplication.							

The system defaults to using electronic gear ratio 1. It is also possible to switch between multiple electronic gear ratios via INFn.24 and INFn.56. The switching relationships are as follows.

INFn.56	INFn.24	Actual electronic gear ratio
invalid	invalid	$\frac{\text{Electronic gear ratio 1 numerator}}{\text{Electronic gear ratio 1 denominator}}$
invalid	valid	$\frac{\text{Electronic gear ratio 2 numerator}}{\text{Electronic gear ratio 2 denominator}}$

valid	invalid	$\frac{\text{Electronic gear ratio 1 numerator}}{\text{Electronic gear ratio 2 denominator}}$
valid	valid	$\frac{\text{Electronic gear ratio 2 numerator}}{\text{Electronic gear ratio 1 denominator}}$

5.2.4 Electronic gear ratio smooth switching function

When the electronic gear ratio changes greatly, it is easy to cause sudden changes in the motor speed. The internal electronic gear ratio can be switched smoothly through the P03.16 electronic gear ratio switching filter time constant.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.16	S16	PV	RW	Immediately	ms	0	0~32767	Not
316 0x2003_10H	Parameter Name：Electronic gear ratio switching time constant Description：Set the electronic gear ratio switching time to make the internal electronic gear ratio smoothly Switch.							

5.2.5 Position command filter function

The position command filtering is to filter the position command. Consider adding positional command filtering in the following situations.Note: P03.06 and P03.07 are also functional in bus mode, but require enabling via BIT0 of P08.34.

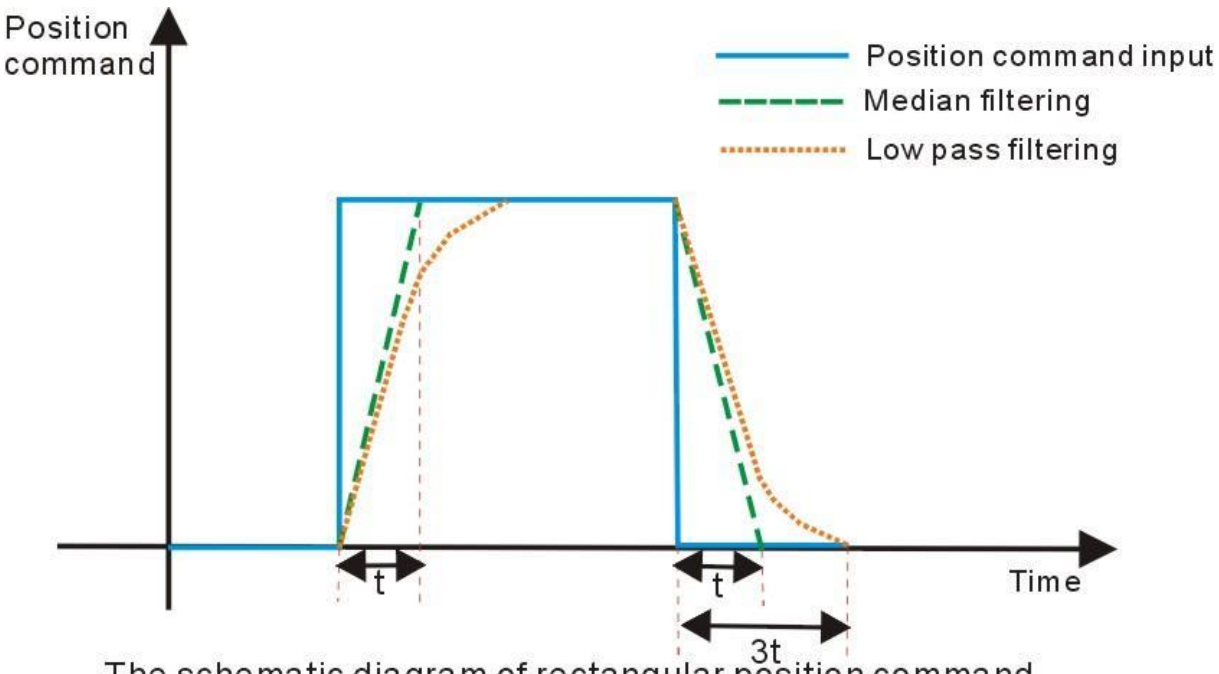
In the following situations, consider adding position command filtering:

- The position command output by the host controller is not accelerated or decelerated.
- The pulse command frequency is low;
- When the electronic gear ratio is 10 times or more.

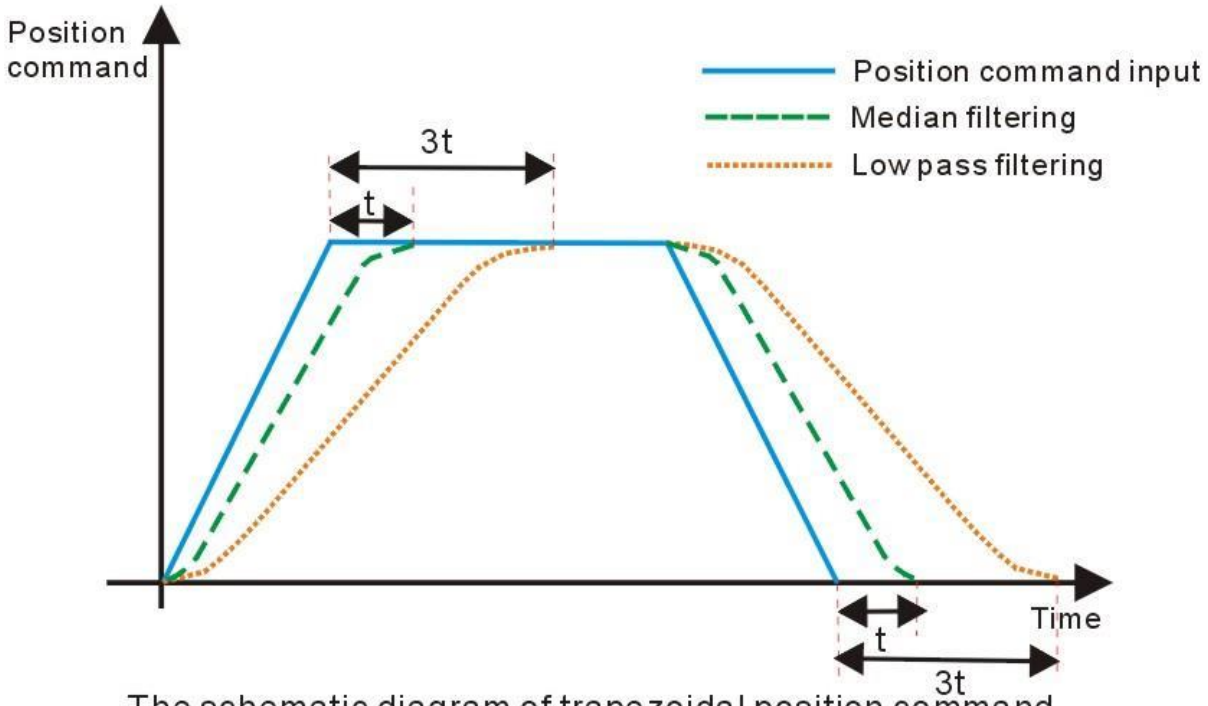
There are two filtering methods to choose from, one is a low-pass filter and the other is a median filter.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.06	S16	P	RW	Immediately	ms	0	0~128	Not
306 0x2003_6H	Parameter Name：Position command given median filter time constant Description：Set the median filter time constant for the position command (encoder unit).							
P03.07	S16	P	RW	Immediately	ms	20	0~32767	Not
307 0x2003_7H	Parameter Name：Position command given low-pass filter time constant Description：Set the low-pass filter time constant of the position command (encoder unit).							

The larger the filter time constant is set, the more severe the position command lags and the greater the position error during operation. The waveform is as follows.



The schematic diagram of rectangular position command low pass filtering and median filtering



The schematic diagram of trapezoidal position command low pass filtering and median filtering

5.2.6 Position deviation clear function

Position Deviation = (Position Command - Position Feedback) (Encoder Units)

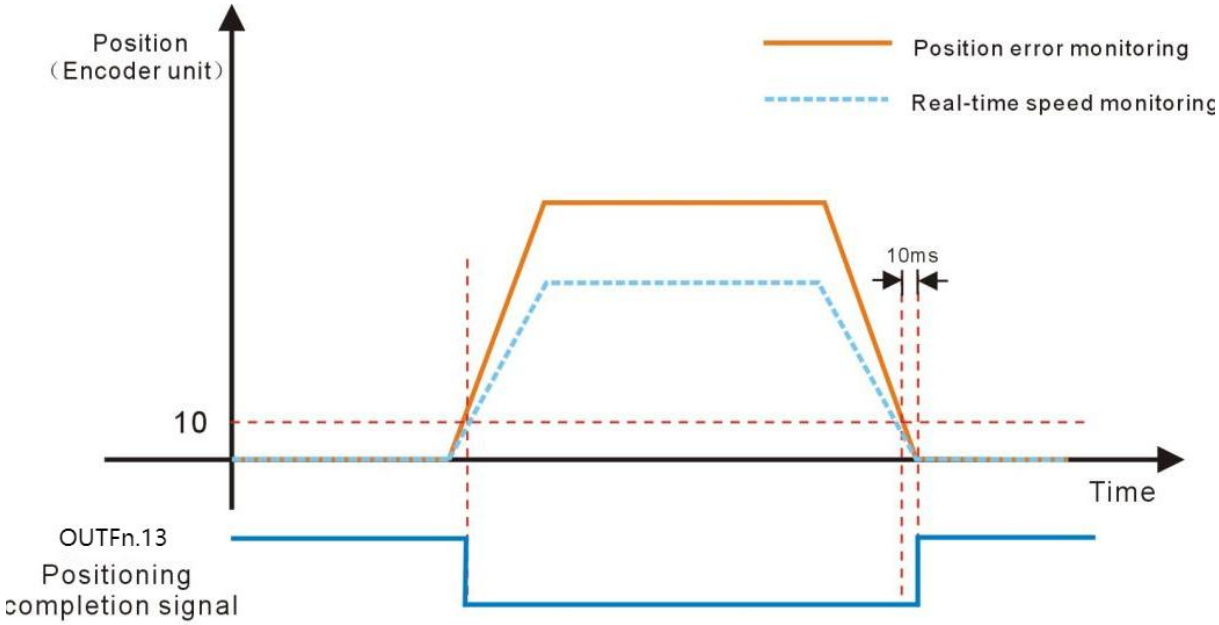
The position deviation clearing function is to clear the position error through the level change of the position deviation clearing signal INFn.25. For the position error clear function, there are several options to set the action of the drive after the position error is cleared.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.21 321 0x2003_15H	S16	P	RW	Immediately	-	0	0~3	Not
	Parameter Name：Position deviation clears signal pattern setting Description： 0- Clear deviation when ON 1-Retain 2-Clear deviation when OFF 3-Retain							
P03.22 322 0x2003_16H	S16	P	RW	Immediately	-	0	0~128	Not
	Parameter Name：Position deviation clearing options Description： 0-Clear position deviation, and the speed command immediately becomes zero. 1-Retain 2-Retain 3-Retain 4-Retain 5-Retain 6-Retain							

5.2.7 Positioning complete/proximity function

The positioning completion function means that the absolute value of the position error P03.17 satisfies the user-set condition P03.45 and maintains the time threshold (ms) set by P03.49, and it can be considered that the positioning is completed in the position control mode. At this time, the servo drive can output a positioning completion signal, and the host computer can confirm that the positioning of the servo drive is completed when the signal is received. For the output signal of positioning completion/positioning approaching, you can directly configure the DOx function control register, and the signal is monitored through the DO terminal valid state (P06.49).

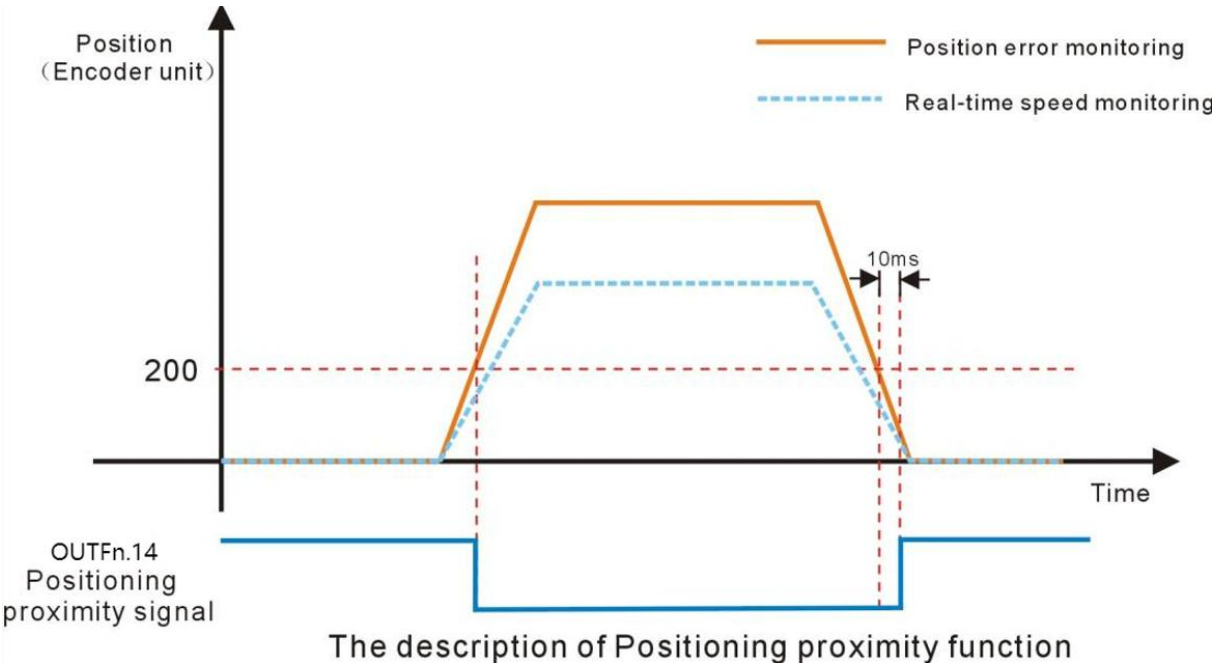
As shown in the figure below, when the positioning completion threshold is set to 10 units (10*0.0001 cycles), and the hold time is set to 10ms, the DO outputs the positioning completion signal.



The description of Positioning completion function

The positioning close function means that the absolute value of the position error P03.17 satisfies the condition P03.47 set by the user, and the time threshold (ms) set by P03.49 is maintained, and the positioning is considered to be close in the position control mode. At this time, the servo driver can output a positioning close signal, and the host constroller receives the signal to confirm that the servo driver is positioned close.

As shown in the figure below, the positioning close threshold is set to 200 pulses, and when the hold time is set to 10 ms, the DO output the positioning signal.



The description of Positioning proximity function

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.45	S16	P	RW	Reposition	-	0	0~2	Not

345 0x2003_2DH	Parameter Name：Positioning completion signal output condition Description： 0 - Output when position error is less than the positioning completion threshold; otherwise, clear output. 1 - Output when position error is less than the positioning completion threshold AND the speed command (P03.95) in position mode is zero; otherwise, clear output. 2 - Output when position error is less than the positioning completion threshold AND the filtered speed command (P03.96) in position mode is zero; otherwise, clear output. 3 - Output when position error is less than the positioning completion threshold AND the speed command (P03.95) in position mode is zero; clear output when the speed command (P03.95) in position mode is non-zero. 4 - Output when multi-segment position commands are fully sent AND position error is less than the positioning completion threshold. 5 - Output when multi-segment position commands are fully sent, position error is less than the positioning completion threshold, AND the hold time is maintained; otherwise, clear output. 6 - Reserved. 7 - Reserved. 8 - Reserved. 9 - Reserved. 10 - Output when all commands are sent, position error converges within a certain range, AND remains so for a set time; cleared when a trigger command is received. If load disturbance occurs during the process, the positioning completion status remains unchanged. 11 - Output when the load position (P02.62/P03.90) approaches the target position (P13.10) within a certain range AND remains so for a set time; cleared when a trigger command is received. If load disturbance occurs during the process, the positioning completion status remains unchanged (only applicable to absolute positioning mode).							
P03.46 346 0x2003_2EH	S16	P	RW	Immediately	0.0001rpm	0	0~32767	Not
	Parameter Name：Positioning completion threshold							
P03.47 347 0x2003_2FH	S16	P	RW	Immediately	-	0	0~3	Not
	Parameter Name：Positioning close signal output condition Description： 0-Output when the position error is less than the positioning close threshold, otherwise clear the output; 1-Output when The position error is smaller than the positioning close threshold and the speed command in position mode P03.95 is zero, otherwise the output is cleared; 2-Output when The position error is less than the positioning close threshold and the filtered speed command in position mode P03.96 is zero, otherwise the output is cleared; 3-Output when the position error is less than the positioning close threshold and the speed command in position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero							
P03.48 348 0x2003_30H	S16	P	RW	Immediately	0.0001rpm	0	0~32767	Not
	Parameter Name：Positioning close threshold							
P03.49 349	S16	P	RW	Immediately	ms	0	0~32767	Not
	Parameter Name：Positioning completion/close time threshold							

0x2003_31H								
P03.17 317 0x2003_11H	S32	P	RO	Immediately	0.0001rpm	-	-	Not
	Parameter Name：Position error							
P03.95 395 0x2003_5FH	S16	PVT	RO	Immediately	rpm	-	-	Not
	Parameter Name：The speed command in position mode							
P03.96 396 0x2003_60H	S16	PVT	RO	Immediately	rpm	-	-	Not
	Parameter Name：The filtered speed command in position mode							

Related output function bits are as follows.

Function bits	Bit description
OUTFn.13	Positioning completion signal output，active when Positioning completion
OUTFn.14	Positioning close signal output，active when Positioning close

5.2.8 Pulse frequency division output function

The servo pulse frequency division output function has only one type: open-collector signal output.

The servo can output motor encoder pulses by setting parameter P06.40, and these motor pulses support frequency-divided output. In this mode, the maximum output frequency of the motor pulses is 3 kHz, with output ports DO1 and DO2.

The frequency division factor for motor pulse output can be configured via parameter P03.79.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.78 378 0x2003_4EH	S16	P	RW	Reposition	-	0	0~2	Not
	Parameter Name：Selection of servo pulse output source Description： 0-output motor pulse 1-output command pulse 2-no output, as input							
P03.79 379 0x2003_4FH	U16	P	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Motor Pulse Output Parameters Description： Motor Pulse Output Parameters. For absolute encoders, this parameter defines the number of pulses output per revolution. For example, if set to 10,000, the motor pulse output port will output 10,000 pulses (after 4x frequency multiplication) when the motor completes one full revolution. If set to 5,000, it will output 5,000 pulses per revolution. If set to 0, the value is automatically set to 10,000 internally, meaning the motor pulse							

	output port will output 10,000 pulses per revolution.							
P03.80	S16	P	RW	Reposition	-	0	0~1	Not
380	Parameter Name：Output direction of pulse frequency division							
0x2003_50H	Description： 0-forward output, 1-reverse output.							
P06.40	S16	PVT	RW	Immediately	-	0	0~32767	Not
640	Parameter Name：DO1DO2 function control register							
0x2006_28H	Description：E=[BIT1-BIT0] configures the functions of DO1 and DO2. When E=0, DO1 and DO2 output according to the functions configured in P06.41 and P06.42 respectively. When E=1, DO1 and DO2 output A/B pulses respectively. When E=2, DO1 outputs the Z-phase signal, and DO2 outputs according to the function configured in P06.42. When E=3, DO2 and DO3 output A/B pulses respectively.D=[BIT3-BIT2] configures the DI speed settings. When D=0, the speed is automatically set based on the DI function bits. When D=1, DI9 and DI10 are fixed as high-speed DIs, while the others are low-speed DIs. When D=2, DI3 and DI4 are fixed as high-speed DIs, while the others are low-speed DIs.							

5.2.9 Z point pulse output function

The servo can configure DO1 to output the Z-phase pulse signal via parameter P06.40. The Z-phase pulse is output as an open-collector signal, and when the motor speed is below 3000rpm, the active level duration of the pulse exceeds 5ms.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.81	S16	P	RW	Reposition	-	0	0~1	Not
381	Parameter Name：Z pulse polarity selection							
0x2003_51H	Description： 0- forward output 1- reverse output							

5.2.10 Homing

The servo has multiple home zeroing modes. The user can choose the appropriate origin return mode according to the site conditions and process requirements. The parameters related to zero return are as follows.

Remarks: Before using the zero return function, you need to set the enable software and hardware limit P03.73 to 0 or 2. When it is set to 1, triggering the forward and reverse limit will cause the servo motor to directly enter the fault protection state and cannot continue to complete the zero return. operate.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.51	S16	P	RW	Immediately	-	1	0~99	Not
351	Parameter Name：Homing method							
0x2003_33H	Description：							

	Set homing mode.							
P03.52 352 0x2003_34H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Homing acceleration/deceleration time.							
P03.53 353 0x2003_35H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：High Homing Speed.							
P03.54 354 0x2003_36H	S16	P	RW	Immediately	rpm	100	0~32767	Not
	Parameter Name：Low Homing Speed.							
P03.55 355 0x2003_37H	S32	P	RW	Immediately	UserUnit	0	-2147483648~2147483648	Not
	Parameter Name：Post-Homing Offset							
P03.57 357 0x2003_39H	S16	P	RW	Immediately	0.0001rpm	-	0~32767	Not
	Parameter Name：Home Range							

The associated input function bits are as follows.

Function bits	Bit description
INFn.26	Trigger Homing
INFn.34	Zero point switch input
INFn.43	Positive position limit switch
INFn.44	Negative position limit switch

The associated output function bits are as follows.

Function bits	Bit description
OUTFn.15	Homing completes output. When the encoder position of the motor is within the Zero point range, and the speed reference in the position mode P09.89=0, the time of P03.49 is also maintained, and the Homing completes output signal is output.

The VECServo has a variety of homing method to choose from, including:

(1) Method 1: Depends on the negative position limit switch and Z index pulse;

(2) Method 2: Depends on the positive position limit switch and Z index pulse;

(3) Method 3-Method 6: Depends on the zero position switch and Z index pulse;

(4) Method 7-Method 10: Depends on the zero position switch, positive position limit switch and Z index pulse;

(5) Method 11 - Method 14: Depends on the zero position switch, negative position limit switch
and Z index pulse

(6) Method 17: Depends on the negative position limit switch

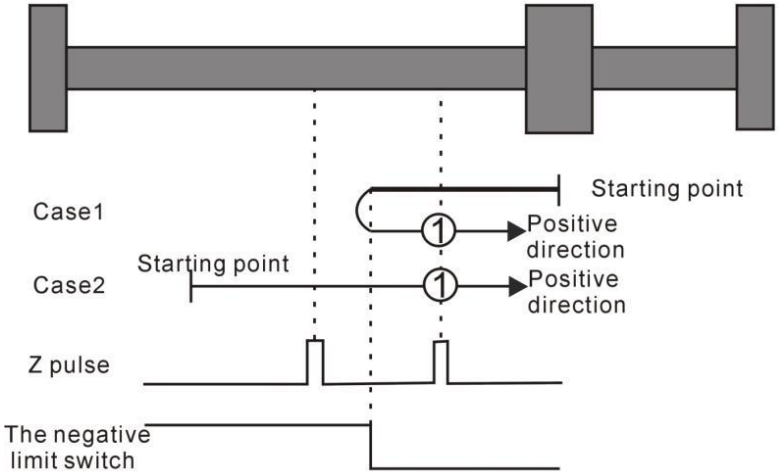
(7) Method 18: Depends on the positive position limit switch

(8) Method 19 - Method 22: Depends on the zero position switch
(9) Method 23 - Method 26: Depends on the zero position switch, positive position limit switch
(10) Method 27 - Method 30: Depends on the zero position switch, negative position limit switch
(11) Method 33 - Method 34: Depends on the Z pulse
(12) Method 35: Depends on the current position

Homing method 1: Homing on the negative limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the negative limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and the starts to move at second speed; the position where the first Z index pulse is encountered when the negative

Case 2: When the user triggers the execution of homing, if the negative limit switch state is at the high level, the axis starts to move in the positive direction at the second speed, and the first Z index pulse is encountered when the negative limit switch state is at the low level. The location is the zero point position.

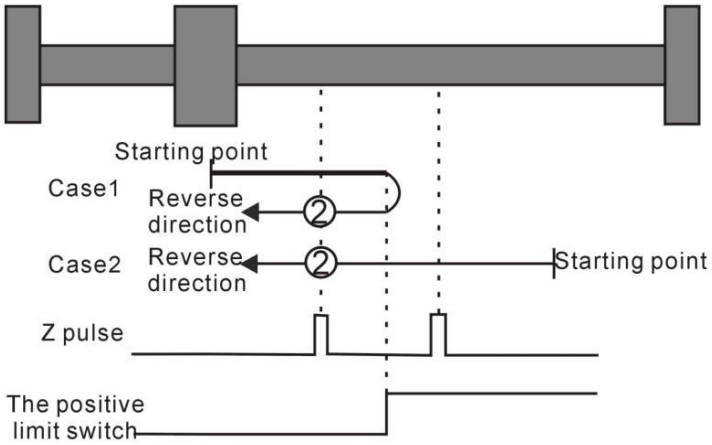


Homing method 1: Homing on the negative limit switch and Z index pulse

Homing method 2: Homing on the positive limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the positive limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive limit switch is in the high level, the moving direction changes and moving speed changes at the second speed, the position where the first Z index pulse is encountered when the positive limit switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the positive limit switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the first Z index pulse is encountered when the positive limit switch state is at the low level. The location is the zero point position.



Homing method 2: Homing on the positive limit switch and Z index pulse

Homing method 3 ~ 6 Homing on the home switch and the Z index pulse

Homing method 3

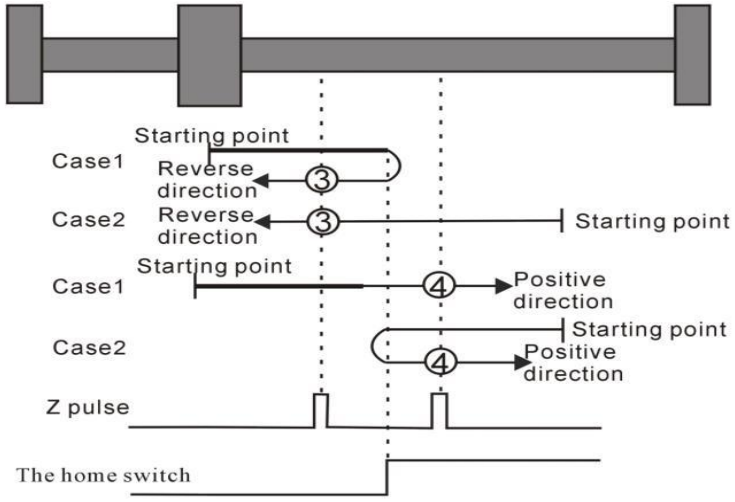
Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the origin switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the position where the first Z index pulse is encountered when the home switch state is at the low level is the zero point position.

Homing method 4

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed is reversed. The position of a Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves in the reverse direction at the second speed, and the position where the first Z index pulse is encountered is the zero point position.



Homing method 3 ~ 4 Homing on the home switch and the Z index pulse

Homing method 5

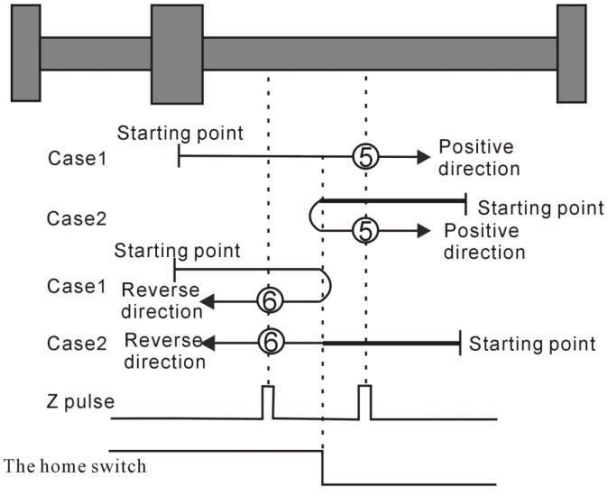
Case 1: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts to move forward at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Homing method 6

Case 1: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move forward in the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves forward in the second speed, and the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers to perform zero return, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered is the zero point position.



Homing method 5 ~ 6 Homing on the home switch and the Z index pulse

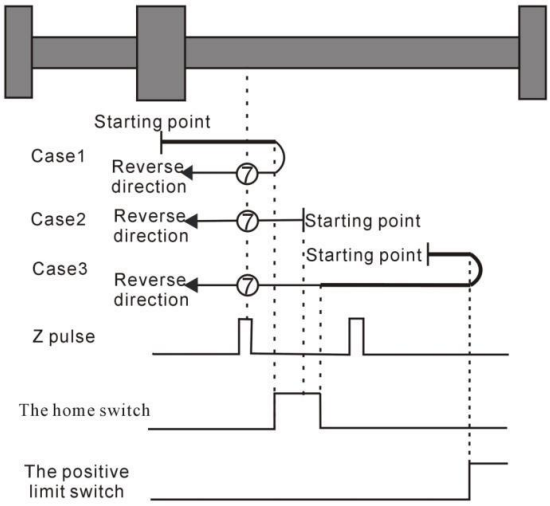
Homing method 7 ~ 10 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 7

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high position, the axis directly starts to move in the reverse direction at the second speed. When the origin switch state is at a low level, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The movement starts at the first speed, and when the home switch is in the high level, the movement starts at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.



Homing method 7 Homing on the home switch, positive limit switch, and Z index pulse

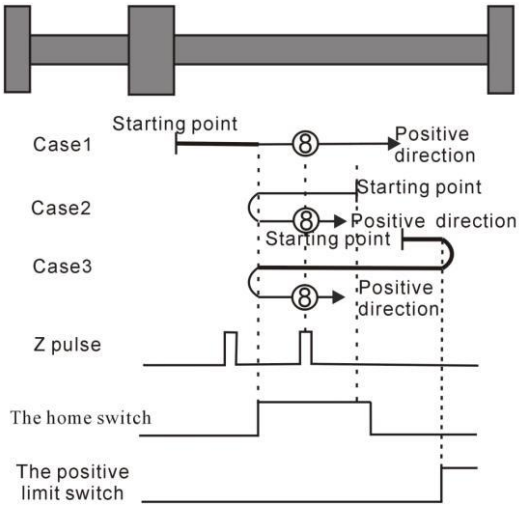
Homing method 8

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed starts to move. The position of the first Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis directly starts the reverse motion at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes.

When the home switch is in the high level, it still moves at the first speed. The motion direction changes when the home switch state is low, and then starts to move at the second speed. When the home switch in the high level, and the position where the first Z index pulse is encountered is the zero point position.



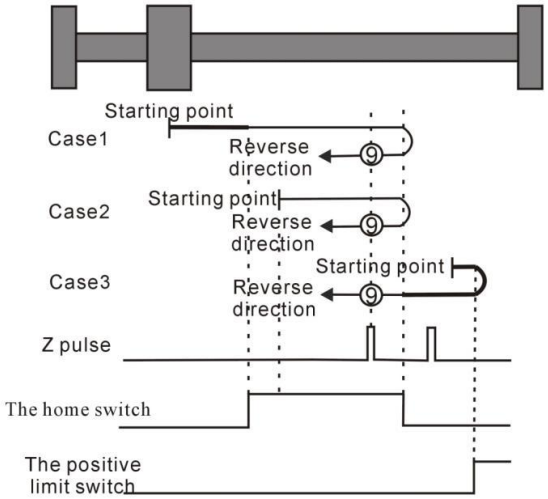
Homing method 8 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 9

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the direction of motion changes and continues to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis starts to move forward at the second speed, until when the origin switch is at a low level, the movement direction changes and starts to move at the second speed , when the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered is the home position.



Homing method 9 Homing on the home switch, positive limit switch, and Z index pulse

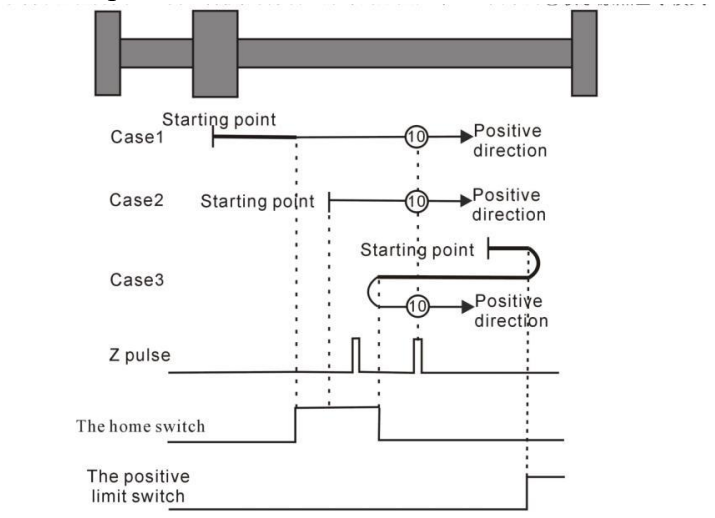
Homing method 10

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is in the low position, the position where the first Z pulse is encountered is the home position.

Case 2: When the user triggers the execution of homing, if the origin switch state is at a high position, the axis starts to move forward at the second speed. When the origin switch is at a low position, the position where the first Z pulse is encountered is the origin position .

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed. When the home switch is at a low position, the position where the first Z pulse

is encountered is the home position.



Homing method 10 Homing on the home switch, positive limit switch, and Z index pulse

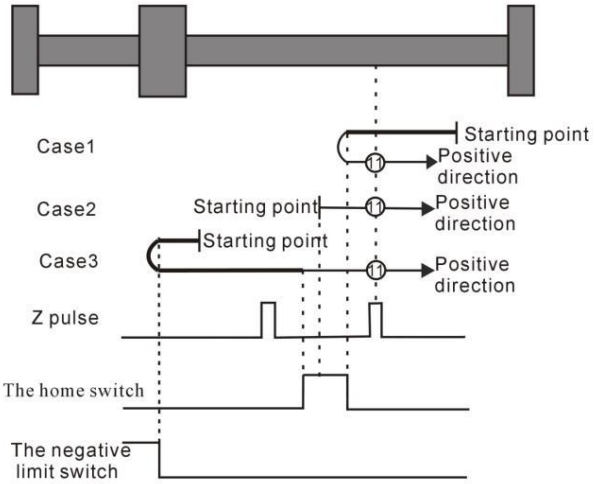
Homing method 11 ~ 14 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 11

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position where the first Z pulse is encountered when the home switch state is low is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high position, the axis directly starts to move forward at the second speed, and the position where the first Z pulse is encountered when the origin switch state is at a low position is the origin position.

Case3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered when the home switch is at a low state is the home position.



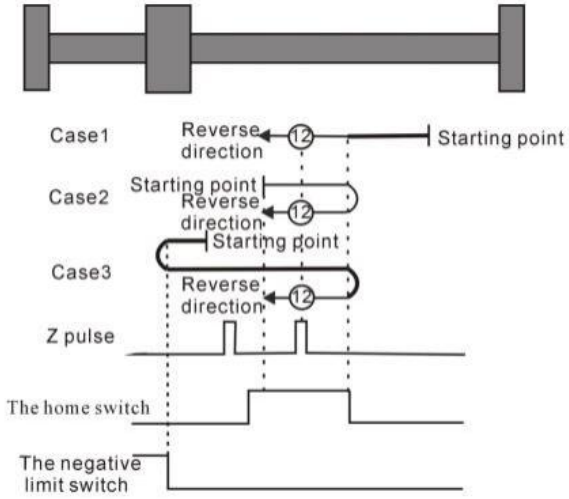
Homing method 11 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 12

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position of the Z pulses is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. , when the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the first speed. When it encounters the home switch When it is in the high position, it starts to move at the second speed, and the position where it encounters the first Z pulse is the origin position.



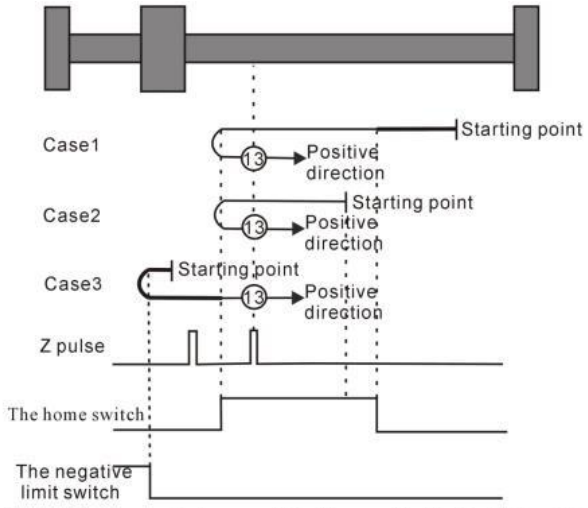
Homing method 12 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 13

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first stage speed. When the origin switch is in the high position, it starts to move at the second stage speed. When the switch is in the low position, the movement direction changes and starts to move at the second speed. When the origin switch is in the high position, the position where the first Z pulse is encountered is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis will directly move in the reverse direction at the second speed. When the origin switch is at a high position, the position where the first Z pulse is encountered is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, start moving at the second speed, and the position where the first Z pulse is encountered is the home position.



Homing method 13 Homing on the home switch, the negative limit switch and the Z index pulse

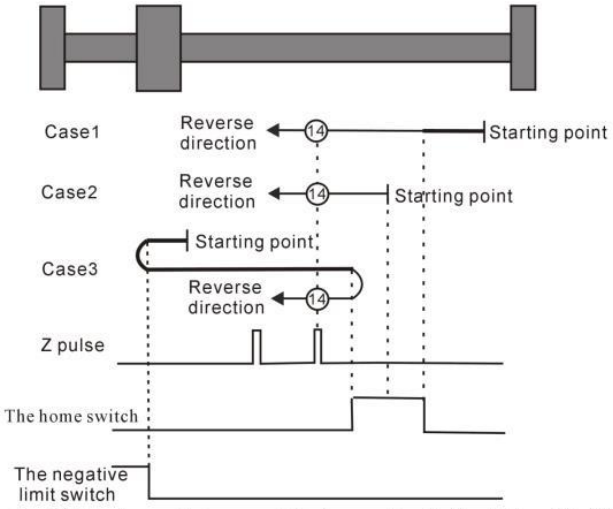
Homing method 14

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is in the low position, the position where the first Z pulse is encountered is the home position.

Case 2: When the user triggers the execution of homing, if the origin switch state is at a high position, the axis starts to move in the reverse direction at the second speed. When the origin switch is at a low position, the position where the first Z pulse is encountered is the origin position .

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start to move at the first speed, when the

origin switch is at a high position, the direction of movement changes again and starts to move at the second speed, when the home switch is at a low position, the position where the first Z pulse is encountered is the origin position.



Homing method 14 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 15 ~ Homing method 16 Reserved

• Homing method 15 and Homing method 16 are reserved as the Homing method for future development.

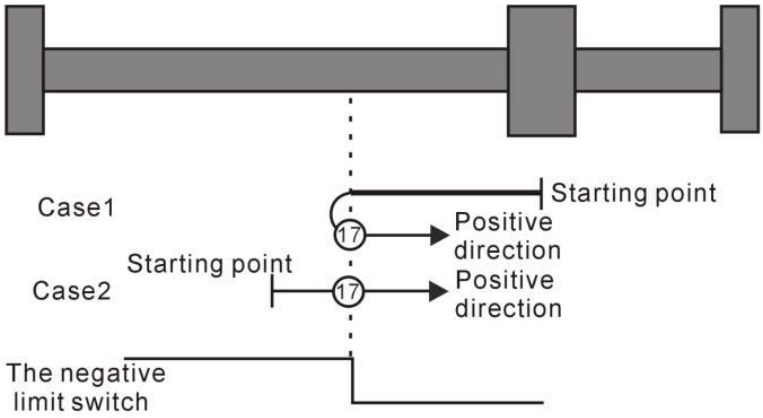
Homing method 17 ~ homing method 30 does not require Z index pulse

Mode 17 to Mode 30 are similar to Mode 1 to Mode 14 mentioned above, except that the positioning of their origin return position no longer requires Z pulses, but only according to the state change of the relevant origin switch and limit switch. Mode 17 is similar to Mode 1, Mode 18 is similar to Mode 2, Mode 19 and Mode 20 are similar to Mode 3, Mode 21 and Mode 22 are similar to Mode 5, Mode 23 and Mode 24 are similar to Mode 7, Mode 25 and Mode 26 are similar to Mode 9 above. Mode 27 and Mode 28 are similar to the previous Mode 11, and Mode 29 and Mode 30 are similar to the previous Mode 13.

Homing method 17：Origin return depending on the reverse operation limit switch

Case 1: When the user triggers the execution of homing, if the negative position limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and starts to move at the second speed; the position when the negative limit switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of zero return, if the state of the reverse operation limit switch is at a high position, the axis starts to move forward at the second speed, and the position when the reverse operation limit switch state is at a low position is the origin position.



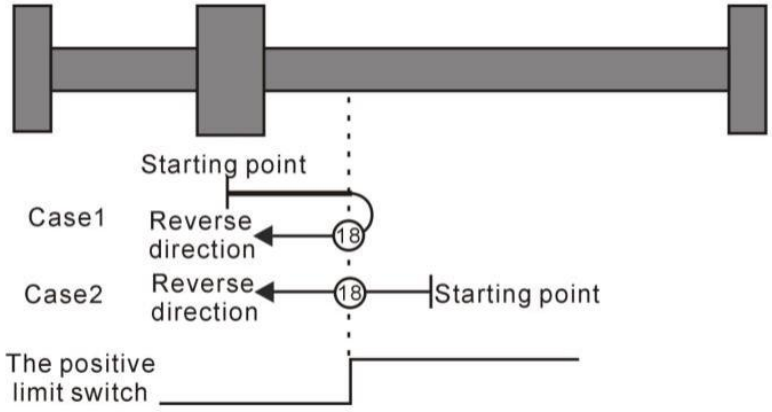
Homing method 17: Homing on the negative limit switch

Homing method 18:Homing on the positive limit switch

Case 1: When the user triggers the execution of homing, if the positive position limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive position limit switch is in the high level, the moving direction changes and starts to move at second speed, and the position at the time when the positive limit switch state is at the low level is the zero point position.

Case 2: When the user triggers the execution of the zero return, if the forward running limit switch state is at a high position, the axis will directly start reverse movement at the second speed, and the position when the forward running limit switch state is at a low position

is the origin position.



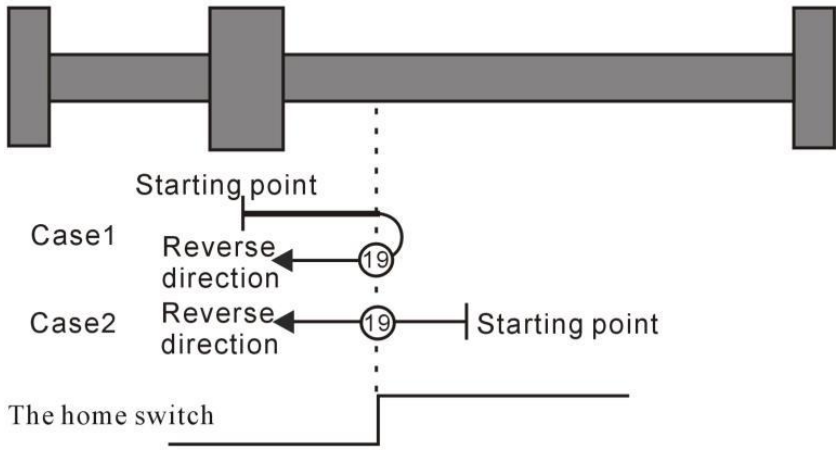
Homing method 18: Homing on the positive limit switch

Homing method 19~ Homing method 20 Depends on the origin return of the origin switch

Homing method 19

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the origin switch is in the low position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move in the reverse direction at the second speed, and the position when the origin switch is in the low position is the origin position.

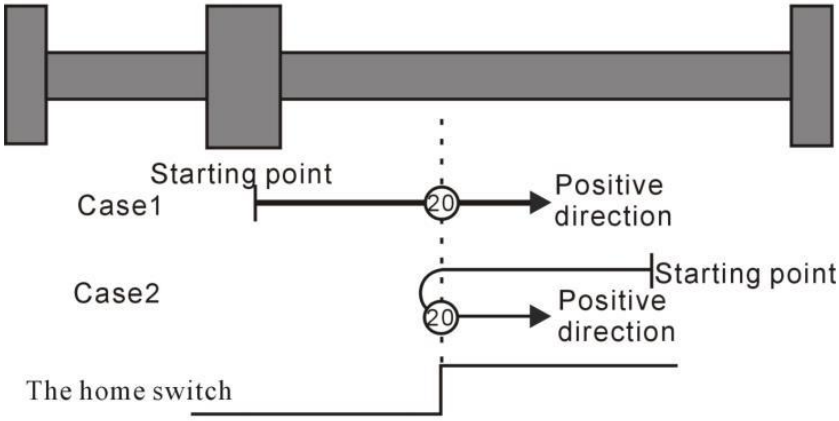


Homing method 19 Homing on the home switch

Homing method 20

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move forward at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis starts to move in the reverse direction at the second speed. When the origin switch is at a low level, the movement direction changes and starts at the first speed. , the position when the origin switch is in high position is the origin position.

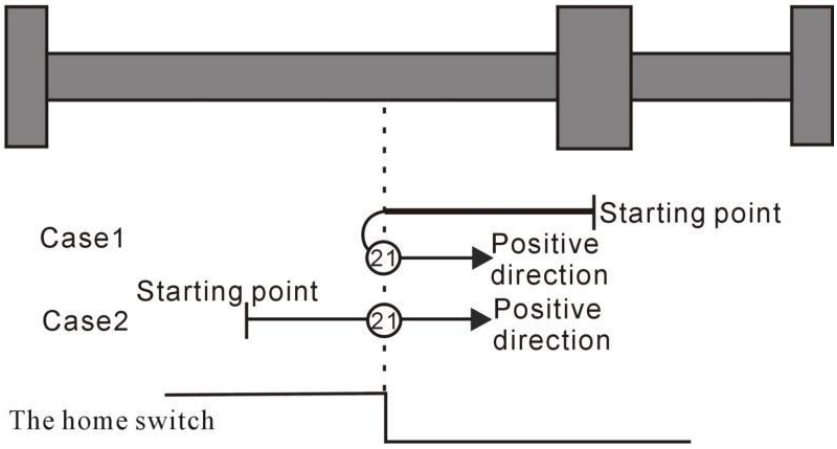


Homing method 20 Homing on the home switch

Homing method 21

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the origin switch is in the low position is the origin position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis directly starts to move forward at the second speed, and the position when the origin switch is in the low position is the origin position.

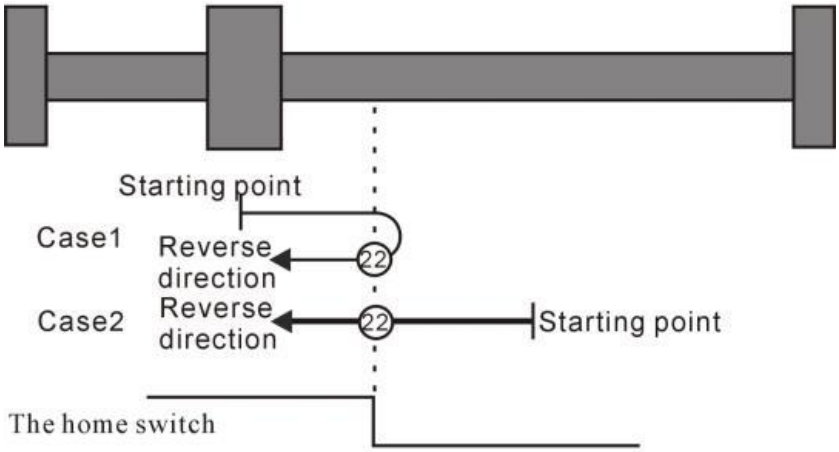


Homing method 21 Homing on the home switch

Homing method 22

Case 1: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts at the first speed. , the position when the origin switch is in high position is the origin position.

Case 2: When the user triggers the execution of homing, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed, and the position when the origin switch is in the high position is the origin position.



Homing method 22 Homing on the home switch

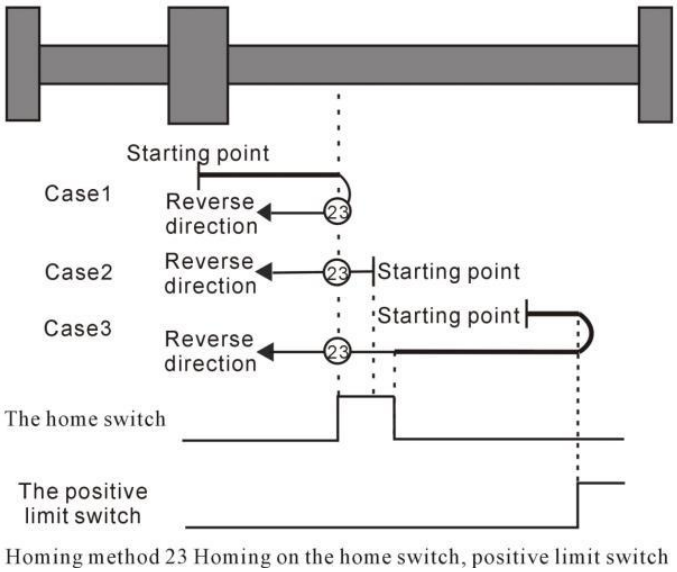
Homing method 23 ~ 26 Origin return depending on origin switch, forward run limit

Homing method 23

Situation 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the home switch state is low is the home position.

Scenario 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move in the reverse direction at the second speed, and the position when the origin switch state is in the low position is the origin position.

Scenario 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, when the origin switch is in the high position, start the movement at the second speed, and the position when the origin switch is in the low position is the origin position.



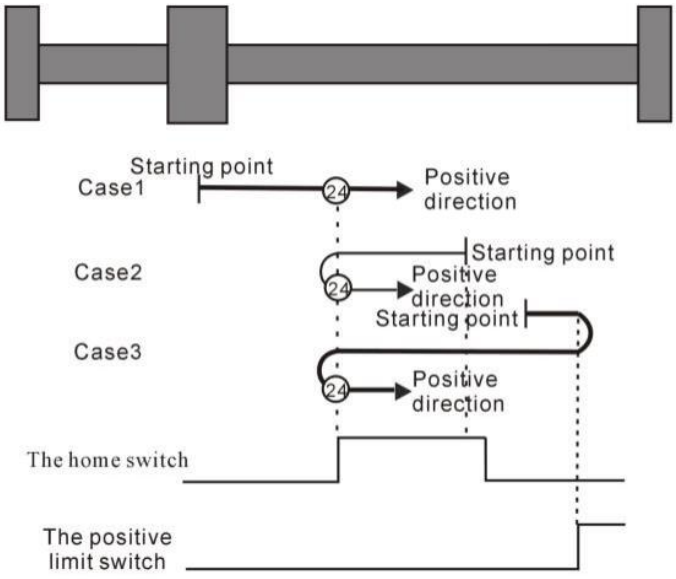
Homing method 23 Homing on the home switch, positive limit switch

Homing method 24

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move forward at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2：When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move in reverse at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. The position when the home switch is in the high position is the home position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the second speed. When it encounters the home switch The position at the high position is the origin position.



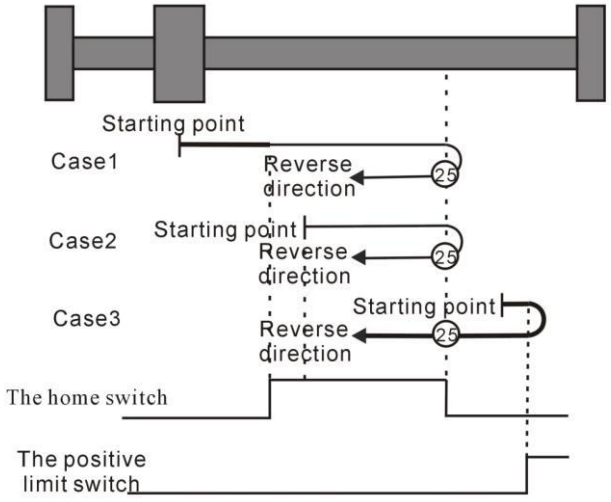
Homing method 24 Homing on the home switch, positive limit switch

Homing method 25

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. When the switch is at the low position, the movement direction changes and starts to move at the second speed. When the home switch is at the high position, the position is the home position.

Case 2: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. The position when the origin switch is at a high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, and the position when the origin switch is at a high position is the origin position.



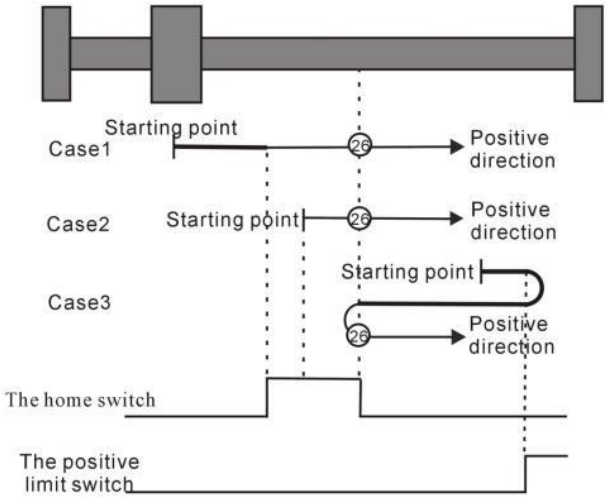
Homing method 25 Homing on the home switch, positive limit switch

Homing method 26

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move forward at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position when the switch is in the low position is the origin position.

Case 2: When the user triggers the execution of zero return, if the state of the origin switch is in the high position, the axis starts to move forward at the second speed, and the position when the origin switch is in the low position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move forward at the first speed. When the origin switch is in the low position and the forward operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed, and the position when the home switch is at a low position is the home position.



Homing method 26 Homing on the home switch, positive limit switch

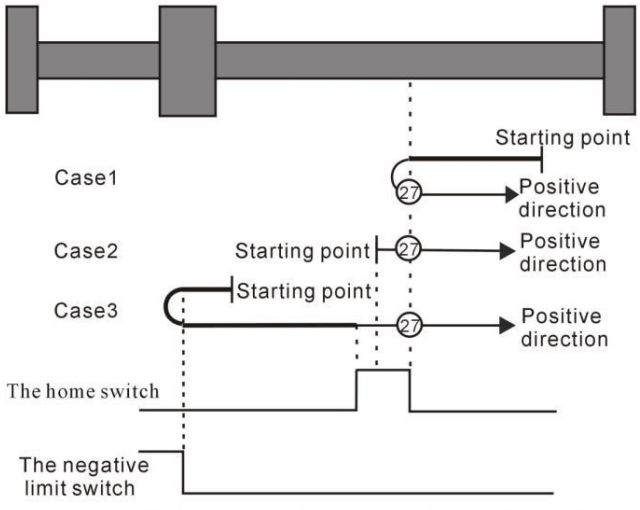
Homing method 27 ~ 30 Origin return depending on origin switch, reverse run limit

Homing method 27

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, the movement direction changes and starts to move at the second speed. The position when the home switch state is low is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is in the high position, the axis starts to move forward at the second speed, and the position when the origin switch state is in the low position is the origin position.

Case 3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start to move at the first speed, when the origin switch is at a high position, start to move at the second speed, and the position when the home switch is at a low position is the home position.



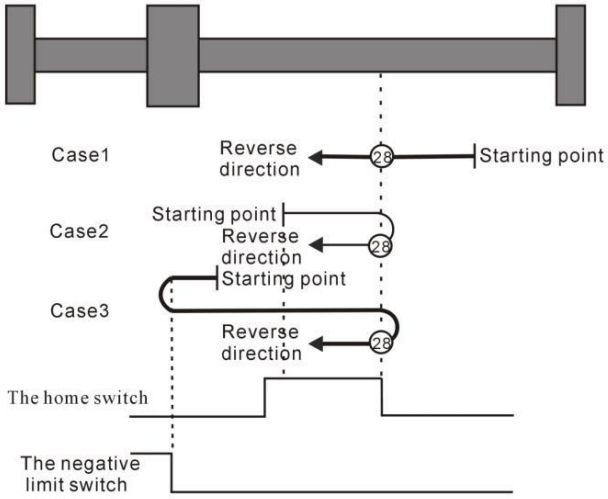
Homing method 27 Homing on the home switch, the negative limit switch

Homing method 28

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed, and the position when the origin switch is in the high position is the origin position.

Case 2: When the user triggers the execution of zero return, if the origin switch state is at a high level, the axis directly starts to move forward at the second speed. When the origin switch is at a low level, the movement direction changes and starts to move at the second speed. , the position when the origin switch is in high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and It starts to move at the first speed. When the origin switch is at a high position, it still moves at the first speed. When the home switch is at a low state, the movement direction changes and starts to move at the second speed. When it encounters the home switch The position at the high position is the origin position.



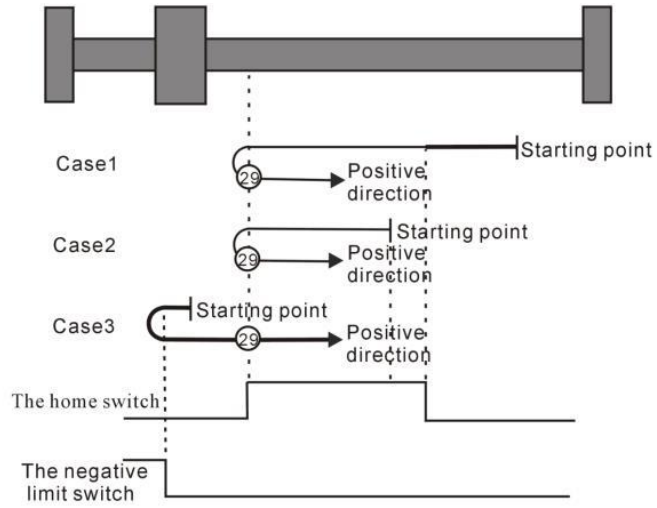
Homing method 28 Homing on the home switch, the negative limit switch

Homing method 29

Case 1: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first stage speed. When the origin switch is in the high position, it starts to move at the second stage speed. When the switch is at the low position, the movement direction changes and starts to move at the second speed. When the home switch is at the high position, the position is the home position.

Case 2: When the user triggers the execution of the zero return, if the origin switch state is at a high level, the axis will directly move in the reverse direction at the second speed. The position when the origin switch is at a high position is the origin position.

Case 3: When the user triggers the execution of zero return, if the state of the origin switch is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start the movement at the first speed, and the position when the origin switch is at a high position is the origin position.



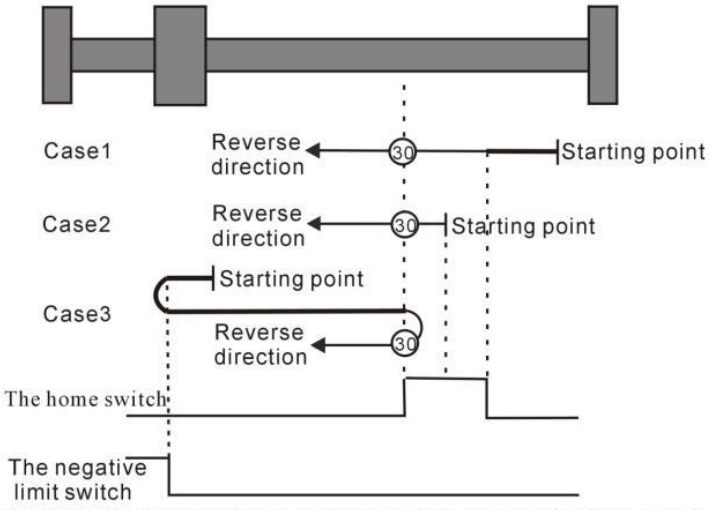
Homing method 29 Homing on the home switch, the negative limit switch

Homing method 30

Case 1: When the user triggers the execution of the zero return, if the origin switch state is at a low level, the axis starts to move in the reverse direction at the first speed. When the origin switch is at a high level, it starts to move at the second speed. The position when the home switch is in the low position is the home position.

Case 2: When the user triggers the execution of homing, if the state of the origin switch is in the high position, the axis starts to move in the reverse direction at the second speed. When the origin switch is in the low position, the position is the origin position.

Scenario 3: When the user triggers the execution of the zero return, if the origin switch state is in the low position, the axis starts to move in the reverse direction at the first speed. When the origin switch is in the low position and the reverse operation limit switch is in the high position, the movement direction changes and Start moving at the first speed, when the origin switch is at a high position, the movement direction changes again and starts moving at the second speed, and the position when the home switch is at a low position is the home position.



Homing method 30 Homing on the home switch, the negative limit switch

Homing method 31 and 32 are reserved.

Homing method 31~32 are reserved as homing modes for later development.

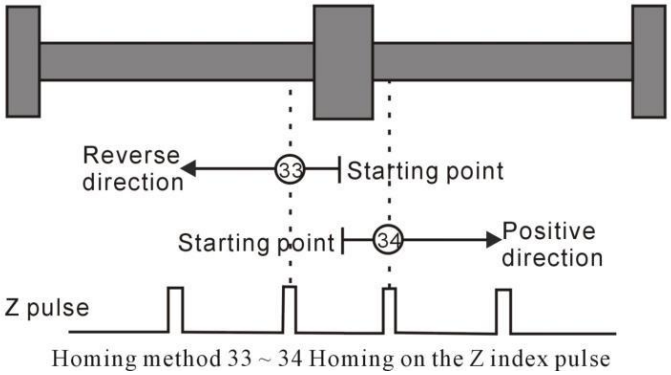
Homing method 33~34 Depends on Z pulse

Homing method 33

In mode 33, when the user triggers the execution of homing, the axis starts to move in the reverse direction at the second speed, and the position where the first Z pulse is encountered is the origin position.

Homing method 34

In mode 34, when the user triggers the execution of homing, the axis starts to move forward at the second speed, and the position where the first Z pulse is encountered is the origin position.



Homing method 33 ~ 34 Homing on the Z index pulse

Homing method 35：depends on current location

In mode 35, when the user triggers the home return, the axis does not move, and the current position of the axis is considered to be the home position.

5.2.11 4th power position curve function

Generally speaking, a trapezoidal velocity curve is used for position planning inside the servo. The trapezoidal speed curve has a certain impact on the machine. In order to reduce the impact of the trapezoidal speed curve on the machine, the 4th power position curve function can be enabled. After enabling, the position curve is planned with a 4th power curve, which can greatly reduce the impact on the mechanical system.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.82	S16	P	RW	Enable effective	-	0	0~1	Not
382	Parameter Name：Enable 4th power curve planning							
0x2003_52H	Description：Select Curve Planning Algorithm							
	0- Adopt Trapezoidal Velocity Profile							
	1- Using a 4th power curve							

5.2.12 Torque limit function

Position mode torque limit and torque mode torque limit are the same. Refer to (5.4.3 Torque Limit).

5.2.13 Travel limit function

Both velocity mode and position mode are equipped with hardware and software limit functions. When software limit is enabled, if the encoder position value is less than the software limit lower value (P03.74) and the motor is moving in the negative direction, a software limit fault (Er207) will be triggered. Similarly, if the encoder position value exceeds the software limit upper value (P03.76) and the motor is moving in the positive direction, the same fault (Er207) will be reported. To disable software limit and use only hardware limit, set both software limit upper and lower values to 0.

A new over-travel limit function has been added. This function is designed to prevent false alarms when the motor experiences minor displacement during limit alarm reset after hitting the limit. For usage details, refer to the parameter description of P03.73 below.

Note: The over-travel limit function is only valid for hardware limits.

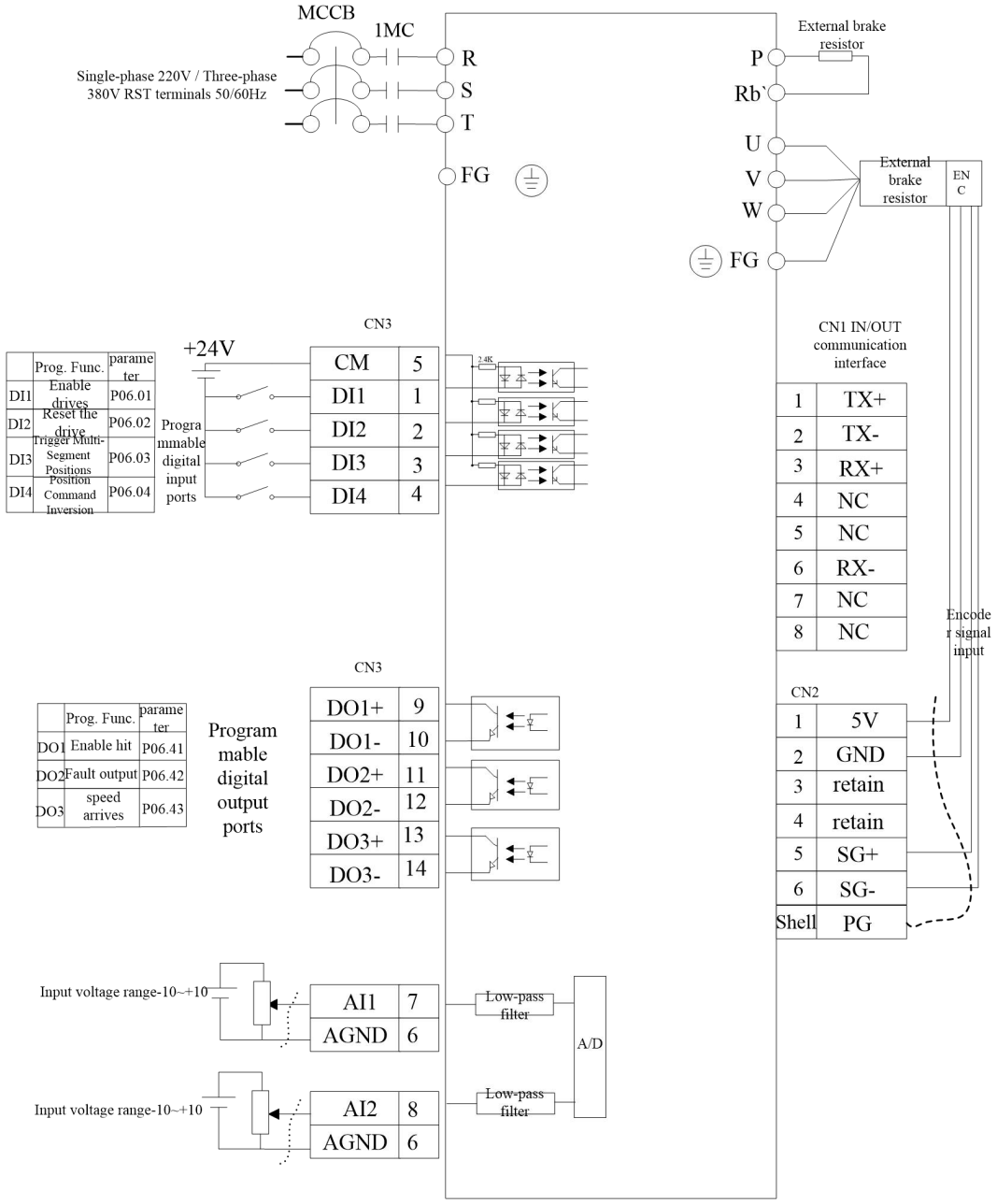
When hardware limit is enabled, configure INFn.43 and INFn.44 to assign specific DIx. A hardware limit fault (Er208) will be triggered when DIx is active and the speed is greater than/less than zero (refer to INFn.43 and INFn.44 bit descriptions below).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.73 373 0x2003_49H	S16	PV	RW	Enable effective	-	0	0~32767	Not
	Parameter Name：Software and hardware limit settings Description： When the lower 4 bits are set to 0: Disable both software and hardware limits.When set to 1: Enable software and hardware limits immediately upon power-up.When set to 2: Enable software and hardware limits after homing completion.The upper 4 bits configure the over-travel distance for hardware limit switches. For rotary motors, the unit is 0.01 revolutions; for linear motors, the unit is 0.1mm. Taking a linear motor as an example, if the parameter is set to 501 (upper 4 bits = 50 in decimal, corresponding to 50 × 0.1mm = 5mm), software and hardware limits are enabled upon power-up. A hardware limit fault (Er208) is triggered when the motor position exceeds the positive limit switch by 5mm or the negative limit switch by 5mm. If the speed upon hitting the limit switch exceeds half of the motor's rated speed, the over-travel distance setting becomes invalid. Note: The over-travel limit function is only valid for hardware limits.							
P03.74 374 0x2003_4AH	S32	PV	RW	Immediately	0.01rpm	-10000000	-2147483648~2147483648	Not
	Parameter Name：Software limit lower limit value Description： If both the software limit upper and lower values are set to 0, the software limit function is disabled.							
P03.76 376 0x2003_4CH	S32	PV	RW	Immediately	0.01rpm	10000000	-2147483648~2147483648	Not
	Parameter Name：Software limit upper limit value							

The relevant input function bits are as follows.

Function bits	Bit description
INFn.43	Forward hardware limit switch in position mode, when the speed is greater than zero and INFn.43 is valid, the hardware limit fault will be reported
INFn.44	Reverse hardware limit switch in position mode, when the speed is less than zero and INFn.44 is valid, a hardware limit fault is reported

5.3.14 Typical Wiring Diagram for position Mode



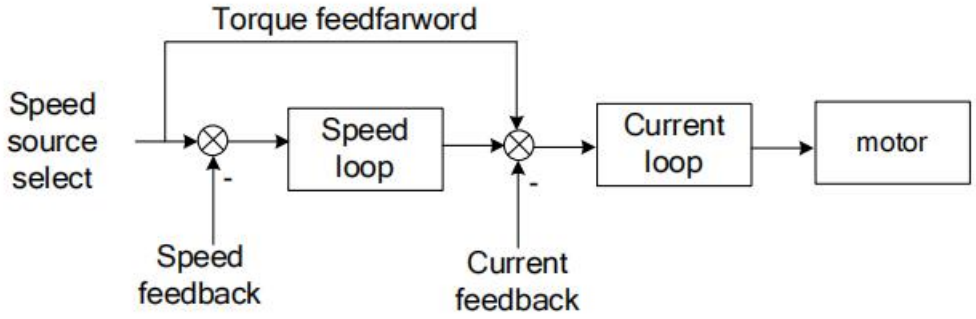
MCCB：Air switch 1MC：AC contactor

1. Indicates twisted pair shield wire.

2.The DC24V power supply is prepared by the user. The DC24V switching power supply should be powered by an isolation transformer, and its grounding terminal should be directly connected to the driver grounding terminal.

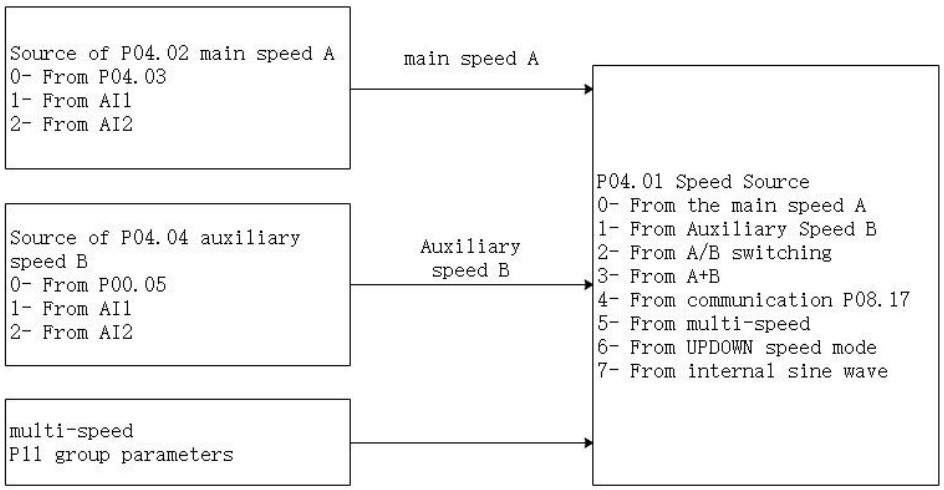
5.3 Speed mode

The speed mode is a control mode with the motor speed as the control target, which is often used for the main shaft dragging. The implementation of the speed mode is shown in the figure below.



5.3.1 Speed command source

The servo has two speeds to choose from, namely the main speed A and the auxiliary speed B. These two speeds can be superimposed on each other or can be switched to each other. Both the main speed A and the auxiliary speed B have multiple speed sources. As shown below：



Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.01	S16	V	RW	Immediately	rpm	0	0~8	Not
401 0x2004_1H	Parameter Name：Speed command source Description：：							

	0- Main speed A 1-Auxiliary speed B 2- INFn.12 switch A/B 3- A+B 4- P08.17 5- Mulit speed 6-UP/DOWN speed mode 7-Sin wave 8-Retain							
P04.02 402 0x2004_2H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Main speed A source Description： 0- From P04.03 1- From AI1 2- From AI2 3- Retain 4- Retain							
P04.03 403 0x2004_3H	S16	V	RW	Immediately	rpm	500	-32767~32767	Not
	Parameter Name：Set value of main speed A Description： When the main speed A source selects the digital given source, set the speed command value through P04.03.							
P04.04 404 0x2004_4H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Auxiliary speed B source Description： When the main speed B source selects the digital given source, set the speed command value through P04.05. 0- From P04.05 1- From AI1 2- From AI2 3- Retain 4-Retain							
P04.05 405 0x2004_5H	S16	V	RW	Immediately	rpm	500	-32767~32767	Not
	Parameter Name：Auxiliary speed B set value							
P08.17 817 0x2008_11H	S16	V	RW	Immediately	-	0	-32767~32767	Not
	Parameter Name：Speed communication given							

The relevant input function bits are as follows.

Function bits	Bit description
INFn.12	Switch the main speed A and the auxiliary speed B, and use the auxiliary speed B when it is

	active.

When the speed command comes from AIx, please refer to "6.3.1 Analog Input AI" for details.

5.3.2 Multi-stage speed mode

Servo supports multi-segment velocity mode. There are 3 modes of multi-stage speed, namely single-run stop, cyclic operation, and IO switching operation.

Single-run stop means that after the motor is enabled, the first stage of speed will be run, and after the operation is completed, the next stage of speed will be run until the running stage number is equal to the total number of stages, and then the machine will stop.

For example, the total number of segments is set to 2, and the single-run stop mode is used. After the motor is enabled, the motor will first run the first stage of speed, and then run the second stage of speed after running, and stop after running.

Cyclic operation is to run the first stage of speed again when a single operation is about to stop, so that the cycle does not stop.

For example, the total number of segments is set to 3, and the cycle operation mode is used. After the motor is enabled, the motor first runs the first stage of speed, then the second stage of speed, then the third stage of speed, and then the first stage of speed, and so on.

IO switching operation means that after the motor is enabled, the driver reads the value of IO to get the segment number, and then runs the speed of the segment. After the IO changes, the driver re-reads the value of IO, gets the segment number again, and then runs the segment speed.

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.01	S16	V	RW	Immediately	-	0	0~2	Not
1101 0x2011_1H	Parameter Name：Multi-speed mode Description：In speed control, when the speed command source is multi-speed, set the multi-speed command operation mode. 0- Single-run stop 1-Cycle run 2- IO switch run							
P11.02	S16	P	RW	Immediately	-	16	1~16	Not
1102 0x2011_2H	Parameter Name：The total number of segments of the speed							
P11.03	S16	P	RW	Immediately	-	1	0~1	Not
1103 0x2011_3H	Parameter Name：Running time unit Description： 0- ms 1- s							
P11.04	U16	V	RW	Immediately	ms	500	0~65535	Not
1104 0x2011_4H	Parameter Name：Acceleration time 1							

P11.05 1105 0x2011_5H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time 1							
P11.06 1106 0x2011_6H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time 2							
P11.07 1107 0x2011_7H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time 2							
P11.08 1108 0x2011_8H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time 3							
P11.09 1109 0x2011_9H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time 3							
P11.10 1110 0x2011_AH	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time 4							
P11.11 1111 0x2011_BH	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time 4							
P11.12 1112 0x2011_CH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：1st stage speed command size							
P11.13 1113 0x2011_DH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：1st speed command run time							
P11.14 1114 0x2011_EH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 1th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.15 1115 0x2011_FH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：2st stage speed command size							
P11.16 1116 0x2011_10H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：2st speed command run time							
P11.17	S16	V	RW	Immediately	rpm	0	0~32767	Not

1117 0x2011_11H	Parameter Name：The 2th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.18 1118 0x2011_12H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：3st stage speed command size							
P11.19 1119 0x2011_13H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：3st speed command run time							
P11.20 1120 0x2011_14H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 3th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.21 1121 0x2011_15H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：4st stage speed command size							
P11.22 1122 0x2011_16H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：4st speed command run time							
P11.23 1123 0x2011_17H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 4th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.24 1124 0x2011_18H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：5st stage speed command size							
P11.25 1125 0x2011_19H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：5st speed command run time							

P11.26 1126 0x2011_1AH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 5th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.27 1127 0x2011_1BH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：6st stage speed command size							
P11.28 1128 0x2011_1CH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：6st speed command run time							
P11.29 1129 0x2011_1DH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 6th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.30 1130 0x2011_1EH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：7st stage speed command size							
P11.31 1131 0x2011_1FH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：7st speed command run time							
P11.32 1132 0x2011_20H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 7th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.33 1133 0x2011_21H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：8st stage speed command size							
P11.34 1134 0x2011_22H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：8st speed command run time							

P11.35 1135 0x2011_23H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 8th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.36 1136 0x2011_24H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：9st stage speed command size							
P11.37 1137 0x2011_25H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：9st speed command run time							
P11.38 1138 0x2011_26H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 9th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.39 1139 0x2011_27H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：10st stage speed command size							
P11.40 1140 0x2013_28H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：10st speed command run time							
P11.41 1141 0x2011_29H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 10th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.42 1142 0x2011_2AH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：11st stage speed command size							
P11.43 1143 0x2011_2BH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：11st speed command run time							

P11.44 1144 0x2011_2CH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 11th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.45 1145 0x2011_2DH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：12st stage speed command size							
P11.46 1146 0x2011_2EH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：12st speed command run time							
P11.47 1147 0x2011_2FH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 12th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.48 1148 0x2011_30H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：13st stage speed command size							
P11.49 1149 0x2011_31H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：13st speed command run time							
P11.50 1150 0x2011_32H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 13th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.51 1151 0x2011_33H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：14st stage speed command size							
P11.52 1152 0x2011_34H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：14st speed command run time							

P11.53 1153 0x2011_35H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 14th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.54 1154 0x2011_36H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：15st stage speed command size							
P11.55 1155 0x2011_37H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：15st speed command run time							
P11.56 1156 0x2011_38H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 15th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							
P11.57 1157 0x2011_39H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：16st stage speed command size							
P11.58 1158 0x2011_3AH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name：16st speed command run time							
P11.59 1159 0x2011_3BH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：The 16th speed acceleration and deceleration time selection Description： 0-Adopt the universal speed mode with configured acceleration and deceleration times. 1- Using acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4							

The relevant input function bits are as follows.

Function bits	Bit description
INFn.17	Select 0 for the speed segment number of multi-step speed
INFn.18	Select 1 for the speed segment number of multi-step speed

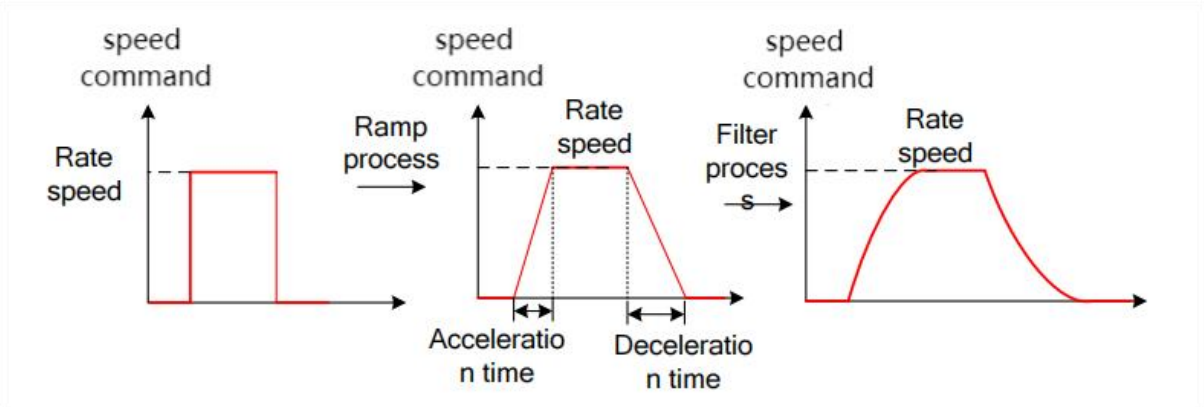
INFn.19	Select 2 for the speed segment number of multi-step speed
INFn.20	Select 3 for the speed segment number of multi-step speed

According to the status of INFn17~20, multi-speed speed segment number = INFn.20*8 + INFn.19*4 + INFn.18*2 + INFn.17*1 +1. See the table below for details.

INFn.20	INFn.19	INFn.18	INFn.17	Multi-speed running segment number
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
.....				
1	1	1	1	16

5.3.3 Ramp control and speed command filtering

All speed sources have ramp control to prevent the impact of a given speed on the machine. The ramp control is achieved by setting the acceleration/deceleration time of the speed. The speed command after the ramp processing is then subjected to low-pass filtering to make the speed command smoother. For example, when the set speed is the rated speed, the actual running speed is processed as shown below.



All speed sources have ramp control to prevent the impact of a given speed on the machine. The ramp control is achieved by setting the acceleration/deceleration time of the speed. The speed command after the ramp processing is then subjected to low-pass filtering to make the speed command smoother. For example, when the set speed is the rated speed, the actual running speed is processed as shown below:

$$\text{Actual acceleration and deceleration time} = \text{Set acceleration and deceleration time} \times \frac{\text{Variation of the input speed command}}{\text{Rated speed}}$$

The advantage of filtering is to make the speed output smoother, but the disadvantage is that the speed command will lag. The larger the set filter time constant, the smoother the

speed output and the longer the lag time.

Related parameters are as follows.

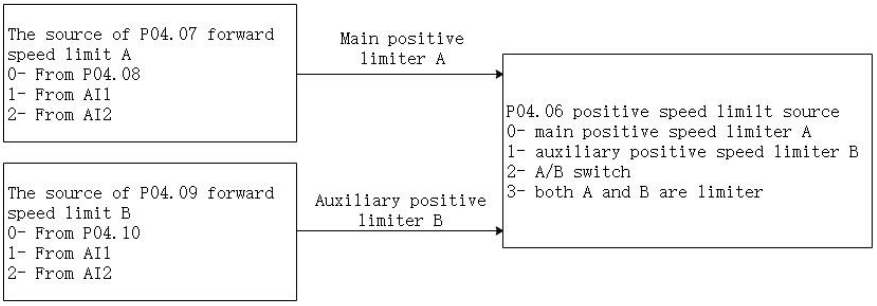
Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.20 420 0x2004_14H	S16	V	RW	Immediately	ms	20	0~32767	Not
	Parameter Name：Time const for speed command filter							
P03.17 317 0x2003_11H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time							
P03.18 318 0x2003_12H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time							

5.3.4 Speed limit

Speed limiting includes forward limiting and reverse limiting, each of which has a primary limiting A source and an auxiliary limiting B source. That is, the main positive limiter A, the auxiliary positive limiter B, the main negative limiter A, and the auxiliary negative limiter B.

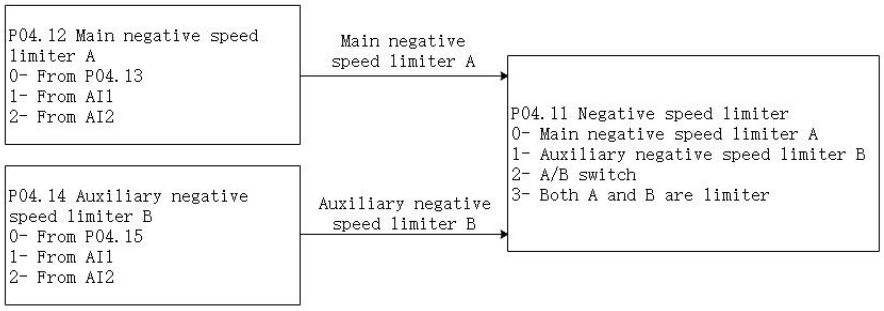
5.3.4.1 Positive speed limiting

The source of the forward speed limit is shown below. There are two types of positive speed limiting, one is the main positive speed limiter A, and the other is the auxiliary positive speed limiter B. Both speed limits have different speed limit sources.



5.3.4.2 Negative speed limiter

The source of the reverse speed limit is shown below. There are two types of reverse speed limiting, one is the main negative speed limiter A, and the other is the auxiliary reverse speed limiter B. Both speed limits have different speed limit sources.



The speed limit related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.06 406 0x2004_6H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of positive speed limiting Description： 0-Main positive speed limiter A 1Auxiliary reverse speed limiter B 2- A/B switch 3-Both A and B are limiter							
P04.07 407 0x2004_7H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of main positive speed limiter A Description： 0- From P04.08 1- FromAI1 2-FromAI2 3- Retain							
P04.08 408 0x2004_8H	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：Set value of positive speed limit A							
P04.09 409 0x2004_9H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of auxiliary reverse speed limiter B Description： 0- FromP04.10 1- FromAI1 2- FromAI2 3-Retain							
P04.10 410 0x2004_AH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：Set value of positive speed limiter B							
P04.11 411 0x2004_BH	S16	V	RW	Immediately	-	0	0~65535	Not
	Parameter Name：source of negative speed limiting Description： 0-Main negative speed limiter A 1- Auxiliary negative speed limiter B							

	2- A/B switch 3- Both A and B are limiter							
P04.12 412 0x2004_CH	S16	V	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Source of main negative speed limiter A Description： 0- FromP04.13 1- FromAI1 2- FromAI2 3-Retain							
P04.13 413 0x2004_DH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：Digital value of main negative speed limiter A							
P04.14 414 0x2004_EH	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of auxiliary negative speed limiter B Description： 0- FromP04.15 1- FromAI1 2- FromAI2 3-Retain							
P04.15 415 0x2004_FH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：Digital value of auxiliary negative speed limiter B							

The relevant input function bits are as follows.

Function bits	Bit description
INFn.07	Switch the positive speed limit source A/B, when valid, use positive limit B
INFn.08	Switch the negative speed limit source A/B, when valid, use negative limit B

5.3.5 Torque limit

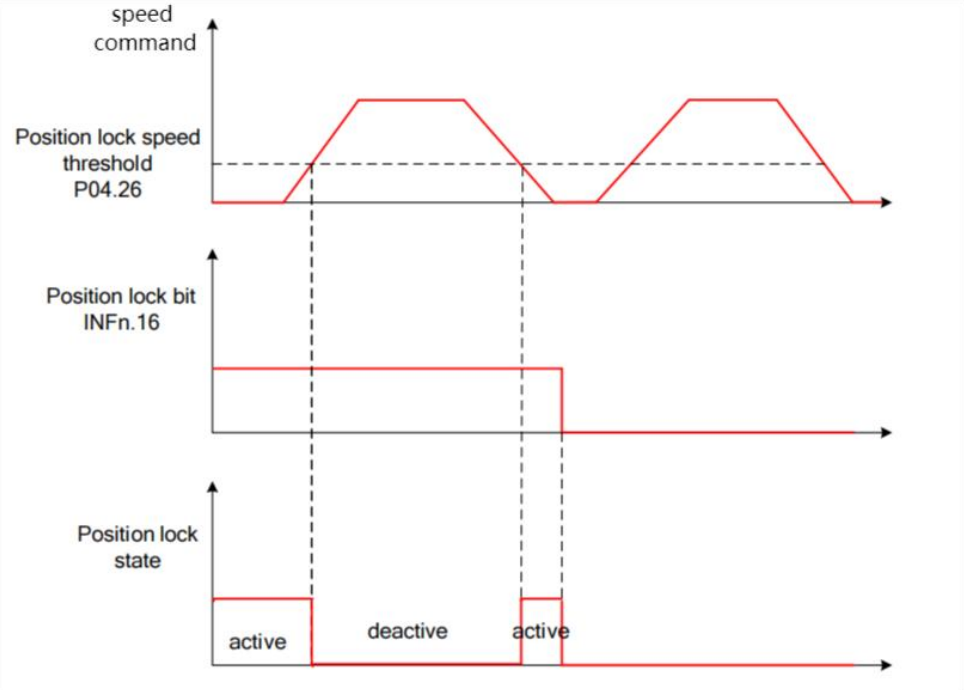
Refer to "5.4.3 Torque Limit" for Torque Mode. The two are shared.

5.3.6 Zero position fixation function

The zero-position fixing function means that in the speed control mode, when the zero-position fixing DI signal INFn.16 is valid, and the speed command amplitude is less than or equal to the set value of P04.26, the servo motor enters the zero-position locking state. At this time, a position loop is built inside the servo drive, and the speed command is invalid; the servo motor is fixed within ±1 pulse of the effective position of the zero-position fixation. Even if it rotates due to external force, it will return to the zero-position fixation. If the amplitude of the speed command is greater than P04.26, the servo motor exits the zero-position lock state, and the servo motor continues to run according to the current input

speed command.

If the zero-position fixed DI signal INFn.16 is invalid, the zero-position fixation function is invalid.



Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.26	S16	V	RW	Immediately	rpm	5	0~32767	Not
426 0x2004_1AH	Parameter Name：Zero-position fixed speed threshold Description：In the speed control mode, when the zero-position fixed DI signal is valid, when the amplitude of the speed command is less than or equal to the value set by P04.26, the servo motor enters the zero-position locking state.							

Related input function bits.

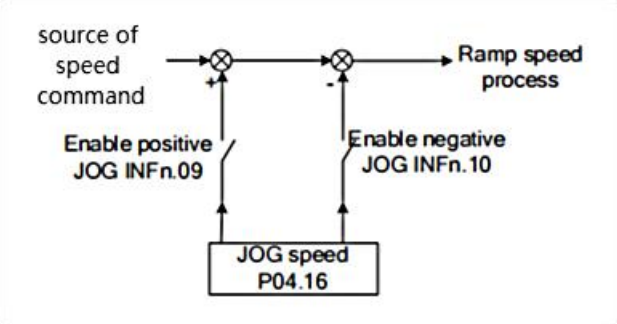
Function bits	Bit description
INFn.16	Zero position fixed function enable

5.3.7 Other functions

5.3.7.1 Speed JOG

In Bus Mode, speed jogging can only be performed via the panel's FN001.

In Local Mode (Speed Mode), there are two types of jogging: forward jogging and reverse jogging, controlled respectively by INFn.09 and INFn.10. When INFn.09 or INFn.10 is active, the speed output will superimpose a jogging speed P04.16 onto the current speed command, as shown in the figure below.



5.3.7.2 Speed command reverse

When INFn.11 is active, the speed command will be inverted.

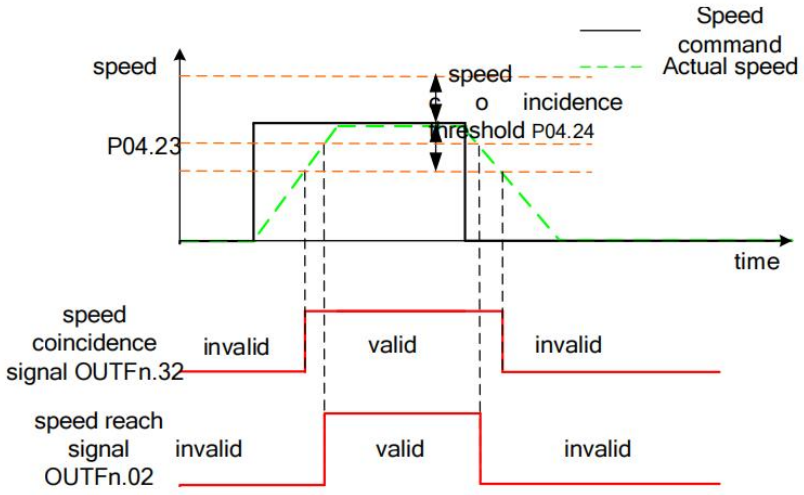
5.3.7.3 Speed pause

When INFn.13 is valid, the speed command is set to zero directly.

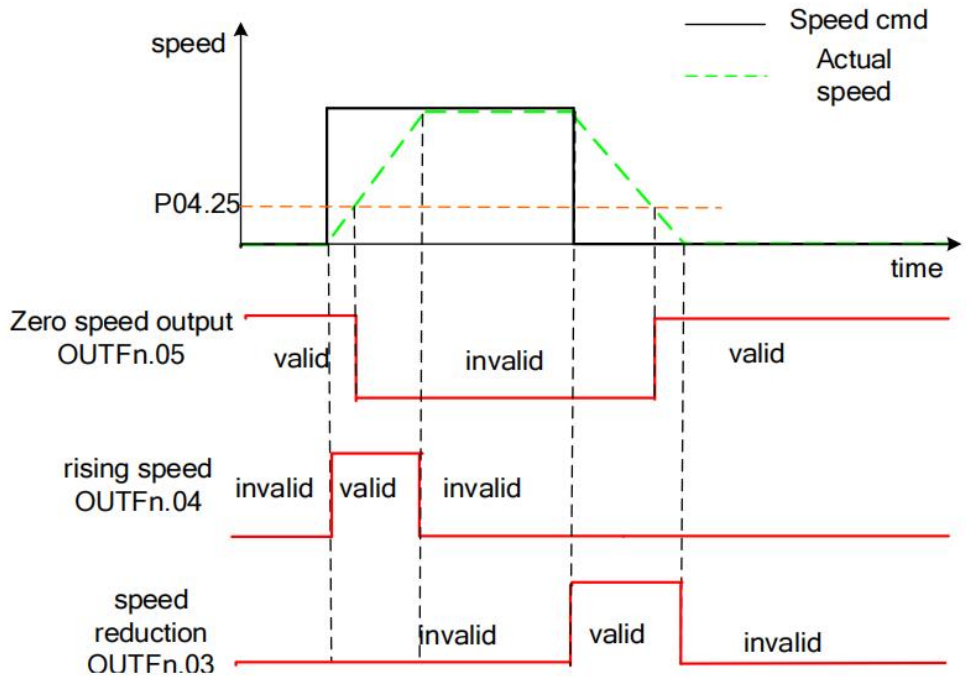
5.3.7.4 Speed related signal output

When the difference between the actual output speed P04.21 and the speed given command is less than the speed consistency threshold P04.24, the speed consistency signal OUTFn.32 is valid. When the absolute value of the actual output speed P04.21 is greater than the speed reaching threshold P04.23, the speed reaching signal OUTFn.02 is valid.

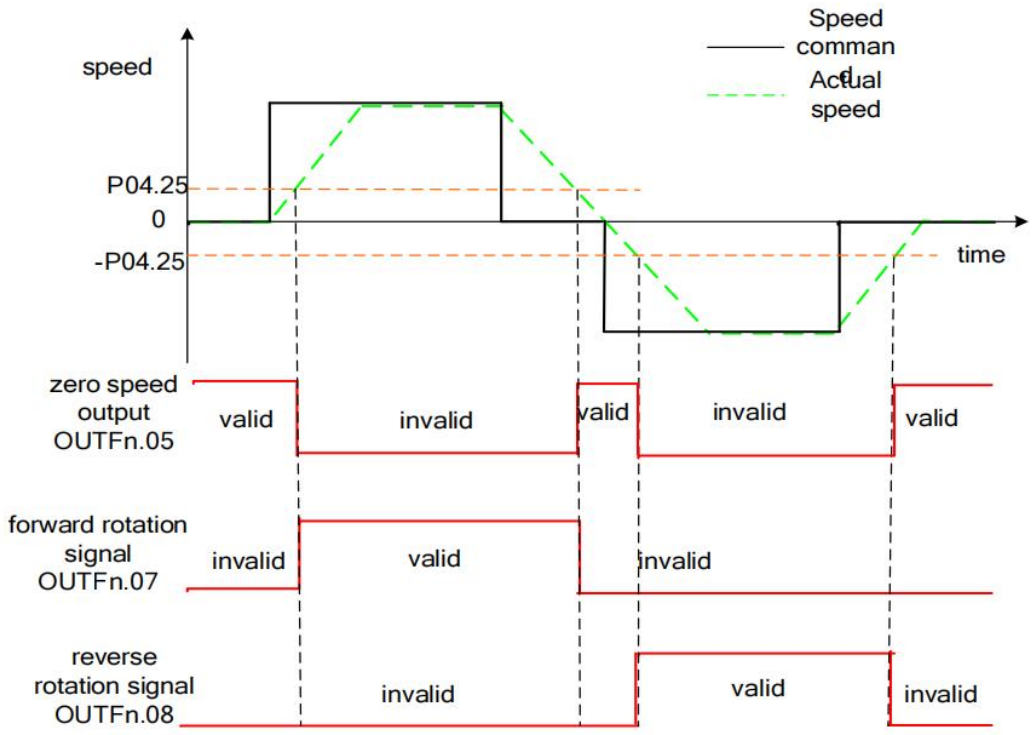
The signal output is shown in the figure below.



When the amplitude of the actual output speed P04.21 is less than the zero-speed threshold P04.25, the zero-speed signal OUTFn.05 is valid. When the amplitude of acceleration is greater than the acceleration threshold P04.27, the acceleration OUTFn.04 is valid. When the amplitude of the deceleration is greater than the acceleration and deceleration threshold P04.27, the deceleration OUTFn.03 is valid. The signal output is shown in the figure below.



When the actual output speed P04.21 is greater than the zero speed threshold, the forward rotation signal OUTFn.07 is valid; when the actual output speed P04.21 is less than the negative zero speed threshold, the reverse rotation signal OUTFn.08 is valid. The signal output is shown in the figure below.



5.3.7.5 Speed feedback filtering and display filtering

Perform low-pass filtering on the speed feedback value by setting the software filtering time constant P00.10. You can also set the speed display filter time constant P04.22 to filter

the speed display value.

5.3.7.6 Related parameters

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.16 416 0x2004_10H	S16	PV	RW	Immediately	rpm	20	-32767~32767	Not
	Parameter Name：JOG speed Description： When using the DI jog function, set the jog running speed command value. Note: This value will be modified during keyboard jog test operation, but will not be saved.							
P04.17 417 0x2004_11H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time Description： The time for the speed command to accelerate from 0 to the rated speed. The calculation formula of the actual acceleration time is as follows: Actual acceleration time t 1=change of speed command/rated speed×speed command acceleration time							
P04.18 418 0x2004_12H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time Description： The time for the speed command to decelerate from the rated speed to 0. Actual deceleration time t 2=change of speed command/rated speed×speed command deceleration time							
P04.20 420 0x2004_14H	S16	V	RW	Immediately	ms	20	0~32767	Not
	Parameter Name：Speed Reference Filter Time Constant							
P04.21 421 0x2004_15H	S16	V	RO	Immediately	rpm	0	-	Not
	Parameter Name：Display Filtered Speed Value							
P04.22 422 0x2004_16H	S16	V	RW	Immediately	ms	300	0~32767	Not
	Parameter Name：Speed display filter time							
P04.23 423 0x2004_17H	S16	V	RW	Immediately	rpm	1000	0~32767	Not
	Parameter Name：Speed arrival threshold Description：When the absolute value of the actual speed of the servo motor after filtering exceeds P04.23, it is considered that the actual speed of the servo motor reaches the expected value, and the servo drive can output the speed reaching signal at this time.							
P04.24 424 0x2004_18H	S16	V	RW	Immediately	rpm	10	0~32767	Not
	Parameter Name：Speed consistent threshold Description：In the speed control mode, when the absolute value of the deviation between the actual speed P04.21 of the filtered servo motor and the speed command is less than P04.24, it is considered that the actual speed of the motor reaches the set value of the speed command, and the drive can output a speed consistent signal at this time.							
P04.25 425	S16	V	RW	Immediately	rpm	5	0~32767	Not
	Parameter Name：Zero Speed Threshold							

0x2004_19H								
P04.27 427 0x2004_1BH	S16	V	RW	Immediately	rpm/s	375	0~32767	Not
	Parameter Name：Lifting speed threshold Description：Acceleration/Deceleration ThresholdWhen acceleration/deceleration exceeds this threshold, output acceleration/deceleration signals. Unit: rpm per second.							
P04.26 426 0x2004_1AH	S16	V	RW	Immediately	rpm	5	0~327678	Not
	Parameter Name：Zero Position Fixed Speed Threshold							

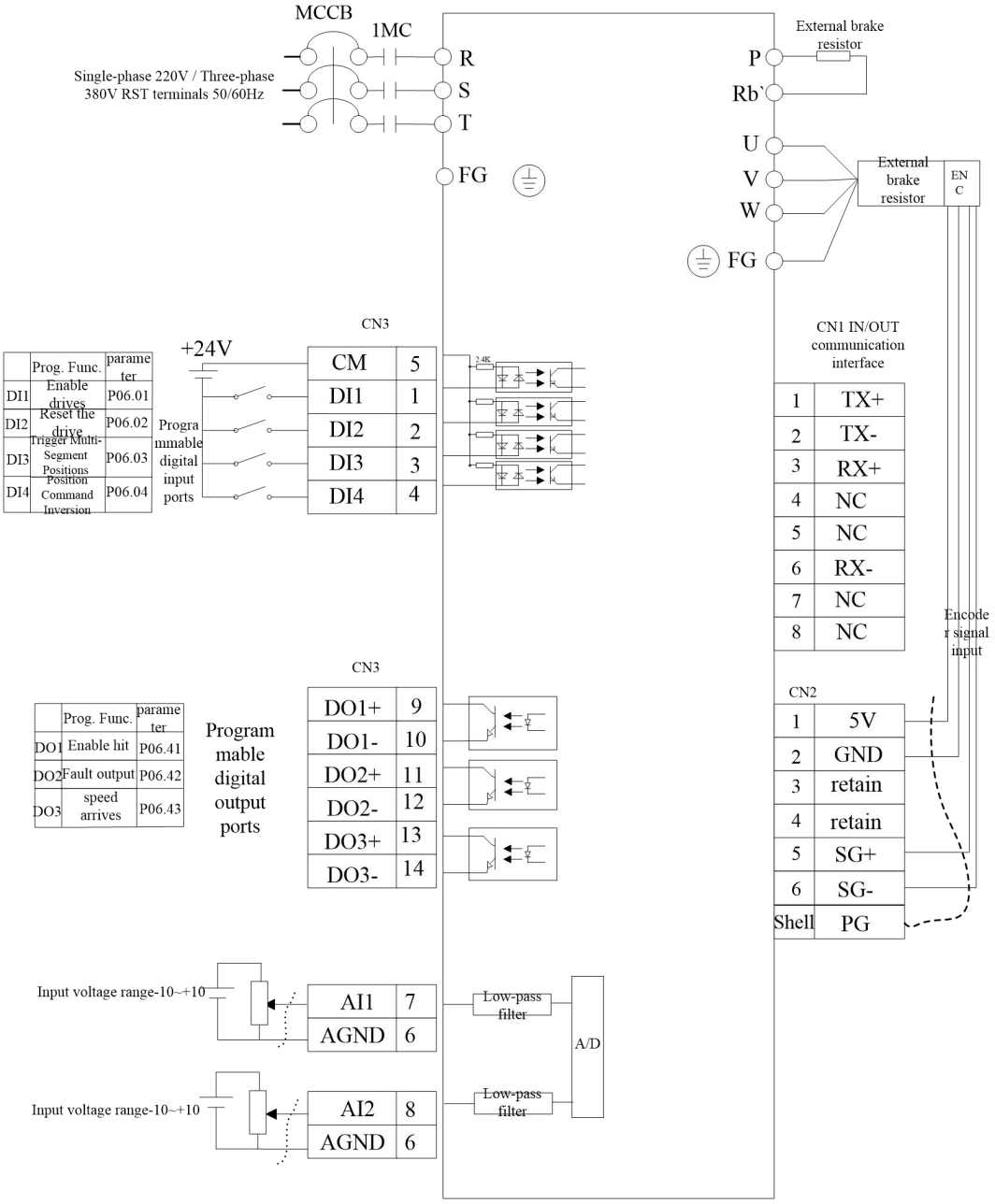
Related input function bits.

Function bits	Bit description
INFn.09	Forward speed jog
INFn.10	Reverse speed jog
INFn.11	Speed reverse
INFn.12	Main speed A/B switching
INFn.13	Speed pause

Related output function bits.

Function bits	Bit description
OUTFn.02	Speed arrives
OUTFn.03	Speed down
OUTFn.04	Speed up
OUTFn.05	Zero speed
OUTFn.06	Speed overrun
OUTFn.07	Forward rotate
OUTFn.08	Reverse rotate
OUTFn.32	Consistent speed

5.3.8 Typical Wiring Diagram for speed Mode



1. Indicates twisted pair shield wire.

2.The DC24V power supply is prepared by the user. The DC24V switching power supply should be powered by an isolation transformer, and its grounding terminal should be directly connected to the driver grounding terminal.

5.3.9 Servo uses analog quantity to control the speed

（1）Analog signal wiring

The analog signal can be input from AI1 (pin 7) or AI2 (pin 8). Taking AI1 as an example, the analog signal line is connected to AI1 (pin 7) of CN3, and the analog ground is connected to AGND (pin 5).

（2）Correspondence between analog voltage and actual speed command

Under the default parameters, -10V corresponds to the negative rated speed of the motor and 10V corresponds to the positive rated speed of the motor. Taking the AI1 input command voltage as an example, if you need to change the correspondence, you can modify the AI1 offset (P06.64) and AI1 magnification (P06.66). If the dead band is set to zero, the corresponding relationship between the input voltage and the speed command is:

$$\text{actual speed command} = \text{rate speed} \times (\text{AI1 magnification P06.66})\% \times \frac{(\text{AI1 input voltage P06.61}) - (\text{AI1 Zero drift P06.68}) - (\text{AI1 offset P06.64})}{10000}$$

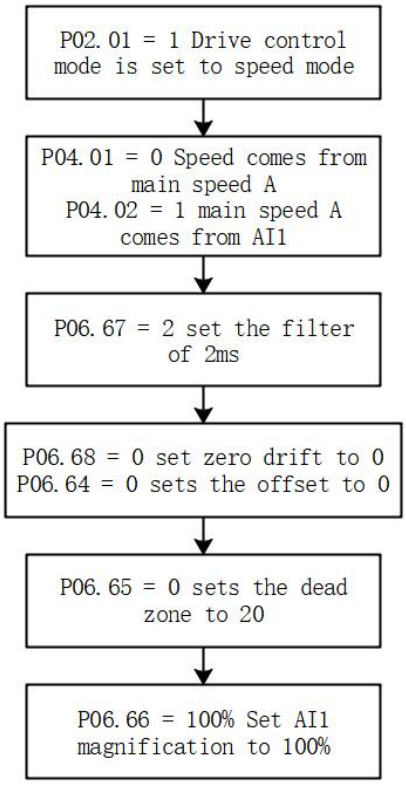
For example:

- By default, AI1 magnification=100.0%, AI1 zero drift=0 mV; AI1 offset=0 mV;Then when ±10000mV is input, the actual output speed is = ± rated speed;
- If AI1 magnification=200.0%; AI1 zero drift=0mV; AI1 offset=0mV;Then when ± 5000mV is input, the actual output speed is = ± rated speed;

  If AI1 magnification=200.0%; AI1 zero drift=0 mV; AI1 offset=5000mV;When inputting 0-10000mV, the actual output speed is = ± rated speed;

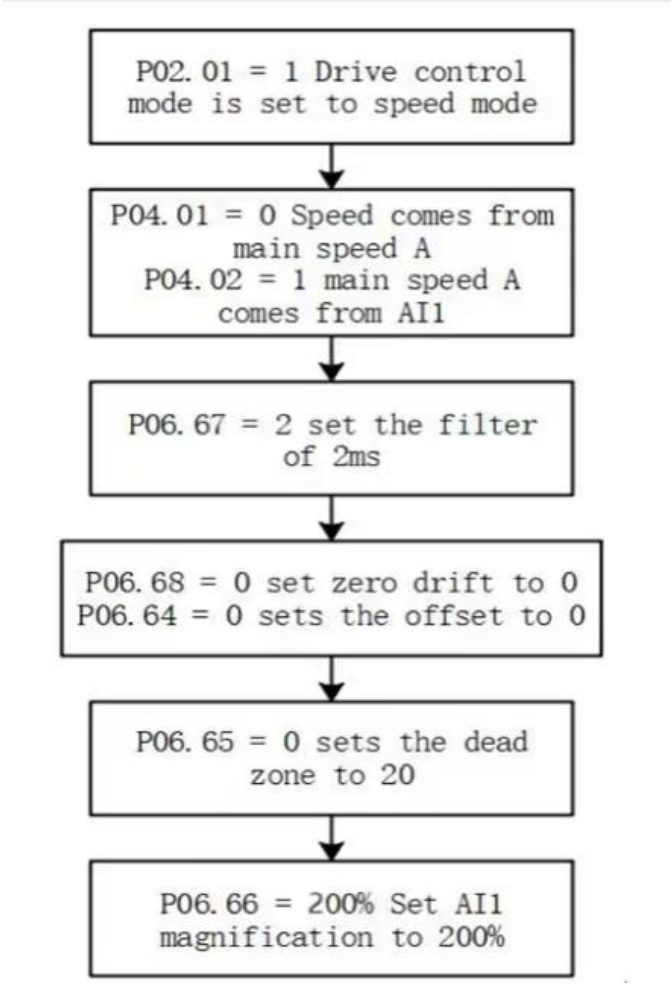
（3）Parameter setting step

a. Input the speed command with AI1, input ±10V corresponding to ± rated speed as an example:



b.Take AI1 input speed command, input ±5V corresponding to ± rated speed as an

example:



(4) Enable the motor

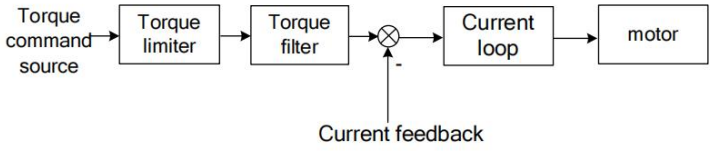
By default, P06.01=1, the enable signal is input from DI1. If P06.21 is set to 1, then the servo can be enabled without receiving any signal when it is powered on.

(5) Zero drift correction

When the analog input is 0mV, set P06.79=4 once to trigger zero drift correction once. Zero drift can also be corrected via DI. Refer to the VC Servo User Manual for details.

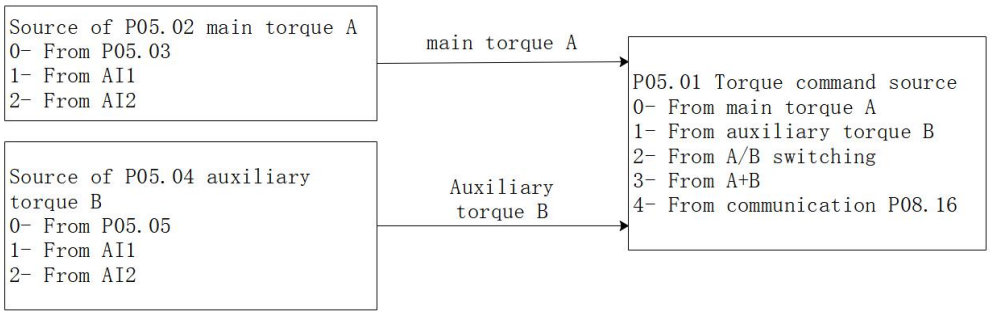
5.4 Torque Mode

Torque Mode is a control mode that targets motor output torque as the primary control objective, such as in tension control applications. The implementation of Torque Mode is illustrated in the following diagram.



5.4.1 Torque mode

Torque mode is a control mode in which the output torque of the motor is the control target, such as tension control. The implementation of torque mode is shown in the figure below.



Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.01	S16	T	RW	Immediately	-	0	0~5	Not
501 0x2005_1H	Parameter Name：Torque command source Description：Set Torque Command Source。 0- Main torque command A 1-Auxiliary torque command B 2-INFn.03 switching A/B 3- A+B 4-From P08.16 5-Internal Sine Wave							
P05.02	S16	T	RW	Immediately	-	0	0~3	Not
502 0x2005_2H	Parameter Name：Source of main torque command A Description：Set the torque command source of the main torque command A 0-From P05.03 1-From AI1 2-From AI2 3-Retain							
P05.03	S16	T	RW	Immediately	%	0	-300~300	Not
503 0x2005_3H	Parameter Name：Set value of main torque A Description：When the main torque A selects the digital given source, set the required torque percentage through P05.03.							
P05.04	S16	T	RW	Immediately	-	0	0~3	Not
504 0x2005_4H	Parameter Name：Source of auxiliary torque command B Description：Set the torque command source for the auxiliary torque command B. 0-From P05.05 1-From AI1 2-From AI2 3-Retain							
P05.05	S16	T	RW	Immediately	%	0	-300~300	Not

505 0x2005_5H	Parameter Name：DI1 Function control register							
P08.16 816 0x2008_10H	S16	T	RW	Immediately	-	0	-3276.7~3276.7	Not
	Parameter Name：Torque communication is given							

Related input function bits.

Function bits	Bit description
INFn.03	Switch the main torque command A and the auxiliary torque command B, and use the auxiliary torque command B when valid

When the torque command comes from AIx, please refer to "6.3.1 Analog Input AI" for details.

5.4.2 Source of torque command units

To adapt to the usage habits of a wide range of customers, the unit of the torque command has been changed from the original source being the rated current of the servo (for example, in torque mode, the torque setting is filled with 100, and if the motor torque command is fully utilized, the output current will be the rated current of the servo). Now, an additional unit of the torque command is also derived from the rated current of the motor (for example, in torque mode, Fill in 100 for the torque setting. If the motor torque command is fully utilized, the output current will be the rated current of the motor. The source of the torque command unit can be selected through the following multi-functional parameters or protection parameters.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.07 1007 0x2010_7H	S16	PVT	RW	Immediately	-	80	0~32767	Not
	Parameter Name：Protection-related Settings Description：Different BIT positions have different functions When BIT6: =1, the torque command (P05.13, P05.18) is based on the rated current of the motor							
P01.53 153 0x2001_35H	S16	PVT	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Multi-functional parameter 4 Description：Different functional positions have different functions BIT14: =1 Torque limiting is based on the percentage of the motor's rated current, and it is also required that the motor's rated current be less than the driver's rated current							

5.4.3 Torque limiting

Torque limiting is achieved by limiting the output current of the driver to limit the output torque of the motor. The larger the torque limit value is, the larger the motor output torque is,

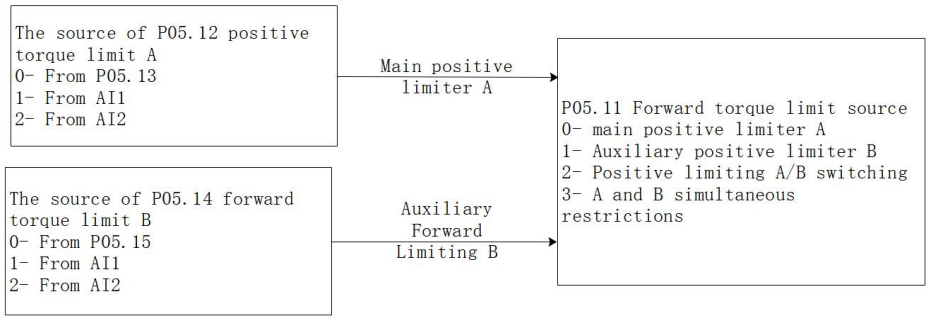
and the easier the driver is to over-current. There are two kinds of limiting methods for torque limiting. One is that the forward and reverse limiters are from the positive limiter value; the other is the positive and negative limiting separately. Which one depends on P05.10. Both the positive limiting and the reverse limiting have a primary limiter A source and an auxiliary limiter B source, respectively a primary forward torque limiter A, an auxiliary forward torque limiter B, and a primary reverse torque limiter A, auxiliary reverse torque limiter B.

In addition to the above torque limiter, in order to protect the motor, the torque output is limited according to the three values of the rated motor current P00.01, the rated current of the driver P01.03, and the current peak current percentage P00.24.

$$\text{Motor torque limiter} = \frac{\text{Motor rated current P00.01}}{\text{Drive rated current P01.03}} \times \text{Motor peak current percentage P00.24}$$

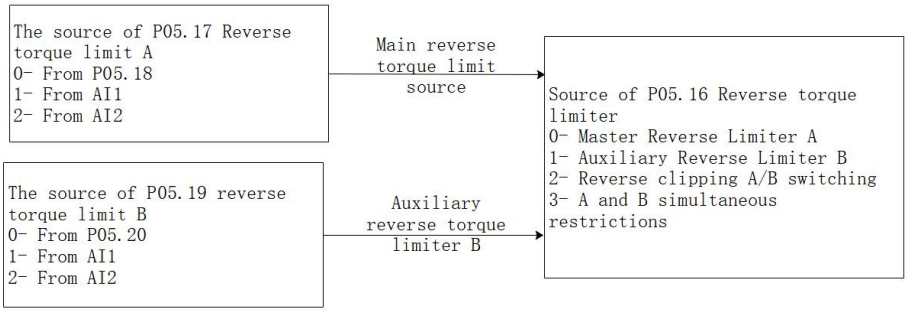
5.4.3.1 Positive torque limiting

The source of the negative torque limit is shown below. There are two types of negative torque limiting, one is the main negative torque limiter A, and the other is the auxiliary negative torque limiter B. Both torque limiters have different sources.



5.4.3.2 Negative torque limiting

The source of the negative torque limit is shown below. There are two types of negative torque limiting, one is the main negative torque limiter A, and the other is the auxiliary negative torque limiter B. Both torque limiters have different sources.



Related parameters are as follows

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.10	S16	T	RW	Immediately	-	0	0~1	Not
510	Parameter Name：Source of torque limitation							

0x2005_AH	Description： 0-Both forward and reverse torque limiting originate from forward torque limiting 1-The forward and reverse torque limits are respectively restricted							
P05.11 511 0x2005_BH	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of forward torque limiting Description： 0- Forward limiting A 1-Forward limiting B 2-A/B switching 3-Both A and B are restricted simultaneously							
P05.12 512 0x2005_CH	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：From 513 Description： 0- From P05.13 1- From AI1 2- From AI2 3- Retained							
P05.13 513 0x2005_DH	S16	PVT	RW	Immediately	%	300	0~800	Not
	Parameter Name：The value of the forward torque limit A							
P05.14 514 0x2005_EH	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：Torque forward limiting B source							
P05.15 515 0x2005_FH	S16	PVT	RW	Immediately	%	300	0~800	Not
	Parameter Name：The value of the forward torque limit B							
P05.16 516 0x2005_10H	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of torque reverse limiting							
P05.17 517 0x2005_11H	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of torque reverse limiting A Description： 0-From 518 1-From AI1 2-From AI2 3-Retained							
P05.18 518 0x2005_12H	S16	T	RW	Immediately	%	300	0~800	Not
	Parameter Name：The value of the torque reverse limit A							
P05.19 519 0x2005_13H	S16	T	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of torque reverse limit B Description：							

	0-From 520 1- Derived from AI1 2- Derived from AI2 3- Retained							
P05.20 520 0x2005_14H	S16	T	RW	Immediately	%	300	0~800	Not
	Parameter Name：The value of the torque reverse limit B							

Related input function bits.

Function bits	Bit description
INFn.05	Forward torque limit source A/B switching, positive limit B is used when valid
INFn.06	Reverse torque limit source A/B switch, when valid, use reverse limit B

5.4.4 Speed limit

When there is no load, given a large torque, the motor speed will increase all the time, so it is necessary to limit the speed. The source of speed limit is the same as the speed limit in speed mode. The relevant parameters are as follows.

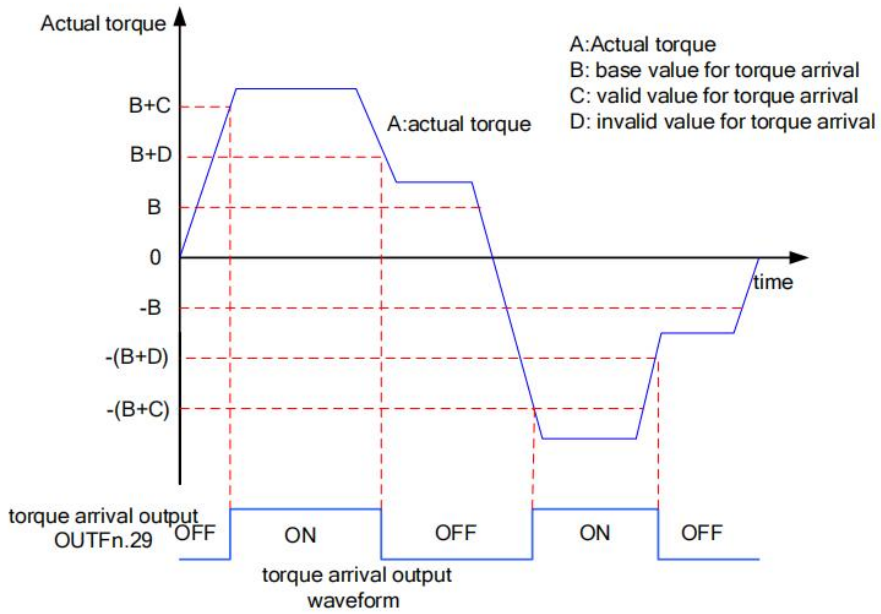
Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.06 406 0x2004_6H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of positive speed limiting Description： 0- main positive speed limiter A 1- auxiliary reverse speed limiter B 2- A/B switch 3-both A and B are limiter							
P04.07 407 0x2004_7H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of main positive speed limiter A Description： 0- from P04.08 1- fromAI1 2- fromAI2 3-Retained							
P04.08 408 0x2004_8H	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：The value of the speed forward limit A							
P04.09 409 0x2004_9H	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of auxiliary reverse speed limiter Description： 0- from P04.10 1- from AI1 2-from AI2							

	3-Retained							
P04.10 410 0x2004_AH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：The value of the speed forward limit B							
P04.11 411 0x2004_BH	S16	V	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Source of negative speed limiting Description： 0- main negative speed limiter A 1- auxiliary negative speed limiter B 2- A/B switch 3- both A and B are limiter							
P04.12 412 0x2004_CH	S16	V	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Source of main negative speed limiter A Description： 0-from 413 1-from AI1 2-from AI2 3-Retained							
P04.13 413 0x2004_DH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：The value of the speed reverse limit A							
P04.14 414 0x2004_EH	S16	V	RW	Immediately	-	0	0~3	Not
	Parameter Name：Source of auxiliary negative speed limiter B Description： 0-from 415 1-from AI1 2-from AI2 3-Retained							
P04.15 415 0x2004_FH	S16	V	RW	Immediately	rpm	3000	0~32767	Not
	Parameter Name：The value of the speed reverse limit B							
P05.25 525 0x2005_19H	S16	VT	RW	Immediately	0.25ms	5	0~32767	Not
	Parameter Name：The time threshold for switching from torque mode to speed mode Description：The time threshold for switching from torque mode to speed mode, with the unit of 0.25ms, is generally set to 10							
P05.26 526 0x2005_1AH	S16	VT	RW	Immediately	rpm	1	0~32767	Not
	Parameter Name：The speed threshold for limiting the shear torque							
P05.27 527 0x2005_1BH	S16	VT	RW	Immediately	0.25ms	500	0~500	Not
	Parameter Name：The time threshold for switching from speed mode to torque mode							

	Description：The time threshold for switching from speed mode to torque mode, with the unit of 0.25ms, is generally set to 200							
P05.28 528 0x2005_1CH	S16	V	RW	Immediately	ms	500	0~32767	Not
	Parameter Name：Speed limit low-pass filter time parameter Description：The speed limit low-pass filter time parameter ms is re-enabled to take effect and is generally set to 500							

5.4.5 Torque reaches output

The torque arrival function is used to judge whether the actual torque reaches the set range. When the actual torque reaches the torque threshold, the drive can output the corresponding DO signal (OUTFn.29: Torque arrival).



Actual torque：A；

Base value for torque arrival P05.31：B；

Valid value for torque arrival P05.32：C；

Invalid value for torque arrival P05.33：D；

where C and D are the biases based on B.

Therefore, when the torque arrival DO signal (OUTFn.29) changes from invalid to valid, the actual torque must satisfy:)

$$|A| \geqslant B+C$$

Otherwise, the torque arrival DO signal remains inactive.

Conversely, when the torque arrival DO signal changes from valid to invalid, the actual torque must meet:

$$|A| < B+D$$

Otherwise, the torque arrival DO signal remains valid.

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.31	S16	T	RW	Immediately	%	50	0~300	Not
531	Parameter Name：Torque Reaches Reference Value							
0x2005_1FH	Description：							
	The value of the forward torque limit A							
P05.32	S16	T	RW	Immediately	%	10	0~300	Not
532	Parameter Name：Torque Reaches RMS Value							
0x2005_20H	Description：							
	The value of the forward torque limit A (0 to 300%)							
P05.33	S16	T	RW	Immediately	%	0	0~300	Not
533	Parameter Name：Torque Reaches Invalid Value							
0x2005_21H	Description：The value of the forward torque limit A (0 to 300%)							

Related output function bits

Function bits	Bit description
OUTFn.29	Torque arrives; when it is valid, the absolute value of torque reaches the set value; when it is invalid, the absolute value of torque is less than the set value.

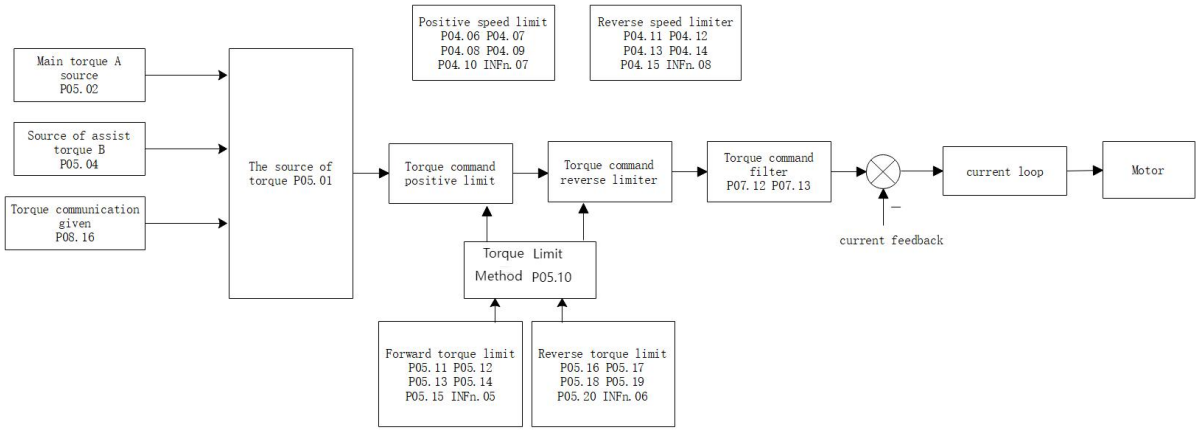
Note: When the torque arrival signal is valid or invalid, the actual torque setting value requirements are different, please refer to the above of this section for details.

5.4.6 Small torque jitter suppression

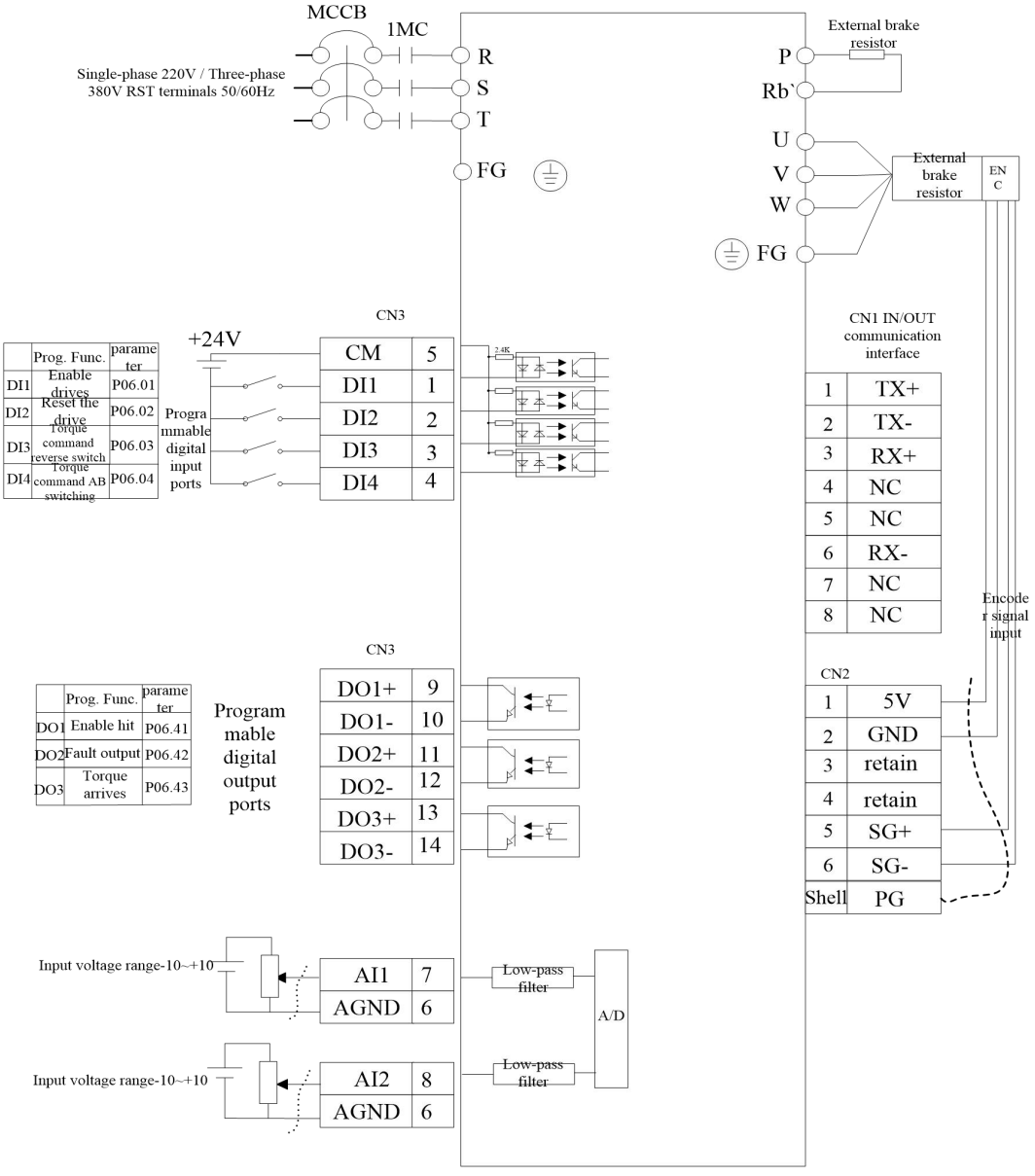
When the given torque is small, the motor will vibrate due to the uneven distribution of the magnetic poles of the motor. It can be set to make the motor output a certain reverse torque to overcome the motor jitter, so that the motor speed output is uniform. Related parameters are as follows:：

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.35	S16	T	RW	Immediately	%	0	0~10	Not
535	Parameter Name：Maximum output limit of torque that suppresses jitter							
0x2005_23H								
P05.36	S16	T	RW	Immediately	%	300	0~300	Not
536	Parameter Name：Buffeting gain							
0x2005_24H								
P05.37	S16	T	RW	Immediately	%	10	0~32767	Not
537	Parameter Name：The time constant for detecting the anti-shake speed							
0x2005_25H	Description：The jitter speed detection time constant ms is generally set to 10							
P05.38	S16	T	RW	Immediately	rpm	0	-	Not
538	Parameter Name：Detection value of tremor suppression speed							
0x2005_26H								
P05.39	S16	T	RW	Immediately	%	-	-	Not
539	Parameter Name：Output value of anti-shake torque							
0x2005_27H								

5.4.7 Internal block diagram of torque mode



5.4.8 Typical wiring diagram of torque mode

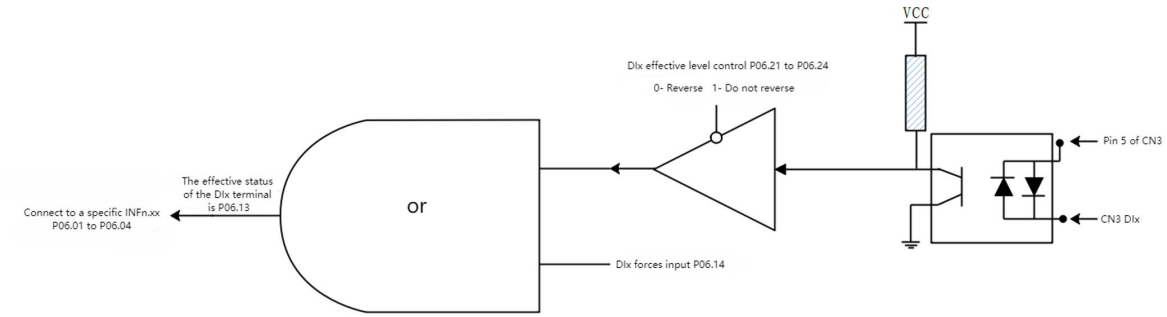


Chapter 6 Inputs and Outputs Function

6.1 Entity DI/DO function

The servo has a total of 5 physical DI, namely DI1 to DI5(DI5 needs to be selected based on hardware; by default, DI5 is not available). Each entity DI can be assigned an input function bit INFn.xx. The effective level of each entity DI can be set separately (P06.21-P06.24). Each entity DI can be forced to input a specific level through P06.14.

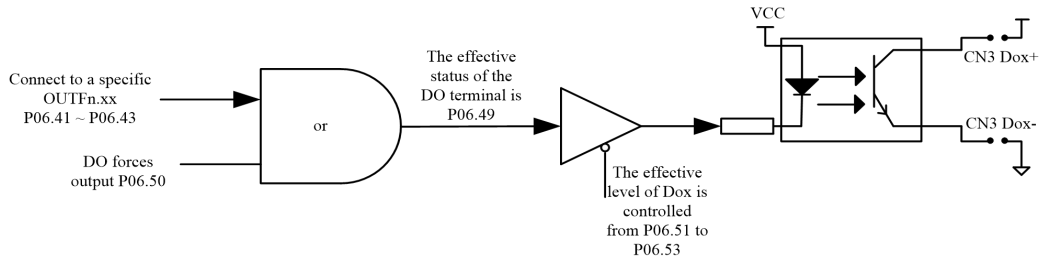
The internal logic of the general-purpose servo DI is shown in the following figure.



（Note: CM: The 5(CM) pin of CN3 short-circuited with +24V is in NPN mode. Short-circuited with COM in PNP mode.）

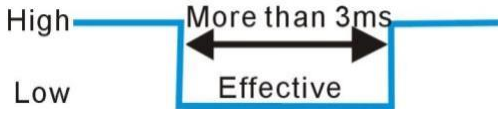
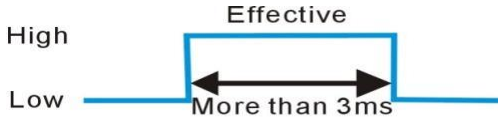
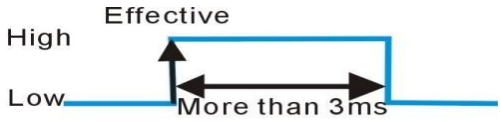
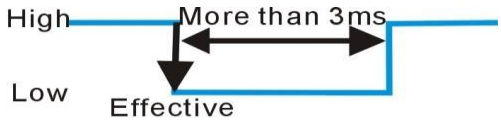
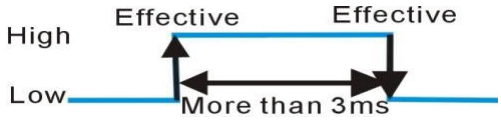
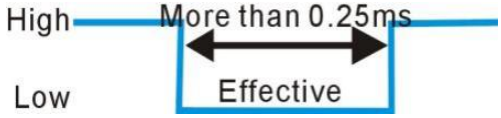
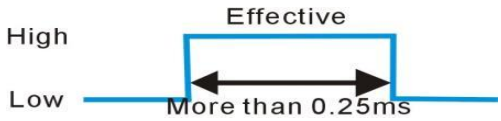
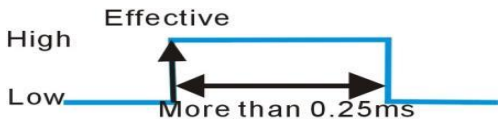
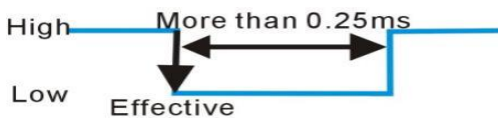
As can be seen from the above figure, to make the DIx terminal effective, one can either modify the actual level of DIx or set the forced effective register P06.14. If the input is from an external terminal, a 24V voltage difference needs to be input between pin 5 of the servo CN3 terminal and the corresponding DIx pin.

The servo has a total of three entities DO, namely DO1 to DO3. Each DO can be assigned an output function bit OUTFn.xx. The effective level of each entity's DO can be set separately, or a DO bit can be forced to be output through the P06.50 register.



（The VC120 servo DO can be selected as NPN or PNP through wiring. For instance, if the relay is connected across terminals 1, it is NPN; if it is connected across terminals 2, it is PNP）

Among them, DI1 to DI2 are low-speed hardware DI, and DI3 to DI4 are high-speed hardware DI. The detailed description is as follows:

Hardware Low-speed DI Description (DI1~DI2)	
DI function valid logical state	remark
Low level	
High level	
Rising edge	
Falling edge	
Rising and falling edges	
Hardware high-speed DI description (DI3, DI4)	
DI function valid logical state	remark
Low level	
High level	
Rising edge	
Falling edge	
Rising and falling edges	

DO1 and DO2 are set to output the A, B, Z signals of the motor encoder through P06.40. Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.01	S16	PVT	RW	Immediately	-	1	0~255	Not
601	Parameter Name：DI1 Function control register							

0x2006_1H	Description：Select the function options of the DI1 controller							
P06.02	S16	PVT	RW	Immediately	-	2	0~255	Not
602	Parameter Name：DI2 Function control register							
0x2006_2H	Description：Select the function options of the DI2 controller							
P06.03	S16	PVT	RW	Immediately	-	0	0~255	Not
603	Parameter Name：DI3Function control register							
0x2006_3H	Description：Select the function options of the DI3 controller							
P06.04	S16	PVT	RW	Immediately	-	0	0~255	Not
604	Parameter Name：DI4Function control register							
0x2013_4H	Description：Select the function options of the DI4 controller							
P06.13	S16	PVT	RO	Immediately	-	0	-	Not
613	Parameter Name：The effective state of the DI terminal							
0x2006_DH	Description：Displayed in decimal format and converted to binary format, it contains 0 to 9 bits, with the lower to higher bits representing the states of the digital output terminals DI1 to DI10 in sequence. 0=OFF, 1=ON, and the 0th bit corresponds to DI1, etc. The 9th position corresponds to DI10							
P06.14	S16	PVT	RW	Immediately	-	0	0~1023	Not
614	Parameter Name：DI forced input							
0x2006_EH	Description：When the DI forced input is valid, set the level logic of the DI function through this parameter. Input in decimal (BCD) format and convert to Binary (Binary) to obtain the corresponding DIx input signal. For example, P06.14=42(BCD)=0000101010(Binary) indicates that terminals DI2, DI4, and DI6 are ON.							
P06.15	S16	PVT	RW	Immediately	-	1023	-	Not
615	Parameter Name：The actual level of the DI terminal							
0x2006_FH								
P06.16	S16	PVT	RW	Immediately	us	500	1~32767	Not
616	Parameter Name：High-speed DI filter configuration							
0x2006_10H								
P06.17	S16	PVT	RW	Immediately	us	2100	1~32767	Not
617	Parameter Name：Low-speed DI filter configuration							
0x2006_11H								
P06.21	S16	PVT	RW	Immediately	-	0	0~1	Not
621	Parameter Name：DI1 effective level							
0x2006_15H	Description： 0-Low level effective 1-High level effective							
P06.22	S16	PVT	RW	Immediately	-	0	0~1	Not
622	Parameter Name：DI2 effective level							
0x2006_16H	Description： 0-Low level effective 1-High level effective							
P06.23	S16	PVT	RW	Immediately	-	0	0~1	Not
623	Parameter Name：DI3 effective level							
0x2006_17H	Description：							

	0-Low level effective 1-High level effective							
P06.24 624 0x2006_18H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：DI4 effective level Description： 0-Low level effective 1-High level effective							
P06.40 640 0x2006_28H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：The DO1DO2 function configuration register takes effect upon power-on (Note: DO1 corresponds to DO1+ and DO1-, and DO2 corresponds to DO2+ and DO2-) Description：E=[BIT1-BIT0] sets the function of DO1-DO2. When E=0, DO1 and DO2 output according to the functions configured at P06.41 and P06.42 respectively. When E=1, DO1 and DO2 output A and B pulses respectively. When E=2, DO1 outputs the Z-point signal and DO2 outputs according to the function configured at P06.42. When E=3, DO2 and DO3 output A and B pulses respectively. D=[BIT3-BIT2] sets the speed of DI. When D=0, the speed is automatically set according to the DI function bits. When D=1, DI9 and DI10 are fixed as high-speed DI and the rest are low-speed DI. When D=2, DI3 and DI4 are fixed as high-speed DI and the rest are low-speed DI.							
P06.41 641 0x2006_29H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO1Function control register							
P06.42 642 0x2006_2AH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO2Function control register							
P06.43 643 0x2006_2BH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO3Function control register							
P06.49 649 0x2006_31H	S16	PVT	RO	Immediately	-	0	-	Not
	Parameter Name：The DO terminal is in an effective state Description：Displayed in decimal format and converted to binary format, it contains 0 to 5 bits, with the lower to higher bits representing the states of the digital output terminals DO1 to DO3 in sequence. 0=OFF, 1=ON, and the 0th bit corresponds to DO1, etc. The second position corresponds to DO3							
P06.50 650 0x2006_32H	S16	PVT	RW	Immediately	-	0	0~63	Not
	Parameter Name：DO forced output Description：When the DO forced output is valid, set whether the DO function is valid through this parameter. Input in decimal (BCD) format and convert to Binary (Binary) to obtain the corresponding DOx input signal. For example: P06.50=5(BCD)=101(Binary) indicates that DO1 and DO3 output ON.							
P06.51 651 0x2006_33H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：DO1 effective level							
P06.52 652 0x2006_34H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：DO2 effective level							

P06.53 653 0x2006_35H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：DO3 effective level							

6.1.1 DI Menu

The specific functions of DI are configured in INFn.xx as shown in the following table, and its valid status can be monitored through P06.13.

DI Address	DI Function	ModbusAddress	Mode		Effective rules
0	Not				-
INFn.01	Enable	41	PVT		It is valid when the valid status is high
	After activation, enable the servo				
INFn.02	Reset drive	42	PVT		The effective state changes from low to high effective
	Used to reset the drive or drive failure				
INFn.03	Torque AB selector switch	43	T		It is valid when the valid status is high
	It is used to switch the torque source. When not activated, the torque comes from the main torque A, and after activation, the torque comes from the auxiliary torque B				
INFn.04	Torque reverse switch	44	T		It is valid when the valid status is high
	It is used to switch the torque direction. When not activated, the torque is in the positive direction. After activation, the torque direction				
INFn.05	Forward torque limit selection	45	T		It is valid when the valid status is high
	It is used for switching between forward torque limiting source A and B. When not activated, select forward torque limiting source A; after activation, select forward torque limiting source B				
INFn.06	Reverse torque limit selection	46	T		It is valid when the valid status is high
	It is used for the reverse torque limiting source A/B switching. When not activated, select reverse torque limiting source A; after activation, select reverse torque limiting source B				
INFn.07	Positive speed limit selection	47	PVT		It is valid when the valid status is high
	It is used to switch the forward speed limit source A/ B. When not activated, select the forward speed limit source A. After activation, select the forward speed limit B				
INFn.08	Reverse speed limit selection	48	PVT		It is valid when the valid status is high
	It is used to switch the reverse speed limit source A/ B. When not activated, select the reverse speed limit				

	source A. After activation, select the reverse speed limit B				
INFn.09	Forward point motion	49	PV		It is valid when the valid status is high
	When activated, a point motion speed will be positively superimposed on the speed command				
INFn.10	Reverse dot motion	50	PV		It is valid when the valid status is high
	When activated, a point motion speed will be superimposed in reverse on the basis of the speed command				
INFn.11	Given speed in reverse	51	V		It is valid when the valid status is high
	After activation, the speed command will be inverted on the original basis				
INFn.12	Selection of the main speed AB	52	V		It is valid when the valid status is high
	It is used to switch the speed source. When not activated, the speed comes from the main speed A; after activation, the speed comes from the auxiliary speed B				
INFn.13	Speed stop input	53	V		It is valid when the valid status is high
	After activation, the speed command is directly set to 0				
INFn.16	Zero is fixed in speed mode	56	V		It is valid when the valid status is high
	After activation, when the amplitude of the speed command is less than or equal to the set value of P04.26, the servo motor enters the zero position locking state				
INFn.17	Multi-speed speed selection switch 0	57	V		It is valid when the valid status is high
	When running at multiple speeds, it is used to switch the speed command for operation				
INFn.18	Multi-speed speed selection switch1	58	V		It is valid when the valid status is high
	When running at multiple speeds, it is used to switch the speed command for operation				
INFn.19	Multi-speed speed selection switch2	59	V		It is valid when the valid status is high
	When running at multiple speeds, it is used to switch the speed command for operation				
INFn.20	Multi-speed speed selection switch3	60	V		It is valid when the valid status is high
	When running at multiple speeds, it is used to switch the speed command for operation				
INFn.21	Location command prohibited	61	P		It is valid when the valid status is high
	After activation, position instructions are prohibited from being input into the servo. It can be used for emergency stop operations.				
INFn.22	Reverse position command	62	P		It is valid when the valid status is high
	After activation, invert the position command and input it into the servo				
INFn.24	Electronic gear ratio switching switch 1	64	P		It is valid when the valid status is high

	It is used to switch between electronic gear ratio 1 and electronic gear ratio 2. When not activated, electronic gear ratio 1 is selected; after activation, electronic gear ratio 2 is selected				
INFn.25	Position error clearance	65	P		Depends P03.21
	Used to eliminate positional errors				
INFn.26	Position mode origin return to zero command	66	P		The effective state changes from low to high effective
	Used to activate the return-to-zero operation				
INFn.27	Multi-segment position trigger signals	67	P		The rising edge of the effective state triggers the start of multiple positions. The falling edge of the effective state triggers = stop multiple positions
	Used to activate multi-segment position operations				
INFn.28	Multi-segment position selection switch 0	68	P		It is valid when the valid status is high
	Used to select which segment to run in multiple positions				
INFn.29	Multi-segment position selection switch 1	69	P		It is valid when the valid status is high
	Used to select which segment to run in multiple positions				
INFn.30	Multi-segment position selection switch 2	70	P		It is valid when the valid status is high
	Used to select which segment to run in multiple positions				
INFn.31	Multi-segment position selection switch 3	71	P		It is valid when the valid status is high
	Used to select which segment to run in multiple positions				
INFn.32	Position direction in multi-segment position mode	72	P		It is valid when the valid status is high
	After activation, the position direction in the multi-segment position mode is reversed				
INFn.33	Rapid forward point movement	73	PVT		It is valid when the valid status is high
	When activated, a fast jog speed will be superimposed forward on the basis of the speed command				
INFn.34	Return to zero origin signal input	74	P		It depends on the return to zero mode
	Used for the input of origin signals				
INFn.36	Control mode switch 0	76	PVT		It is valid when the valid status is high
	When P02.01=3, it is used to switch between position mode and torque mode, where 0 represents position mode and 1 represents torque mode When P02.01=4, it is used to switch between position mode and speed mode, where 0 represents position mode and 1 represents speed mode				

<table>
<tr><td></td><td colspan="5">When P02.01=5, it is used to switch between speed mode and torque mode.0 represents speed mode and 1 represents torque mode
When P02.01=6, it is used to switch to position mode and speed and torque mode
When INFn37 and INFn36 equal 00, speed mode
When INFn37 and INFn36 equal 01, the torque mode
When INFn37 and INFn36 equal 10, the position mode</td></tr>
<tr><td rowspan="2">INFn.37</td><td>Control mode switching switch 1</td><td>77</td><td>PVT</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">When P02.01=6, it is used to switch to position mode and speed and torque mode
When INFn37 and INFn36 equal 00, speed mode
When INFn37 and INFn36 equal 01, the torque mode
When INFn37 and INFn36 equal 10, the position mode</td></tr>
<tr><td rowspan="2">INFn.42</td><td>Reset fault</td><td>82</td><td>PVT</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">It is used to reset faults. When resetting faults less than 100, the drive will be restored</td></tr>
<tr><td rowspan="2">INFn.43</td><td>Forward travel limit switch</td><td>83</td><td>PV</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">When the speed is greater than zero and INFn.43 is valid, a hardware limit fault is reported</td></tr>
<tr><td rowspan="2">INFn.44</td><td>Reverse travel limit switch</td><td>84</td><td>PV</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">When the speed is less than zero and INFn.44 is valid, a hardware limit fault is reported</td></tr>
<tr><td rowspan="2">INFn.56</td><td>Electronic gear ratio switching switch 2</td><td>96</td><td>P</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">Switch multiple electronic gear ratios through INFn.24 and INFn.56. The switching relationship is as follows.
<table>
<tr><th>INFn.56</th><th>INFn.24</th><th>Actual electronic gear ratio</th></tr>
<tr><td>Invalid</td><td>Invalid</td><td>$\frac{\text{Electronic Gear Ratio1 Numerator}}{\text{Electronic Gear Ratio 1 Denominator}}$</td></tr>
<tr><td>Invalid</td><td>Effective</td><td>$\frac{\text{Electronic Gear Ratio1 Numerator}}{\text{Electronic Gear Ratio 1 Denominator}}$</td></tr>
<tr><td>Effective</td><td>Invalid</td><td>$\frac{\text{Electronic Gear Ratio1 Numerator}}{\text{Electronic Gear Ratio 2 Denominator}}$</td></tr>
<tr><td>Effective</td><td>Effective</td><td>$\frac{\text{Electronic Gear Ratio2 Numerator}}{\text{Electronic Gear Ratio 1 Denominator}}$</td></tr>
</table></td></tr>
<tr><td rowspan="2">INFn.57</td><td>Motor overheating</td><td>97</td><td>-</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">It is used to receive the motor overheating signal. After activation, it reports the motor overheating fault</td></tr>
<tr><td rowspan="2">INFn.58</td><td>Emergency stop input</td><td>98</td><td>PVT</td><td></td><td>It is valid when the valid status is high</td></tr>
<tr><td colspan="5">After activation, the motor will perform an emergency stop in the emergency stop mode selected on P02.14</td></tr>
</table>

INFn.65	Quick reverse dot movement	105	PV		It is valid when the valid status is high
	When activated, a fast jog speed will be superimposed in reverse on the basis of the speed command				
INFn.74	Trigger to return to zero in absolute value	114	P		The valid status is valid from low to high
	Trigger to return to zero in absolute value				
INFn.75	Activate STO	114	-		It is valid when the valid status is high
	Used to connect to the STO signal of the software				
INFn.78	Local fault clearance	118	-		The valid status is valid from low to high
	It is used to reset faults. When resetting faults less than 100, the drive will be restored				

6.1.2 DO Menu

DO Address	DO Function	Modbus Address	Mode
OUTFn.01	The drive is enabled	141	PVT
	Output condition: Output after the driver is enabled		
OUTFn.02	Speed reached	142	V
	Output condition: Output when the absolute value of the actual output speed P04.21 is greater than or equal to the speed reaching the threshold P04.23		
OUTFn.03	Decelerating	143	V
	Output condition: When the amplitude of deceleration is greater than the acceleration and deceleration threshold P04.27, output		
OUTFn.04	Speeding up	144	V
	Output condition: When the amplitude of acceleration is greater than the acceleration and deceleration threshold P04.27, output		
OUTFn.05	At zero speed	145	V
	Output condition: When the amplitude of the actual output speed P04.21 is less than the zero-speed threshold P04.25 and greater than or equal to 0, output		
OUTFn.06	Speed beyond the limit	146	PVT
	Output condition: Output when the speed exceeds the overspeed threshold P10.05		
OUTFn.07	Rotating forward	147	PVT
	Output condition: When the amplitude of the actual output speed P04.21 is greater than the zero-speed threshold P04.25, output		
OUTFn.08	In reverse	148	PVT
	Output condition: When the amplitude of the actual output speed P04.21 is less than the negative zero speed threshold P04.25, output		
OUTFn.09	Fault output	149	-

	Output condition: Output when the servo reports a fault		
OUTFn.10	In the forward speed limit in torque mode	150	T
	Output condition: Output when the speed is in the forward limit in torque mode		
OUTFn.11	Negative speed limit in torque mode	151	T
	Output condition: Output when the speed is in the negative limit in torque mode		
OUTFn.12	Speed limit in torque mode	152	T
	Output condition: Output when either OutFn10 or OutFn11 is valid		
OUTFn.13	Positioning completed output	153	P
	Output condition When the position error is less than the positioning completion threshold (P03.46), output directly; otherwise, clear the output. 1.Output when the position error is less than the positioning completion threshold (P03.46) and the speed command P03.95 in position mode is zero; otherwise, clear the output. 2.Output when the position error is less than the positioning completion threshold (P03.46), and the filtered speed command P03.96 in the position mode is zero; otherwise, clear the output. 3. Output when the position error is less than the positioning completion threshold (P03.46) and the speed command P03.95 in position mode is zero. When the speed command P03.95 in position mode is not zero, clear the output. 4. The multi-segment position instructions have been sent successfully and the position error is less than the positioning completion threshold (P03.46) 5. When the multi-segment position instructions are sent successfully and the position error is less than the positioning completion threshold (P03.46), and the holding time (P03.49) is maintained, the output is cleared; otherwise, the output is eliminated 6. After the instruction is issued and the position error converges to a certain range and persists for a certain period of time (P03.49), reset to zero when the instruction is triggered. If there is any load disturbance in the middle, the positioning will not change after completion 7. When the load position (P02.62/P03.90) is close to the target position (P03.10) within a certain range and remains so for a certain period of time (P03.49), it is set. When the command is triggered, it is reset to zero. If there is any load disturbance in the middle, the positioning will not change after completion		
OUTFn.14	Positioning proximity output	154	P
	Output condition 1.Output when the position error is less than the positioning approach threshold; otherwise, clear the output		

	2.Output when the position error is less than the positioning approach threshold and the speed command P03.95 in position mode is zero; otherwise, clear the output 3.Output when the position error is less than the positioning approach threshold and the speed command P3.96 after filtering in the position mode is zero; otherwise, clear the output 4.Output when the position error is less than the positioning approach threshold and the speed command P03.95 in position mode is zero. Clear the output when the speed command P03.95 in position mode is not zero		
OUTFn.15	Returning the origin to zero completes the output	155	P
	Output condition: When the encoder position of the motor is within the origin range (P03.57), and the speed is set at P09.89=0 in the position loop mode, and P03.49 time is maintained, the output returns to zero completion signal		
OUTFn.16	Output with excessive position error	156	P
	Output condition: When the position error P03.17 is greater than the maximum position error P03.19, output		
OUTFn.18	Software limit output	158	PVT
	Output condition： When P03.90 is less than P03.74 and the value of P04.21 is less than 0, output When P03.90 is greater than P03.76 and the value of P04.21 is greater than 0, output		
OUTFn.24	Brake output	164	PVT
	Output condition: Output when the enable signal is valid		
OUTFn.26	Always OFF	166	PVT
	Output condition: Never output		
OUTFn.27	Always ON	167	PVT
	Output condition: Continuous output		
OUTFn.28	Torque limiting output	168	PVT
	Output condition: Output when the servo is enabled and the torque reaches the limit		
OUTFn.29	Torque arrives	169	T
	Output condition: Output when the actual torque is greater than or equal to P05.31+P05.21 and less than or equal to P05.31+P05.33		
OUTFn.32	Consistent speed	172	V
	Output condition: In speed mode, when the difference between the actual output speed P04.21 and the speed setting command is less than the speed consistency threshold P04.24, the speed consistency signal OUTFn.32 is valid		
OUTFn.35	The speed command has an output of 0	175	V
	Output condition: Output when the speed command is 0		
OUTFn.36	The speed command is zero and the speed	176	V

	feedback is also 0 output		
	Output condition: Output when the speed command is 0 and the feedback speed is 0		
	The servo is ready for output	177	PVT
OUTFn.37	Output condition: Output after the servo hardware self-checks are completed upon power-on		

The specific functions of DO OUTFn.xx are shown in the following table.

6.2 Virtual DI/DO function

The servo driver has 16 general-purpose virtual DI (VDI), and each virtual DI has two level types, including write 1 always effective and rising edge effective. The functions of each virtual DI (P12.01 to P12.16) can be configured separately. The level of VDI is simulated by writing values to the virtual DI input register (P12.20).

The servo driver has 16 general-purpose virtual DOS (Vdos), and each virtual DO has two level types: one outputs 1 when effective, and the other outputs 0 when effective. The functions of each virtual DO (P12.41-P12.56) can be configured separately. The output level of DO can be displayed in P12.60.

The servo driver also has two dedicated input/output sets: VDI20 and VDO20, VDI21 and VDO21. These two VDI/VDO are directly connected internally.

The relevant parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.01 1201 0x2012_1H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI1 function configuration							
P12.02 1202 0x2012_2H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI2 function configuration							
P12.03 1203 0x2012_3H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI3 function configuration							
P12.04 1204 0x2012_4H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI4 function configuration							
P12.05 1205 0x2012_5H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI5 function configuration							
P12.06 1206 0x2012_6H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI6 function configuration							

P12.07 1207 0x2012_7H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI7 function configuration							
P12.08 1208 0x2012_8H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI8 function configuration							
P12.09 1209 0x2012_9H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI9 function configuration							
P12.10 1210 0x2012_AH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI10 function configuration							
P12.11 1211 0x2012_BH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI11 function configuration							
P12.12 1212 0x2012_CH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI12 function configuration							
P12.13 1213 0x2012_DH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI13 function configuration							
P12.14 1214 0x2012_EH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI14 function configuration							
P12.15 1215 0x2012_FH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI15 function configuration							
P12.16 1216 0x2012_10H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI16 function configuration							
P12.17 1217 0x2012_11H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI20 function configuration							
P12.18 1218 0x2012_12H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI21 function configuration							
P12.19 1219 0x2012_13H	S16	PVT	RO	Immediately	-	0	-	Not
	Parameter Name：The monitoring values of virtual DI20 and virtual DI21							
P12.20 1220 0x2012_14H	U16	PVT	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Virtual DI1 to DI16 input value setting registers							

P12.21	S16	PVT	RW	Immediately	-	0	0~1	Not
1221	Parameter Name：Virtual DI1 level type							
0x2012_15H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.22	S16	PVT	RW	Immediately	-	0	0~1	Not
1222	Parameter Name：Virtual DI2 level type							
0x2012_16H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.23	S16	PVT	RW	Immediately	-	0	0~1	Not
1223	Parameter Name：Virtual DI3 level type							
0x2012_17H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.24	S16	PVT	RW	Immediately	-	0	0~1	Not
1224	Parameter Name：Virtual DI4 level type							
0x2012_18H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.25	S16	PVT	RW	Immediately	-	0	0~1	Not
1225	Parameter Name：Virtual DI5 level type							
0x2012_19H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.26	S16	PVT	RW	Immediately	-	0	0~1	Not
1226	Parameter Name：Virtual DI6 level type							
0x2012_1AH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.27	S16	PVT	RW	Immediately	-	0	0~1	Not
1227	Parameter Name：Virtual DI7 level type							
0x2012_1BH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.28	S16	PVT	RW	Immediately	-	0	0~1	Not
1228	Parameter Name：Virtual DI8 level type							
0x2012_1CH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.29	S16	PVT	RW	Immediately	-	0	0~1	Not
1229	Parameter Name：Virtual DI9 level type							

0x2012_1DH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.30	S16	PVT	RW	Immediately	-	0	0~1	Not
1230	Parameter Name：Virtual DI10 level type							
0x2012_1EH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.31	S16	PVT	RW	Immediately	-	0	0~1	Not
1231	Parameter Name：Virtual DI11 level type							
0x2012_1FH	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.32	S16	PVT	RW	Immediately	-	0	0~1	Not
1232	Parameter Name：Virtual DI12 level type							
0x2012_20H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.33	S16	PVT	RW	Immediately	-	0	0~1	Not
1233	Parameter Name：Virtual DI13 level Type							
0x2012_21H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.34	S16	PVT	RW	Immediately	-	0	0~1	Not
1234	Parameter Name：Virtual DI14 level type							
0x2012_22H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.35	S16	PVT	RW	Immediately	-	0	0~1	Not
1235	Parameter Name：Virtual DI15 level type							
0x2012_23H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.36	S16	PVT	RW	Immediately	-	0	0~1	Not
1236	Parameter Name：Virtual DI16 level type							
0x2012_24H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.37	S16	PVT	RW	Immediately	-	0	0~1	Not
1237	Parameter Name：Virtual DI20 level type							
0x2012_25H	Description： 0-Writing 1 is always valid							

	1-Jumping from 0 to 1 is valid							
P12.38	S16	PVT	RW	Immediately	-	0	0~1	Not
1238	Parameter Name：Virtual DI21 level type							
0x2012_26H	Description： 0-Writing 1 is always valid 1-Jumping from 0 to 1 is valid							
P12.41	S16	PVT	RW	Immediately	-	0	0~99	Not
1241	Parameter Name：Virtual DO1 configuration register							
0x2012_29H								
P12.42	S16	PVT	RW	Immediately	-	0	0~99	Not
1242	Parameter Name：Virtual DO2 configuration register							
0x2012_2AH								
P12.43	S16	PVT	RW	Immediately	-	0	0~99	Not
1243	Parameter Name：Virtual DO3 configuration register							
0x2012_2BH								
P12.44	S16	PVT	RW	Immediately	-	0	0~99	Not
1244	Parameter Name：Virtual DO4 configuration register							
0x2012_2CH								
P12.45	S16	PVT	RW	Immediately	-	0	0~99	Not
1245	Parameter Name：Virtual DO5 configuration register							
0x2012_2DH								
P12.46	S16	PVT	RW	Immediately	-	0	0~99	Not
1246	Parameter Name：Virtual DO6 configuration register							
0x2012_2EH								
P12.47	S16	PVT	RW	Immediately	-	0	0~99	Not
1247	Parameter Name：Virtual DO7 configuration register							
0x2012_2FH								
P12.48	S16	PVT	RW	Immediately	-	0	0~99	Not
1248	Parameter Name：Virtual DO8 configuration register							
0x2012_30H								
P12.49	S16	PVT	RW	Immediately	-	0	0~99	Not
1249	Parameter Name：Virtual DO9 configuration register							
0x2012_31B								
P12.50	S16	PVT	RW	Immediately	-	0	0~99	Not
1250	Parameter Name：Virtual DO10 configuration register							
0x2012_32H								
P12.51	S16	PVT	RW	Immediately	-	0	0~99	Not
1251	Parameter Name：Virtual DO11 configuration register							
0x2012_33H								
P12.52	S16	PVT	RW	Immediately	-	0	0~99	Not
1252	Parameter Name：Virtual DO12 configuration register							
0x2012_34H								

P12.53 1253 0x2012_35H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO13 configuration register							
P12.54 1254 0x2012_36H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO14 configuration register							
P12.55 1255 0x2012_37H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO15 configuration register							
P12.56 1256 0x2012_38H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO16 configuration register							
P12.57 1257 0x2012_39H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO20 configuration register							
P12.58 1258 0x2012_3AH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO21 configuration register							
P12.59 1259 0x2012_3BH	S16	PVT	RO	Immediately	-	0	-	Not
	Parameter Name：The output level of the virtual DO20 DO21							
P12.60 1260 0x2012_3CH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：The output levels of virtual DO1-DO16							
P12.61 1261 0x2012_3DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO1 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.62 1262 0x2012_3EH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO2 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.63 1263 0x2012_3FH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO3 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.64 1264 0x2012_40H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO4 effective level Description：							

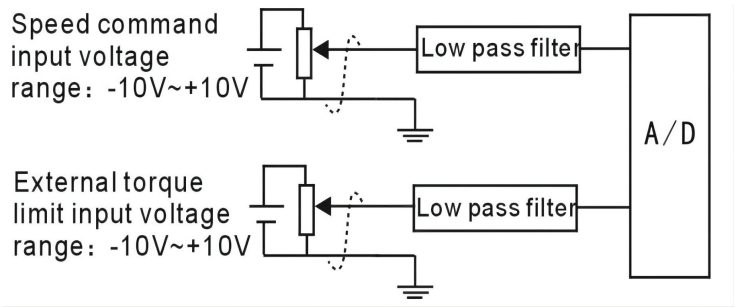
	0-Output 1 when valid 1-Output 0 when valid							
P12.65 1265 0x2012_41H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO5 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.66 1266 0x2012_42H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO6 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.67 1267 0x2012_43H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO7 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.68 1268 0x2012_44H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO8 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.69 1269 0x2012_45H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO9 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.70 1270 0x2012_46H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO10 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.71 1271 0x2012_47H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO11 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.72 1272 0x2012_48H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO12 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							

P12.73 1273 0x2012_49H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO13 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.74 1274 0x2012_4AH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO14 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.75 1275 0x2012_4BH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO15 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.76 1276 0x2012_4CH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO16 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.77 1277 0x2012_4DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO20 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.78 1278 0x2012_4EH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DO21 effective level Description： 0-Output 1 when valid 1-Output 0 when valid							
P12.79 1279 0x2012_4FH	S16	PVT	RW	Immediately	-	1	0~1	Not
	Parameter Name：Whether the virtual DI1 to DI16 input value register P12.20 is reset to zero upon power-on Description： 0-The virtual DI input value P12.20 is not reset to zero upon power-on 1-The virtual DI input value P12.20 is reset to zero upon power-on							

6.3 Simulated input and simulated output AI function

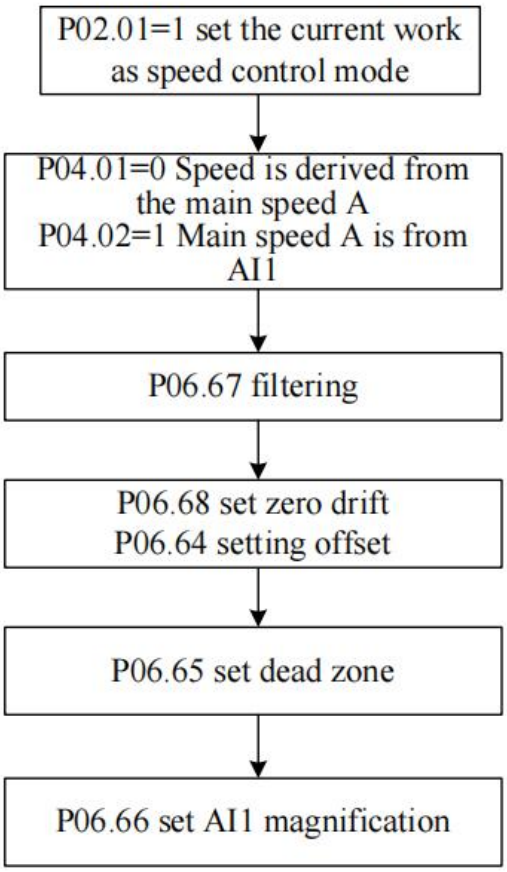
The VC120 servo driver has two AI terminals, and the input range of AI1-AI2 is ±10V input.

Analog input circuit



Operation method and steps

Take AI1 as an example to illustrate the method of setting speed instructions for analog voltage.



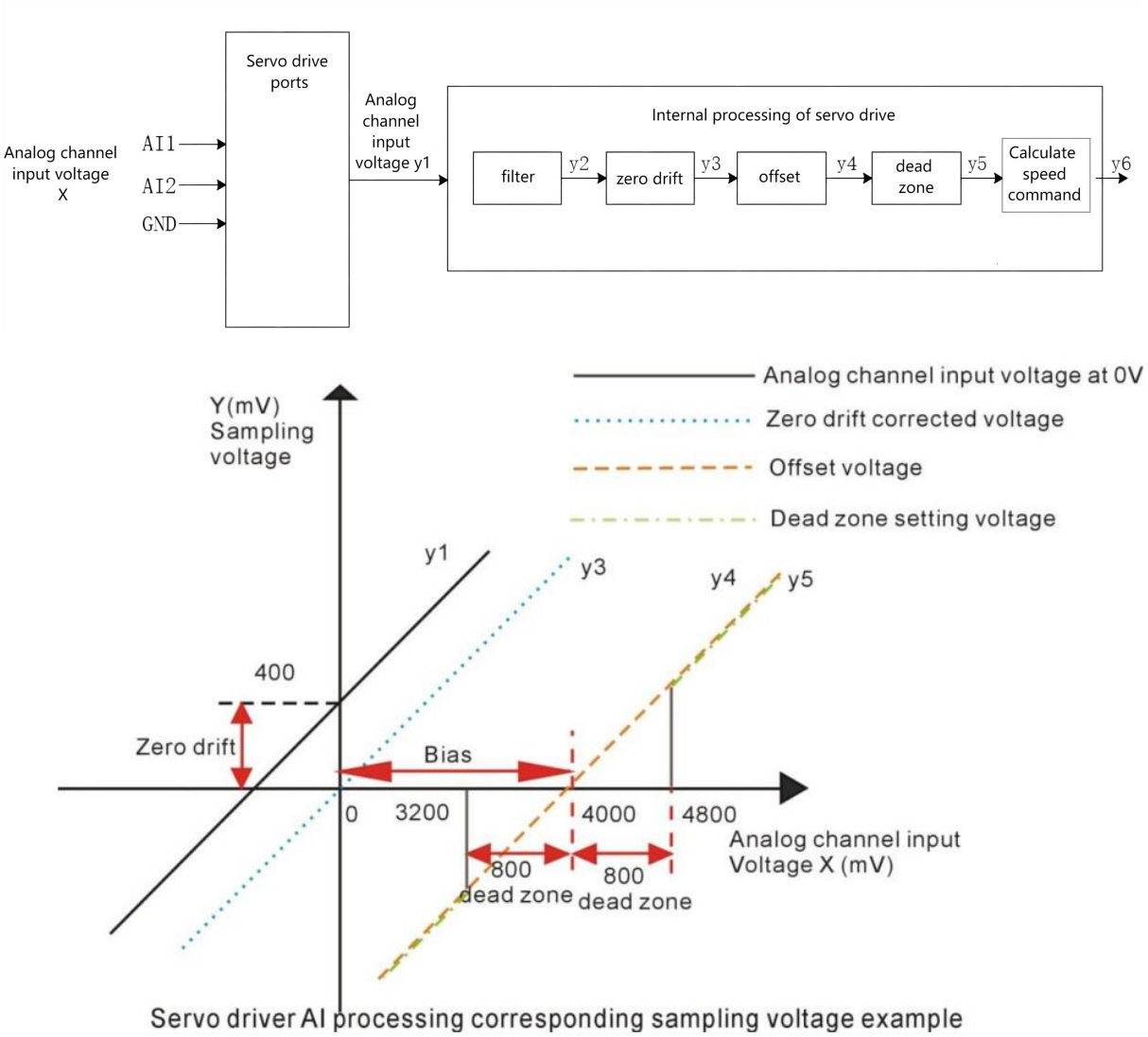
Noun explanation:

Zero drift: It refers to the value of the sampling voltage of the servo driver relative to GND when the input voltage of the analog channel is zero.

Bias: It refers to the input voltage value of the analog channel corresponding to zero when the sampling voltage is zero after zero drift correction.

Dead zone: Refers to the input voltage range corresponding to the analog channel when the sampling voltage is zero.

The output voltage of the untreated analog channel is shown in Figure y1. After being processed internally by the servo driver, the speed command y6 is ultimately obtained.



● Filtering：

The servo driver provides analog channel filtering. By setting the filter time constants P06.67, P06.72, and P06.77, it can prevent the motor command fluctuation caused by the unstable analog input voltage, and can also reduce the motor fault caused by the interference signal. The filtering function has no elimination or suppression of zero drift and dead zone.

● Zero drift correction

When the actual input voltage is corrected to 0V, the voltage P06.61 collected by the analog channel AI1 deviates from the value of 0V.

In the figure, the output voltage of the analog channel without the internal processing of the driver is shown as y1. Taking the filtering time constant P06.67= 0.00ms as an example, the sampling voltage y2 after filtering is consistent with y1.

It can be seen that when the actual input voltage x=0, the collected voltage P06.61=y1=400mV, this 400mV is called zero drift.

After zero drift correction, the sampling voltage is shown as y3. y3=y1-400.0

● Offset Correction:

When the sampling voltage is set to 0, the corresponding actual input voltage value.

As shown in the figure, when the preset sampling voltage y4=0, the corresponding actual

input voltage x=4000mV, this 4000mV is called offset. Set P06.64=4000.

- Dead zone settings:

Limits the valid input voltage range when the sampling voltage of the driver is not 0.

After the offset setting is completed, when the input voltage x is within 3200mV and 4800mV, the sampling voltage value is 0, and this 800mV is called the dead zone. Set P06.65=800.0, after setting the dead zone, the sampling voltage is shown as y5.

$$y_5 = \begin{cases} 0, 3200 \le x \le 4800 \\ y_4, 4800 \le x \le 10000 \text{or} -10000 \le x \le 3200 \end{cases}$$

- Calculate the percentage of analog commands

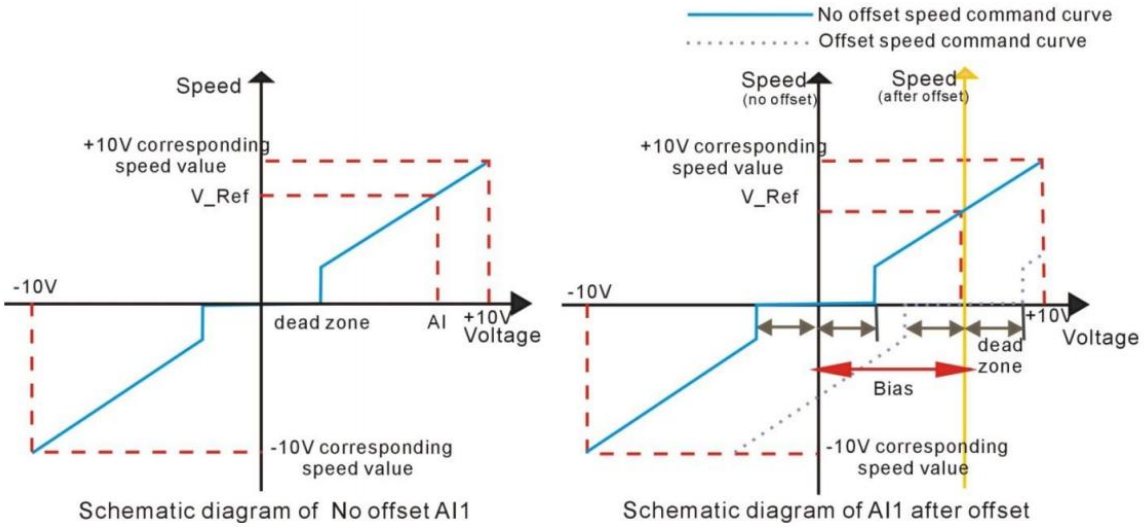
After the zero drift, offset and dead zone settings are completed, divide by 10000mV, and then multiply by the magnification percentage to obtain the final analog command percentage.

$$y_6 = \frac{y_5}{10000} \times (P06.66)\%$$

- Calculate speed command y6 or torque command

$$\text{Speed command (rpm)} = \text{Rated speed (rpm)} \times \text{Analog command percentage}$$
$$\text{Torque command percentage} = \text{Analog command percentage}$$

For example, when there is no offset, it is shown on the left of the following figure, and with an offset, it is shown on the right of the following figure. After completing the correct settings, you can view the AI1 sampling voltage value and the speed command value corresponding to the analog input in real time through the oscilloscope channel.



The relationship between the final speed command value percentage y6 and the input voltage x:

$$y6 = \begin{cases} 0, B - C \le X \le B + C \\ \dfrac{(x - B)}{10000} \times (P06.66 \text{orP06.67orP06.77})\%, B + C \le X \le 10000, or -10000 \le x \le B - C \end{cases}$$

Among them: B: bias; C: dead zone.

To sum up, assuming that the AI1 filter time constant is 0, the AI1 analog command calculation process is as follows:

（1） Eliminate zero drift and offset

$b1$ = (AI1 input voltage value P06.61) - (AI1 zero drift P06.68) - (AI1 bias P06.64)

（2） join dead zone

$$b2 = \begin{cases} 0, & |b1| < \text{dead zone P06.65} \\ b1, & |b1| > \text{dead zone P06.65} \end{cases}$$

（3） Calculate the percentage of analog instructions

$$\text{AI1 analog command percentage P06.91} = \frac{b2}{10000} \times (\text{AI1 magnification P06.66})\%$$

（4） Calculate the speed command or torque command

（5）

Speed command (rpm) = AI1 analog command percentage P06.91 × Rated speed P00.02

Torque command% = AI1 analog command percentage P06.91

The AI correction method is as follows: write 1 to P06.79 to trigger AI1 zero drift correction; write 2 to P06.79 to trigger AI2 zero drift correction; write 4 to P06.79 to trigger AI1 and AI2 zero drift correction. Or trigger INFn67 through DI, and perform zero drift correction on AI1 and AI2 at the same time.

AI related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.61 661 0x2006_3DH	S16	PVT	RO	Immediately	mv	-	-	Not
	Parameter Name：AI1 input voltage							
P06.62 662 0x2006_3EH	S16	PVT	RO	Immediately	mv	-	-	Not
	Parameter Name：AI2 input voltage							
P06.64 664 0x2006_40H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：AI1 Bias							
P06.65 665 0x2006_41H	S16	PVT	RW	Immediately	mv	0	0~5000	Not
	Parameter Name：AI1 Dead zone							
P06.66 666	S16	PVT	RW	Immediately	%	100	-32767~32767	Not

0x2006_42H	Parameter Name：AI1 Magnification							
P06.67	S16	PVT	RW	Immediately	ms	2	0~32767	Not
667	Parameter Name：Time constant of AI1 low-pass filter							
0x2006_43H								
P06.68	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
668								
0x2006_44H	Parameter Name：AI1 Zero Drift							
P06.69	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
669								
0x2006_45H	Parameter Name：AI2 Bias							
P06.70	S16	PVT	RW	Immediately	mv	0	0~5000	Not
670	Parameter Name：AI2 Dead zone							
0x2006_46H								
P06.71	S16	PVT	RW	Immediately	%	100	-32767~32767	Not
671								
0x2006_47H	Parameter Name：AI2 Magnification							
P06.72	S16	PVT	RW	Immediately	ms	2	0~32767	Not
672	Parameter Name：Time constant of AI2 low-pass filter							
0x2006_48H								
P06.73	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
673								
0x2006_49H	Parameter Name：AI2 Zero Drift							
P06.79	S16	PVT	RW	Immediately	-	0	0~7	Not
679	Parameter Name：Automatic Zero Drift Calibration 0 - No Operation 1 - Automatic Calibration of AI1 Once 2 - Automatic Calibration of AI2 Once 3 - Reserved 4 - Automatic Calibration of AI1 and AI2 Once 5 - Automatic Calibration of Current Sensor Once 6 - Clear Zero Drift of Current Sensor							
0x2006_4FH								
P06.91	S16	PVT	RW	Immediately	5	0	-	Not
691	Parameter Name：Final AI1 Input Value							
0x2006_5BH								
P06.92	S16	PVT	RW	Immediately	5	0	-	Not
692	Parameter Name：Final AI2 Input Value							

0x2006_5CH	

Related input function bits.

Function bits	Bit description
INFn.67	Valid to invalid transition, trigger correction of AI1, AI2 zero drift

Chapter 7 Auxiliary Functions

7.1 Fault protection

7.1.1 Fault Downtime

The failure of the servo drive is divided into three categories.

Class I is a serious fault. Once such a fault is reported, the motor power must be cut off immediately and the motor is free to stop. The fault code range for class I is Er.100-Er.199.

Class II is a general fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.10. The fault code range for a Type II fault is Er.200-Er.599.

Class III is not a serious fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.11. The fault code range for Class III faults is Er.600-Er.999.

When the hardware/software travel limit occurs, the servo over travel fault stop mode can be set separately by P02.12.

There are five types of downtime. The first type is free stop; the second type is rapid deceleration stop, the drive is disconnected after stop, the motor is powered off; the third is slow deceleration stop, disconnected after parking is enabled, the motor is powered off; the fourth is Quickly decelerate to stop, keep enabling after parking, users need to disconnect the enable signal to disable; the fifth is slow deceleration stop, keep enabled after parking, users need to disconnect the enable signal to disable. Free parking means that the drive is broken and the motor is free to stop by frictional resistance. Deceleration stop means that the servo drive drives the motor to decelerate. In this process, the motor is kept energized. The deceleration time for rapid deceleration stop is set by P02.16. The deceleration time for slow deceleration stop is set by P02.17. The deceleration time refers to the time from the rated speed to the zero speed. The actual deceleration time is determined by the speed at

the time of the fault and the set deceleration time.

$$\text{Actual deceleration time} = \text{set deceleration time} \times \frac{\text{failure speed}}{\text{Rated speed}}$$

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.10	S16	PVT	RW	Immediately	-	0	0~5	Not
210 0x2002_AH	Parameter Name：Servo type 2 failure stop mode selection Description：Set the deceleration method of the servo motor from rotation to stop and the motor state after stop when the servo class II fault occurs. 0-Break enable free parking 1-Fast deceleration and stop after the parking is enabled							

	2-Slow deceleration stop and enable 3-Fast deceleration stop and keep enabled 4-Slow deceleration stop and keep enabled 5-Braking according to the current set by P02.18							
P02.11 211 0x2002_BH	S16	PVT	RW	Immediately	-	0	0~5	Not
	Parameter Name：Servo three types of failure mode selection Description： 0- Break enable free parking 1- Fast deceleration and stop after the parking is enabled 2- Slow deceleration stop and enable 3-Fast deceleration stop and keep enabled 4-Slow deceleration stop and keep enabled 5-Braking according to the current set by P02.18							
P02.12 212 0x2002_CH	S16	PVT	RW	Immediately	-	0	0~5	Not
	Parameter Name：Over travel stop mode selection Description： 0- Break enable free parking 1- Fast deceleration and stop after the parking is enabled 2- Slow deceleration stop and enable 3- Fast deceleration stop and keep enabled 4- Slow deceleration stop and keep enabled 5-Braking according to the current set by P02.18							
P02.16 216 0x2002_10H	U16	PVT	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Fast stop time							
P02.17 217 0x2002_11H	U16	PVT	RW	Immediately	ms	1000	0~65535	Not
	Parameter Name：Slow parking time							

7.1.2 All faults

Servo supports the following failures.

fault code	Fault description
Er.100	Software overcurrent, when the current percentage P09.31 detected by the software is greater than the value set by P10.01, a software overcurrent fault will be reported, and the fault can be shielded by BIT1 of P10.33.
Er.101	hardware overcurrent
Er.102	Overvoltage, For 220V driver, when the bus voltage P01.08 is greater than 420V, it will report overvoltage. For 380V driver, when the bus voltage P01.08 is greater than 750V, it will report overvoltage.
Er.103	Undervoltage, when the bus voltage P01.08 is less than the rated voltage P01.07*1.414*0.7, it will report undervoltage.

Er.104 or Er.004	The current sensor is faulty. When the power is turned on for the first time, before the relay is closed, the detected current is not 0, and this fault is reported.
Er.105 or Er.005	If the encoder fails and the encoder is not connected, the fault is reported.
Er.106 or Er.006	The EEPROM verify fault, and the fault is reported when the value written to the EEPROM and the value of the read EEPROM are inconsistent.
Er.109	If the current changes greatly, the fault will be reported when the difference between the two sampled currents is 50%.
Er.111	Current phase sequence learning failure
Er.112	The output is out of phase.
Er.113	Did not scan to Z point during self-learning
Er.114	Z point offset not found
Er.116	Great change in rotational speed
Er.117	The drive is overheated, when it is detected that the drive temperature P01.10 is greater than the drive overheating threshold P10.06, the drive over temperature fault will be reported.
Er.119	Motor encoder type does not match
Er.120	Software is not authorized
Er.121	Phase loss at RST input
Er.122 or Er.022	Use timeout
Er.130	STO (INFn75) alarm input signal is valid
Er.138	ECAT PHY Configuration Failure
Er.200	When returns to home, the home signal INFn.34 is not assigned.
Er.201	INFn.xx repeated allocation, one input function bit is assigned to two or more DI
Er.202	Overspeed, when the speed percentage (actual speed/rated speed) exceeds P10.05, it will report overspeed.
Er.203	The position error is too large. When the position error P03.17 is greater than P03.19 and P03.19 is not equal to 0, the fault is reported. Note that it is easy to report this fault if the position is set to a large filter time.
Er.205	No return to home before absolute point motion
Er.206	Motor overload
Er.207	Software limit, after enabling the software limit P03.73, when the encoder position value is less than the lower limit of the software limit or greater than the upper limit of the software limit, this fault will be reported.
Er.208	hardware limit
Er.209	Curve planning failed
Er.213	Fully closed loop position error is too large
Er.214	Prohibit positive (reverse) turn
Er.216	Z point signal is unstable
Er.217	RPDO receive timeout
Er.218	Reserved
Er.219	Motor stall
Er.220	Braking resistor overload
Er.221	The forward stroke switch input function bit INFn.43 is not assigned to the entity DI

Er.222	The reverse stroke switch input function bit INFn.44 is not assigned to entity DI
Er.223	Search home error
Er.226	Absolute value mode lap overflow
Er.227	The battery of the absolute encoder is faulty. (After the battery is powered off, the fault will be reported when the power is turned on for the first time, prompting the customer that the encoder has been powered off. Connect the battery, and the fault will be automatically eliminated after reset.)
Er.228	Inertia learning failed, need to reset P07.03 and P07.04
Er.230	Reserve
Er.231	Bus error
Er.234	Continuous vibration
Er.237	Car breakdown
Er.241	Over-travel error during self-learning
Er.242	Encoder learning error, encoder interference or wrong magnetic pole setting
Er.246	BISSC Protocol Status Abnormal
Er.247	Excessive Position Error in Control Loop
Er.600	Motor overheating
Er.601	DI function code is not assigned
Er.602	AI zero drift is too large, when AIx zero drift P06.68/P06.73/P06.78 is greater than the threshold value P10.10, it will report zero drift too large fault.
Er.603	The zero return time out, when the zero return time is greater than P10.08, this fault will be reported.
Er.604	When the absolute encoder is self-learning, the rotation direction of the motor is wrong, and the UVW wiring needs to be replaced
Er.605	The battery voltage of the absolute encoder is too low, you need to replace the new battery when the drive is powered on
Er.607	The battery voltage of the second encoder is too low, and it needs to be replaced with a new battery when the driver is powered on.
Er.609	Drive parameters not found during factory reset
Er.610	Motor parameters not found when restoring to factory defaults
Er.611	EEPROM verification error when restoring to factory defaults
Er.612	Self-learning current loop error
Er.619	Power-off Brake Output
Er.652	AI1 Abnormal
Er.653	FLASH Erase Failure
Er.701	EtherCAT Bus Error
Er.702	EtherCAT Incoming Line Disconnected
Er.711	Leakage fault

The relevant parameters are as follows：

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.31	S16	PVT	RO	Immediately	%	0	-	Not

931 0x2009_1FH	Parameter Name：Torque current feedback Description：Displays the torque current feedback value.							
P10.01	S16	PVT	RW	Reset	%	340	0~350	Not
1001 0x2010_1H	Parameter Name：Software Overcurrent Threshold Description：Overcurrent threshold %, if the driver torque current percentage is greater than the overcurrent threshold or the single-phase current percentage is greater than the overcurrent threshold, software overcurrent is reported.							
P10.02	S16	PVT	RW	Immediately	%	100	0~200	Not
1002 0x2010_2H	Parameter Name：Overload value Description： Overload value %, normally this value is set as the percentage of the motor's rated current P00.01 divided by the driver's rated current P01.03. The larger this value is, the more difficult it is to report overload, and the higher the requirement for the overload capacity of the motor. ImmediatelyTake effect. When the BIT4 of P10.07 is 1, P10.39 is used for overload protection; otherwise, P10.02 is used for overload protection							
P10.39	S16	PVT	RW	Reset	%	100	1~300	Not
1039 0x2010_27H	Parameter Name：Motor overload coefficient Description： The motor overload factor % is generally set to 100%. Internally, the overload value is automatically set as the percentage of the motor overload factor P10.39 multiplied by the motor rated current P00.01 divided by the driver rated current P01.03. The larger this value is, the more difficult it is to report overload, and the higher the requirement for the overload capacity of the motor. Power on Take effect. When the BIT4 of P10.07 is 1, P10.39 is used for overload protection; otherwise, P10.02 is used for overload protection							
P10.03	S16	PVT	RW	Immediately	%	200	0~800	Not
1003 0x2010_3H	Parameter Name： Locked-rotor protection current threshold (can only be modified after P02.35=8422) Description： When the driver current percentage exceeds this value and persists for P10.04 for a period of time, and the rotational speed is less than 5rpm, a locked rotor fault is reported							
P10.04	S32	PVT	RW	Immediately	ms	2000	0~65535	Not
1004 0x2010_4H	Parameter Name：Locked rotor protection time threshold (can only be modified after P02.35=8422)							
P10.05	S16	PVT	RW	Immediately	%	180	0~3276.7	Not
1005 0x2010_5H	Parameter Name：Percentage of passing speed Description：When the percentage of the actual motor speed (rpm) divided by the rated motor speed (rpm) is greater than the overspeed percentage, an overspeed fault of the motor is reported							
P10.06	S16	PVT	RW	Immediately	℃	80.0	0~3276.7	Not
1006 0x2010_6H	Parameter Name：Driver overheating threshold							
P10.08	S16	PVT	RW	Immediately	s	0	0~32767	Not
1008 0x2010_8H	Parameter Name：The timeout time for returning to the origin Description：The return to origin timeout time is set to 0 and no return to zero timeout protection is performed							
P10.10	S16	PVT	RW	Immediately	mv	500	0~32767	Not
1010	Parameter Name：AI zero-drift threshold							

0x2010_AH	Description：AI zero drift threshold: When the zero drift value of AIx exceeds the AI zero drift threshold, it reports that the AI zero drift is too large							
P10.11	S16	PVT	RW	Reset	-	0	0~5	Not
1011	Parameter Name：Overload curve selection							
0x2010_BH	Description：Overload curve selection: From 0 to 4, select the internal overload curve. When set to 5, select the custom overload curve							
P10.12	S16	PVT	RW	Immediately	%	0	0~100	Not
1012	Parameter Name：The zero-speed command automatically reduces the torque limit value							
0x2010_CH								
P10.13	S16	PVT	RW	Reset	s	0	0~3276.7	Not
1013	Parameter Name：Customize the 1.1 times overload curve time							
0x2010_DH								
P10.14	S16	PVT	RW	Reset	s	0	0~3276.7	Not
1014	Parameter Name：Customize the 1.5 times overload curve time							
0x2010_EH								
P10.15	S16	PVT	RW	Reset	s	0	0~3276.7	Not
1015	Parameter Name：Customize the 2.0 times overload curve time							
0x2010_FH								
P10.16	S16	PVT	RW	Reset	s	0	0~3276.7	Not
1016	Parameter Name：Customize the 2.5 times overload curve time							
0x2010_10H								
P10.17	S16	PVT	RW	Reset	s	0	0~3276.7	Not
1017	Parameter Name：Customize the 3.0 times overload curve time							
0x2010_11H								
P10.18	S16	PVT	RW	Reset	-	0	0~32767	Not
1018	Parameter Name：Flying car detection threshold							
0x2010_12H	Description：When the runaway detection threshold is set to non-zero, runaway protection is enabled. The smaller the value, the more sensitive it is; the larger the value, the less sensitive it is. The setting range is from 0 to 10,000, and it is generally set to 100							
P10.20	S16	PVT	RO	Immediately	-	-	-	Not
1020	Parameter Name：The current fault code							
0x2010_14H								
P10.21	S16	PVT	RW	Immediately	-	0	1~5	Not
1021	Parameter Name：The number of selected fault codes							
0x2010_15H	Description：The number of selected fault codes, choose P10.22-P10.31 to display the fault information of the most recent fault, which can only be set to 1 to 5							
P10.22	S16	PVT	RO	Immediately	-	-	-	Not
1022	Parameter Name：Selected number of fault codes							
0x2010_16H								
P10.23	S16	PVT	RO	Immediately	min	-	-	Not
1023	Parameter Name：The selected fault time point							
0x2010_17H	Description：The selected fault time point refers to the number of seconds from startup to fault reporting							

P10.24 1024 0x2010_18H	S16	PVT	RO	Immediately	rpm	-	-	Not
	Parameter Name：Motor speed at selected fault							
P10.25 1025 0x2010_19H	S16	PVT	RO	Immediately	A	0	-	Not
	Parameter Name：The effective value of the motor current at the selected fault							
P10.26 1026 0x2010_1AH	S16	PVT	RO	Immediately	A	0	-	Not
	Parameter Name：The V-phase current of the motor at the selected fault							
P10.27 1027 0x2010_1BH	S16	PVT	RO	Immediately	A	-	-	Not
	Parameter Name：The W-phase current of the motor at the selected fault							
P10.28 1028 0x2010_1CH	S16	PVT	RO	Immediately	v	-	-	Not
	Parameter Name：The bus voltage at the time of the selected fault							
P10.29 1029 0x2010_1DH	S16	PVT	RO	Immediately	℃	-	-	Not
	Parameter Name：The temperature of the driver at the time of the selected fault							
P10.30 1030 0x2010_1EH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：The selected fault is in the DI state							
P10.31 1031 0x2010_1FH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：The selected fault is in the DO state							
P10.33 1033 0x2010_21H	U16	PVT	RW	Immediately	-	44	0~65535	Not
	Parameter Name：Fault shielding Description：Input in decimal (BCD) format and convert to Binary (Binary) to obtain the corresponding fault shielding signal. For example:Decimal (BCD)12 indicates shielding BIT2 phase faults and large current variations at BIT3 BIT0 shield overload Er206 BIT1 blocks software overcurrent Er100 BIT2 reserved BIT3 reserved BIT4 reserved BIT5 shielded continuous vibration fault Er234 BIT6 blocks the instability of point Z Er216 BIT7 block SYNC lost BIT8 shielded current sensor fault Er104 BIT9 shields under-voltage Er103 BIT10 shielded encoder fault Er105 BIT11 reserved BIT12 shielding blockage fault Er209 BIT13 reserved							

	BIT14 The shielded motor parameters cannot be found for fault Er610 and the driver parameters cannot be found for fault Er609							
P10.34	U16	PVT	RW	Immediately	20ns	150	0 ~65535	Not
1034 0x2010_22H	Parameter Name：Hardware failure time threshold Description：The threshold for the number of hardware failures, Unit, is 20ns. When the duration of a single hardware failure exceeds this value, Er.101 is reported. When the overcurrent protection for the inverter unit is set, the extraction rate is 8 when set to 100, 16 when set to 200, 32 when set to 300, and 64 when set to 400							
P10.35	S16	P	RW	Immediately	rpm	500	0~32767	Not
1035 0x2010_23H	Parameter Name：The Reset fault will be responded to only after the minimum duration of the fault Description：The Reset fault will only be responded to after the minimum duration of the fault, Unit seconds. When reporting software overcurrent, hardware overcurrent, driver overheating, motor overload, locked rotor, or overload of the braking resistor, the Reset fault must wait for P10.35 seconds							
P10.36	S16	PVT	RO	Immediately	-	-	-	Not
1036 0x2010_24H	Parameter Name：The accompanying fault code of the current fault code is 1							
P10.37	S16	PVT	RO	Immediately	-	-	-	Not
1037 0x2010_25H	Parameter Name：The current fault code is accompanied by fault code 2							
P10.38	S16	PVT	RO	Immediately	-	-	-	Not
1038 0x2010_26H	Parameter Name：The current fault code is accompanied by fault code 3							
P10.44	S16	PVT	RO	Immediately	%	-	-	Not
1044 0x2010_2CH	Parameter Name：The speed loop is given at the most recent valid failure							
P10.45	S16	PVT	RO	Immediately	%	-	-	Not
1045 0x2010_2DH	Parameter Name：Speed loop feedback during the most recent valid failure							
P10.46	S16	PVT	RO	Immediately	%	-	-	Not
1046 0x2010_2EH	Parameter Name：The torque setting at the most recent valid failure							
P10.47	S16	PVT	RO	Immediately	%	-	-	Not
1047 0x2010_2FH	Parameter Name：Torque feedback during the most recent effective failure							
P10.48	S16	PVT	RO	Immediately	-	-	-	Not
1048 0x2010_30H	Parameter Name：The position error after filtering during the most recent valid failure							
P10.49	S16	PVT	RO	Immediately	-	-	-	Not
1049 0x2010_31H	Parameter Name：Current record index Description：For the current record index, each time a valid fault is reported, the record index increases once. When it reaches 5, it is reset to zero, and a fault record is made simultaneously.							
P10.50	S16	PVT	RO	Immediately	-	-	-	Not

1050 0x2010_32H	Parameter Name：The fault code of the fault with index 0							
P10.51	U16	PVT	RO	Immediately	s	-	-	Not
1051 0x2010_33H	Parameter Name：The fault time of the fault with index 0							
P10.52	S16	PVT	RO	Immediately	rpm	-	-	Not
1052 0x2010_34H	Parameter Name：The rotational speed of the fault with index 0							
P10.53	S16	PVT	RO	Immediately	A	-	-	Not
1053 0x2010_35H	Parameter Name：The effective value of the fault current with index 0							
P10.54	S16	PVT	RO	Immediately	A	-	-	Not
1054 0x2010_36H	Parameter Name：The instantaneous value of the V-phase current of the fault with index 0							
P10.55	S16	PVT	RO	Immediately	A	-	-	Not
1055 0x2010_37H	Parameter Name：The instantaneous value of the W-phase current of the fault with index 0							
P10.56	S16	PVT	RO	Immediately	V	-	-	Not
1056 0x2010_38H	Parameter Name：The voltage of the faulty capacitor with index 0							
P10.57	S16	PVT	RO	Immediately	℃	-	-	Not
1057 0x2010_39H	Parameter Name：The temperature of the fault with index 0							
P10.58	S16	PVT	RO	Immediately	-	-	-	Not
1058 0x2010_3AH	Parameter Name：The DI status of the fault with index 0							
P10.59	S16	PVT	RO	Immediately	-	-	-	Not
1059 0x2010_3BH	Parameter Name：The DO status of the fault with index 0							
P10.60	S16	PVT	RO	Immediately	-	-	-	Not
1060 0x2010_3CH	Parameter Name：The fault code of the fault with index 1							
P10.61	U16	PVT	RO	Immediately	s	-	-	Not
1061 0x2010_3DH	Parameter Name：The fault time of the fault with index 1							
P10.62	S16	PVT	RO	Immediately	rpm	-	-	Not
1062 0x2010_3EH	Parameter Name：The rotational speed of the fault with index 1							
P10.63	S16	PVT	RO	Immediately	A	-	-	Not
1063 0x2010_3FH	Parameter Name：The effective current value of the fault with index 1							
P10.64	S16	PVT	RO	Immediately	A	-	-	Not

1064 0x2010_40H	Parameter Name：The instantaneous value of the V-phase current of the fault with index 1							
P10.65	S16	PVT	RO	Immediately	A	-	-	Not
1065 0x2010_41H	Parameter Name：The instantaneous value of the W-phase current of the fault with index 1							
P10.66	S16	PVT	RO	Immediately	V	-	-	Not
1066 0x2010_42H	Parameter Name：The capacitor voltage of the fault with index 1							
P10.67	S16	PVT	RO	Immediately	℃	-	-	Not
1067 0x2010_43H	Parameter Name：The temperature of the fault with index 1							
P10.68	S16	PVT	RO	Immediately	-	-	-	Not
1068 0x2010_44H	Parameter Name：The DI status of the fault with index 1							
P10.69	S16	PVT	RO	Immediately	-	-	-	Not
1069 0x2010_45H	Parameter Name：The DO status of the fault with index 1							
P10.70	S16	PVT	RO	Immediately	-	-	-	Not
1070 0x2010_46H	Parameter Name：The fault code of the fault with index 2							
P10.71	U16	PVT	RO	Immediately	s	-	-	Not
1071 0x2010_47H	Parameter Name：The fault time of the fault with index 2							
P10.72	S16	PVT	RO	Immediately	rpm	-	-	Not
10.72 0x2010_48H	Parameter Name：The rotational speed of the fault with index 2							
P10.73	S16	PVT	RO	Immediately	A	-	-	Not
1073 0x2010_49H	Parameter Name：The effective current value of the fault with index 2							
P10.74	S16	PVT	RO	Immediately	A	-	-	Not
1074 0x2010_4AH	Parameter Name：The instantaneous value of the V-phase current of the fault with index 2							
P10.75	S16	PVT	RO	Immediately	A	-	-	Not
1075 0x2010_4BH	Parameter Name：The instantaneous value of the W-phase current of the fault with index 2							
P10.76	S16	PVT	RO	Immediately	V	-	-	Not
1076 0x2010_4CH	Parameter Name：The voltage of the faulty capacitor with index 2							
P10.77	S16	PVT	RO	Immediately	℃	-	-	Not
1077 0x2010_4DH	Parameter Name：The temperature of the fault with index 2							
P10.78	S16	PVT	RO	Immediately	-	-	-	Not

1078 0x2010_4EH	Parameter Name：The DI status of the fault with index 2							
P10.79	S16	PVT	RO	Immediately	-	-	-	Not
1079 0x2010_4FH	Parameter Name：The DO status of the fault with index 2							
P10.80	S16	PVT	RO	Immediately	-	-	-	Not
1080 0x2010_50H	Parameter Name：The fault code of the fault with index 3							
P10.81	U16	PVT	RO	Immediately	s	-	-	Not
1081 0x2010_51H	Parameter Name：The fault time of the fault with index 3							
P10.82	S16	PVT	RO	Immediately	rpm	-	-	Not
1082 0x2010_52H	Parameter Name：The rotational speed of the fault with index 3							
P10.83	S16	PVT	RO	Immediately	A	-	-	Not
1083 0x2010_53H	Parameter Name：The effective current value of the fault with index 3							
P10.84	S16	PVT	RO	Immediately	A	-	-	Not
1084 0x2010_54H	Parameter Name：The instantaneous value of the V-phase current of the fault with index 3							
P10.85	S16	PVT	RO	Immediately	A	-	-	Not
1085 0x2010_55H	Parameter Name：The instantaneous value of the W-phase current of the fault with index 3							
P10.86	S16	PVT	RO	Immediately	V	-	-	Not
1086 0x2010_56H	Parameter Name：The capacitor voltage of the fault with index 3							
P10.87	S16	PVT	RO	Immediately	℃	-	-	Not
1087 0x2010_57H	Parameter Name：The temperature of the fault with index 3							
P10.88	S16	PVT	RO	Immediately	-	-	-	Not
1088 0x2010_58H	Parameter Name：The DI status of the fault with index 3							
P10.89	S16	PVT	RO	Immediately	-	-	-	Not
1089 0x2010_59H	Parameter Name：The DO status of the fault with index 3							
P10.90	S16	PVT	RO	Immediately	-	-	-	Not
1090 0x2010_5AH	Parameter Name：The fault code of the fault with index 4							
P10.91	U16	PVT	RO	Immediately	s	-	-	Not
1091 0x2010_5BH	Parameter Name：The fault time of the fault with index 4							
P10.92	S16	PVT	RO	Immediately	rpm	-	-	Not

1092 0x2010_5CH	Parameter Name：The rotational speed of the fault with index 4							
P10.93	S16	PVT	RO	Immediately	A	-	-	Not
1093 0x2010_5DH	Parameter Name：The effective value of the fault current with index 4							
P10.94	S16	PVT	RO	Immediately	A	-	-	Not
1094 0x2010_5EH	Parameter Name：The instantaneous value of the V-phase current of the fault with index 4							
P10.95	S16	PVT	RO	Immediately	A	-	-	Not
1095 0x2010_5FH	Parameter Name：The instantaneous value of the W-phase current of the fault with index 4							
P10.96	S16	PVT	RO	Immediately	V	-	-	Not
1096 0x2010_60H	Parameter Name：The voltage of the faulty capacitor with index 4							
P10.97	S16	PVT	RO	Immediately	℃	-	-	Not
1097 0x2010_61H	Parameter Name：The temperature of the fault with index 4							
P10.98	S16	PVT	RO	Immediately	-	-	-	Not
1098 0x2010_62H	Parameter Name：The DI status of the fault with index 4							
P10.99	S16	PVT	RO	Immediately	-	-	-	Not
1099 0x2010_63H	Parameter Name：The DO status of the fault with index 4							

7.1.3 Troubleshooting

（1）Er.100 software overcurrent

Fault occurrence conditions:

If the current percentage P09.31 detected by the software is greater than the overcurrent threshold of P10.01, a software overcurrent fault will be reported, which can be shielded by BIT1 of P10.33.

Fault reason	Fault confirmation	Troubleshooting
1.Motor UVW phase sequence reversed or missing phase	➢ Confirm the UVW phase sequence and whether the phase is missing	Adjust the UVW phase sequence or replace the motor
2.P10.01 setting is too small	➢ Check whether the value of parameter P10.01 is too small	Increase P10.01
3.Gain setting is too large	➢ Check P07.01 current loop ratio, P07.02 current loop integral	Reduce gain related parameters

	gain,P07.03 speed loop proportional gain, P07.10 torque feedforward coefficient, whether these parameters are set too large	
4. The motor peak current percentage setting is too large	➢ Check whether P00.24 motor peak current percentage is inconsistent with the actual peak current of the motor	Reduce the percentage of P00.24 motor peak current
5. Motor power is too small	➢ Confirm according to the actual load	Replace the motor with a higher power
6. The motor output current is greater than the motor peak current	➢ Check whether the torque limit value of the drive (the default limit source P05.13) is greater than the motor peak current	Decrease the torque limit value

（2）Er.101 hardware overcurrent

Fault occurrence conditions:

The hardware detects that the driver output current reaches the peak threshold.

Fault reason	Fault confirmation	Troubleshooting
1. The initial phase of the magnetic pole is incorrect	➢ Check UVW Phase Sequence ➢ Whether the servo motor is a non-standard motor	Operate Fn005, re-learn the encoder
2. Abnormal connection of motor UVW power cable	➢ Check whether the driver end and motor end of the UVW cable are in poor contact and the ports are aged. ➢ Unplug the UVW motor cable and check if the wire is short-circuited.	Replace or correctly connect the motor wire
3. Motor power is too small	➢ Determined according to actual load conditions	Replace the motor with a higher power
4. Motor damage	➢ Unplug the motor wire	Unbalanced replacement motor

	and measure the resistance between the UVW and the motor with a multi meter	
5. The braking resistance is too small or short-circuited	➢ Measure whether the resistance across the driver P, Rb' is positive	Replace the braking resistor
6. Drive failure	➢ Unplug the motor cable, then enable the servo drive, but still report this fault	Replace the drive
7. The gain setting is unreasonable	➢ During the rotation of the motor, if the motor vibrates violently or makes a sharp sound, you can also observe the curve of the current loop through VECObserve	Adjust gain
8. The acceleration/ deceleration time is too short	➢ VECObserve observes whether the control command is given too violently ➢ Check whether the parameter setting of acceleration and deceleration time is too small	Modify the acceleration given by the control command, increase the filter time of the control command, increase the acceleration and deceleration time
9. Connect the motor UVW line to the capacities load	➢ Check if the motor cable is too long ➢ Check whether the motor UVW is connected to a capacitor	Shorten the motor cable, exclude the UVW terminal and connect the capacitor
10、Excessive mechanical clearance	➢ Check if the mechanical clearance is too large	Reduce mechanical clearance

（3）Er.102 Overvoltage

Fault occurrence conditions:

When the busbar voltage detection value P01.08 is greater than the overvoltage threshold, it will report overvoltage

For drives whose rated voltage P01.07 is less than 300V, the overvoltage threshold is 420V, and for drives whose rated voltage P01.07 is greater than 300V, the overvoltage threshold is 750V.

Fault reason	Fault confirmation	Troubleshooting
1. The rated voltage of the driver is incorrectly set	➢ Check whether the parameter setting of P01.07 is correct	Modify the drive rated voltage P01.07
2. The bus voltage calibration coefficient is set incorrectly	➢ Check whether the parameter setting of P01.09 is correct	Modify bus voltage calibration coefficient P01.09 (adjustment range 90%~110%)
3. The power supply of the drive RST is unstable	➢ Oscilloscope to check RST power	Adjust the power supply or add a power supply noise filter
4. The DC bus voltage is too high	➢ Use a multi-meter to measure whether the voltages at both ends of the driver P and N are normal	Adjust the bus voltage calibration coefficient P01.09 (the adjustment range is 90%~110%) or adjust the power supply
5. The braking resistor is not working properly	➢ Check the braking resistor for poor contact, short circuit or open circuit ➢ Use a multi-meter to measure whether the resistances at both ends of the driver P and Rb' are normal	Correct wiring or replace braking resistor
6. The parameter setting of the braking resistor is unreasonable	➢ Check whether the parameters of P02.20 for enabling dynamic braking, the resistance value of braking resistor P02.21, and the power of braking resistor P02.22 are set correctly	P02.20 can be selected by users according to their needs, P02.21 should be set correctly, and P02.22 can be set up to 5 times the power of the braking resistor
7. The system is a large inertia load, and the deceleration time is too short	➢ View the actual deceleration time	Properly adjust the deceleration time
8. The gain setting is unreasonable	➢ Check to see if the motor oscillates	Adjust the gain

（4）Er.103 undervoltage

Fault occurrence conditions:

When the busbar voltage detection value P01.08 is less than the undervoltage threshold, it will report undervoltage.

Undervoltage threshold = drive rated voltage P01.07*1.414*0.7

Fault reason	Fault confirmation	Troubleshooting

1. The RST power supply of the driver does not match the rated voltage P01.07 of the driver.	➢ Check whether the parameter setting of P01.07 is correct	Modify the drive rated voltage P01.07
2. The acceleration time is too short	➢ View the actual acceleration time	Decrease acceleration time
3. The grid voltage is too low	➢ Measuring grid voltage	Adjust the drive rated voltage P01.07 to be consistent with the grid voltage
4.Other overloaded devices start	➢ The drive reports this fault as soon as other heavy-duty devices are started	Adjust the RST power supply
5.Charging circuit failure	➢ This fault is reported as soon as the drive is enabled	Replace the drive
6. Braking resistors P, Rb' are short-circuited to ground	➢ Check whether the P and Rb' terminals of the driver are short-circuited with the ground ➢ Or remove the braking resistor, whether to report this fault, if not, it means that the braking resistor P and Rb' are short-circuited to ground	Prevent short circuit of braking resistor P, Rb' to ground
7. Excessive load	➢ When using a single-phase power supply, the actual load is too large	Use three-phase power or derating
8. The three-phase current of the main power supply RST is unbalanced	➢ Measure the three-phase current of the main power supply RST, UVW	Unbalanced, adjust the RST three-phase power supply
9. The cross-sectional area of the RST wire is too small	➢ Check if the RST wire meets the driver current	Replacing the RST power cord with a larger cross-sectional area

5）Er.104 Current sensor failure

Fault occurrence conditions:

Current sensor failure

Fault reason	Fault confirmation	Troubleshooting

1. Current sensor failure	➢ -	Replace the drive

（6）Er.105 Encoder failure

Fault occurrence conditions:

The encoder has no signal or the signal is unstable

Fault reason	Fault confirmation	Troubleshooting
1. The encoder wire is in poor contact	➢ Check the encoder line	Correct wiring
2. The encoder wire is disconnected	➢ The multi-meter detects the signal line	Replace the encoder wire
3.Subject to electromagnetic interference	➢ Exclude and turn off other equipment that may cause interference	eliminate interference

（7）Er.106 EEPROM failure

Fault occurrence conditions:

EEPROM read data error

Fault reason	Fault confirmation	Troubleshooting
1. EEPROM read data error	➢ -	Replace the drive

（10）Er.109 Large current change fault

Fault occurrence conditions:

When the two sampled currents differ by 50%, a fault is reported.

Fault reason	Fault confirmation	Troubleshooting
1. When the two sampled currents differ by 50%	➢ -	Set BIT3 of fault shielding parameter P10.33 to 1 to shield this fault

（11）Er.111 Abnormal motor winding

Fault occurrence conditions:

When self-learning the winding direction of the motor, the current changes in the wrong direction

Fault reason	Fault confirmation	Troubleshooting
1. The motor winding is abnormal	➢ Check motor UVW wiring	Connect the UVW motor cable correctly

（12）Er.113 Encoder Z point not detected

Fault occurrence conditions:

When the encoder is self-learning, the Z point signal cannot be detected

Fault reason	Fault confirmation	Troubleshooting
1. The encoder wire is in poor contact	➢ Check encoder wire	Correctly connect the encoder wire
2. The encoder signal is abnormal	➢ Connect the encoder cable correctly, after self-learning three times, it still reports this	Replace the motor

	fault	

（13）Er.114 Z point offset error

Fault occurrence conditions:

When the encoder is self-learning, it is detected that the Z point signal is larger than the encoder resolution

Fault reason	Fault confirmation	Troubleshooting
1. The encoder signal is abnormal	➢ Connect the encoder cable correctly, after self-learning three times, it still reports this fault	Replace the motor

（15）Er.117 overheating

Fault occurrence conditions:

When the drive temperature P01.10 is greater than the overheating threshold P10.06, an overheating fault will be reported.

Fault reason	Fault confirmation	Troubleshooting
1. The temperature of the drive is overheated	➢ Measuring drive surface temperature	Increase the drive cooling
2. The cooling fan does not work normally	➢ Check the fan operation	Replace the cooling fan
3.The ambient temperature is too high	➢ Thermometer measures the temperature of the site	reduce ambient temperature
4. The motor runs at low frequency and high current for a long time	➢ Monitor the actual load	Increase drive power

（18）Er.200 The home switch for return to zero is not assigned

Fault occurrence conditions:

The homing mode needs to be connected to the origin switch, and there is no origin switch assigned in the DI configuration.

Fault reason	Fault confirmation	Troubleshooting
1. The DI is not configured with the origin switch input signal INFn.34.	➢ Check if the DI is configured with the origin switch input signal INFn.34	DI configuration origin switch input signal INFn.34

（19）Er.201 DI repeat assignment

Fault occurrence conditions:

The same INFn function is assigned to two different DI or VDI terminals.

Fault reason	Fault confirmation	Troubleshooting
1. The same INFn function is assigned to two different DI or VDI terminals.	➢ View DI or VDI configuration	Modify DI or VDI configuration

（20）Er.202 overspeed

Fault occurrence conditions:

When the speed percentage (actual speed/rated speed) is greater than the overspeed percentage P10.05, it will report an overspeed fault.

Fault reason	Fault confirmation	Troubleshooting
1. The setting of overspeed percentage P10.05 is too small	➢ Check out P10.05	Increase P10.05 or decrease the speed percentage
2. The gain is too large	➢ Check the parameter settings of P07.03, P07.04 and P07.05	Decrease the gain
3. HALL switch detection error	➢ -	Re-learning the encoder
4. Z point offset P00.71 error	➢ -	For our company's motors, this value is set to 0, and P02.35=8421 should be set before setting this value

（21）Er.203 Position error is too large

Fault occurrence conditions:

When the difference between the position command and the actual position is greater than the excessive position error threshold P03.19, it will report that the position error is too large.

Fault reason	Fault confirmation	Troubleshooting
1. Position command filter parameters P03.06 and P03.07 are too large	➢ Check P03.06 and P03.07	Decrease P03.06 and P03.07
2. Gain is too small	➢ Check whether the parameter settings of P07.03, P07.04 and P07.05 are reasonable	Adjust the gain
3. Position command speed is too large	➢ View position command speed	Decrease position command speed
4. The position error is too large and the threshold P03.19 is too small	➢ Check the excessive position error threshold P03.19	Increase the excessive position error threshold P03.19
5. Mechanical stuck motor	➢ Check whether the mechanical transmission part is stuck	Dealing with Mechanical Stuck Issues

（23）Er.205 There is no zero return before triggering to go to absolute multi-segment position

Fault occurrence conditions:

There is no homing performed before triggering the absolute multi-segment position.

Fault reason	Fault confirmation	Troubleshooting
1. The zero return is not performed before triggering the absolute multi-segment position.	➢ -	A zero return is required before triggering an absolute multi-segment position.

（24）Er.206 overload

Fault occurrence conditions:

When the motor current works continuously for a certain period of time at a value greater than the rated current, an overload is reported.

Fault reason	Fault confirmation	Troubleshooting
1. Improper parameter setting	➢ Check out P10.02	Please set P10.02 as the percentage of motor rated current and drive rated current.
2. The motor power is not enough	➢ Confirm according to the actual load	Please replace the servo system with a higher power level

（25）Er.207 software limit

Fault occurrence conditions:

After enabling the software limit through P03.73, when the actual user position is less than the lower limit of the position and the speed is negative, the software limit will be reported. When the actual user position is greater than the upper limit of the position and the speed is positive, the software limit will be reported.

Fault reason	Fault confirmation	Troubleshooting
1. Improper parameter setting	➢ Check P03.73	Modify P03.73
2. Improper setting of software limit value	➢ Check P03.74, P03.76	Modify P03.74, P03.76

（26）Er.208 hardware limit

Fault occurrence conditions:

After enabling the hardware limit through P03.73, when the reverse position limit switch is valid and the speed is negative, the hardware limit is reported. When the positive position limit switch is valid and the speed is positive, the hardware limit is reported.

Fault reason	Fault confirmation	Troubleshooting
1. Improper parameter setting	➢ Check P03.73	Modify P03.73
2.Whether the installation position of the position limit switch is appropriate.	➢ Check whether the position limit switch is installed in the proper position.	Adjust the position limit switch installation position

（27）Er.209 4th power position curve planning failed

Fault occurrence conditions:

4th power position curve planning failed

Fault reason	Fault confirmation	Troubleshooting
1. The 4th power position curve planning failed	➢ -	The 4th power position curve planning failed, reset the reasonable speed/position planning value

（29）Er.214 Forward and reverse rotation is prohibited

Fault occurrence conditions:

The forward/reverse rotation is prohibited through P02.03, but the forward/reverse rotation command is actually input

Fault reason	Fault confirmation	Troubleshooting
1. The forward/reverse rotation is prohibited by setting P02.03, but the forward/reverse rotation command is actually input	➢ Check whether the entered command is normal	Modify the command direction

（29）Er.214 Forward and reverse rotation is prohibited

Fault occurrence conditions:

The forward/reverse rotation is prohibited through P02.03, but the forward/reverse rotation command is actually input

Fault reason	Fault confirmation	Troubleshooting
1. The forward/reverse rotation is prohibited by setting P02.03, but the forward/reverse rotation command is actually input	➢ Check whether the entered command is normal	Modify the command direction

（31）Er.217 SYNC signal timeout

Fault occurrence conditions:

The received SYNC signal exceeds the actual sync period

Fault reason	Fault confirmation	Troubleshooting
1. The received SYNC signal exceeds the actual synchronization period	➢ Check whether the CANopen/EtherCAT communication line is connected normally	Correct wiring

（32）Er.219 locked rotor

Fault occurrence conditions:

When the drive current percentage P09.31 is greater than P10.03, and the speed is close to zero, and lasts for the time of P10.04, it will report stalled rotor.

Fault reason	Fault confirmation	Troubleshooting
1. Improper setting of parameters	➢ Check P10.03, P10.04. Generally, P10.03 and P10.04 use the shortcut button in VECObserve	Modify P10.03, P10.04

	software → the default settings after a complete set of matching.	
2. The machine jams the motor	➢ View Mechanical Structure	Dealing with mechanical structural problems
3. Motor power is too small	➢ Judging by the actual load	Increase motor power

（33）Er.220 Braking resistor overload

Fault occurrence conditions:

When the braking resistor is in the braking state continuously and the braking of the braking resistor is greater than the heat dissipation of the braking resistor, the braking resistor is overloaded.

Fault reason	Fault confirmation	Troubleshooting
1. Improper setting of parameters	➢ Check braking resistor resistance value P02.21, braking resistor power P02.22, braking resistor heat dissipation coefficient P02.23	Set P02.21 according to the resistance value of the braking resistor; set the braking resistor power P02.22; P02.23 is generally set to 50
2. The power of the braking resistor is too small	➢ The braking is frequent, and the heat dissipation of the braking resistor is too small	Choose a braking resistor with higher power

（34）Er.221 Forward travel limit switch not assigned

Fault occurrence conditions:

The return-to-zero mode needs to be connected to the forward travel limit switch, and the forward travel limit switch INFn.43 is not allocated in the DI configuration.

Fault reason	Fault confirmation	Troubleshooting
1. Unassigned forward travel limit switch INFn.43	➢ Check the DI function configuration parameters	DI function assignment Forward travel limit switch INFn.43

（35）Er222 Reverse travel limit switch not assigned

Fault occurrence conditions:

The back-to-zero mode needs to be connected to the reverse stroke limit switch, and the reverse stroke limit switch INFn.44 is not allocated in the DI configuration.

Fault reason	Fault confirmation	Troubleshooting
1. Unassigned reverse travel limit switch INFn.44	➢ Check the DI function configuration parameters	DI function assignment Reverse stroke limit switch INFn.44

（36）Er223 Failed to find origin

Fault occurrence conditions:

During the zero return process, the origin switch was not found

Fault reason	Fault confirmation	Troubleshooting
1. Not connected to the origin switch	➢ Check whether the origin switch is correctly connected to the DI	Correctly wire the origin switch

（39）Er.226 Absolute encoder in absolute mode, the number of turns overflows

Fault occurrence conditions:

Absolute encoder in absolute mode, the number of turns overflows

Fault reason	Fault confirmation	Troubleshooting
1. The number of turns overflows when the absolute encoder is in the absolute value mode.	➢ -	-

（40）Er.227 Absolute encoder battery failure in absolute mode

Fault occurrence conditions:

After the battery is powered off, when the power is turned on for the first time, this fault will be reported, prompting the user that the absolute encoder battery is powered off and the multi-turn position information is lost. After connecting the battery, the fault will be automatically eliminated after reset.

Fault reason	Fault confirmation	Troubleshooting
1. The battery is out of power	➢ Measuring encoder battery voltage	Replace the battery and power on again

（41）Er.228 Inertia learning failed

Fault occurrence conditions:

When the self-learning habit is used, the frictional resistance is too large, and the self-learning current limit P02.36 is too small.

Fault reason	Fault confirmation	Troubleshooting
1. When the self-learning habit is used, the frictional resistance is too large, and the self-learning current limit P02.36 is too small.	➢ Check P02.36	Increase P02.36
2. The inertia of the system is too large, and the acceleration and deceleration time P07.33 of the learning habit is too small	➢ Check P07.33	Increasing P07.33
3. The gain setting is not appropriate	➢ If the motor shakes	Increase P07.03, decrease P07.04

（35）Er.234 Continuous vibration

Conditions for fault generation:

During the movement, the motor vibrates at a large amplitude and for a long time

Fault reason	Fault confirmation	Troubleshooting
1、The loop gain is set very reasonably	Check whether the loop gain is reasonable	Ensure that during the full closed-loop learning process, the motor can drive the second encoder to move without any slippage
2、There is a problem with the encoder or it is disturbed	If it is an absolute value encoder, observe whether the values of P09.96 and P09.98 keep increasing when the motor is enabled or running. If so, it indicates that the information fed back by the encoder to the servo has been interfered with.	Connect the motor ground wire. If P09.96 and P09.98 continue to increase in size, it is recommended to replace the motor.

(36)Er.237 Runaway Fault

Conditions for fault generation：

During the movement, the motor was out of control

Fault reason	Fault confirmation	Troubleshooting
1、The motor is not matched properly	➢ Check if it's a new motor and if there's no matching motor	Re-self-learn the encoder
2、The encoder is damaged or subject to strong interference	➢ Manually rotate the motor once to see if the change value of P00.13 is the number of pulses per revolution. Check if the motor ground wire is properly connected and if there are any strong interference sources nearby.	Replace the encoder or replace the entire motor; Connect the ground wire properly and remove strong interference sources

（37）Er.241 Over Travel Error in Self-Learning Process

Conditions for fault generation:

Fault reason	Fault confirmation	Troubleshooting
	➢	

（38）Er.242 Encoder learning error

Conditions for fault generation：

Encoder interference or incorrect magnetic pole Settings

Fault reason	Fault confirmation	Troubleshooting
1、The encoder is disturbed.	➢ Confirm whether there are any strong interference sources near the motor	➢ Remove the strong interference source
2、The magnetic pole Settings are incorrect	➢ Confirm whether the values of P00.62 and P00.64 are consistent with the motor parameters	Modify the values of P00.62 and P00.64 to be consistent with the motor parameters

（39）Er.247 Excessive Position Error in Control Loop

The condition for fault occurrence: The position error P03.94 after filtering is greater than P03.86.

Fault reason	Fault confirmation	Troubleshooting
The gain is too small.	➢	➢ IncreaseP07.05
The feedforward is too small.	➢	➢ IncreaseP07.11

（40）Er.600 Motor overheating

Conditions for fault generation:

Motor temperature is too high

Fault reason	Fault confirmation	Troubleshooting
1. The load is too large, and the motor heats too seriously	➢ Measure motor temperature	Need to replace a larger capacity motor
2. The ambient temperature is too high	➢ Detect the ambient temperature on site	Reduce site ambient temperature

（41）Er.601 The DI function code has not been assigned

Conditions for fault generation：

The DI function code has not been assigned

Fault reason	Fault confirmation	Troubleshooting
1、The speed or torque source AB switch was enabled but the AB switch function bit was not assigned	Check whether the DI configuration is correctly configured	Correctly configure DI

（42）Er.602 The zero drift of AI is too large

Conditions for fault generation：

The zero drift setting P06.68 for AI1 or P06.73 for AI2 is greater than the zero drift threshold P10.10 for AI

Fault reason	Fault confirmation	Troubleshooting
1、The zero drift of AI is too large	➢ Check whether the input analog quantity is	Ensure that the analog input is normal

	normal	

（43）Er.603 Back to zero timeout

Fault occurrence conditions:

The zero return process exceeds the zero return timeout time P10.08

Fault reason	Fault confirmation	Troubleshooting
1. The origin signal is not properly connected	➢ Check whether the origin signal is normal	Normal access to the zero return origin signal

（44）Er.604 Motor rotation direction is wrong during self-learning

Fault occurrence conditions:

Motor rotation direction is wrong during self-learning

Fault reason	Fault confirmation	Troubleshooting
1. The motor rotation direction is wrong during self-learning	➢ During self-learning, check the rotation direction of the motor	Check whether the motor and encoder are normal
2. The UVW phase sequence of the motor is connected incorrectly	➢ Confirm UVW Phase Sequence	Confirm UVW Phase Sequence

（45）Er.605 Absolute encoder battery alarm

Fault occurrence conditions:

The absolute encoder is operating in absolute value Mode, and the battery voltage is too low

Fault reason	Fault confirmation	Troubleshooting
1. The absolute encoder works in absolute value mode, and the battery voltage is too low	➢ Check the battery voltage	The absolute encoder works in absolute value mode, and the battery voltage is too low. If the battery is not needed, change the value of P00.41 to 3 to shield the fault.

（46）Er.607 Insufficient torque during inertia learning

Fault occurrence conditions:

During inertia learning, the torque is too small.

Fault reason	Fault confirmation	Troubleshooting
1、The current is restricted	Check whether the torque limit in the fifth group of parameters is very small	Set the limit value a bit higher
2、The motor power is too small.	Check whether the rated torque of the motor is appropriate	Change to a motor with a larger torque

（47）Er.609 No drive parameters were found during the factory reset.

Fault occurrence conditions:

Fault reason	Fault confirmation	Troubleshooting
➢ 1、Failed to restore drive parameters during factory reset.	➢ Check whether the value of P1.15 (drive level) is correct.	➢ Set the correct value for P01.15 (drive level).

（48）Er.610 No motor parameters were found during the factory reset.

Fault occurrence conditions:

Fault reason	Fault confirmation	Troubleshooting
1、Failed to restore motor parameters during factory reset.	➢ Check whether the value of P0.06 (Motor ID) is correct.	Set the correct P0.06 (motor ID)

（49）Er.611 EEPROM verification error occurred during factory reset.

Fault occurrence conditions:

Fault reason	Fault confirmation	Troubleshooting
1、EEPROMD amaged	➢	➢ If the ER.611 error persists after multiple resets, replace the EEPROM.
2、Experiencing interference	➢ Confirm whether there are any strong sources of interference nearby.	Remove the source of interference.

（50）Er.612 Self-learning current loop error

Fault occurrence conditions:

Fault reason	Fault confirmation	Troubleshooting
The voltage is high, while the current is low.	➢	Check whether there is a phase loss in UVW.

（51）Er.619 Power-off brake output.

Fault occurrence conditions：

When the servo is powered off, the servo erroneously outputs a brake signal.

Fault reason	Fault confirmation	Troubleshooting
There is a bug in the firmware program.	➢	Upgrade to new firmware.

（52）Er.652 AI1 Abnormal

Fault occurrence conditions：

Fault reason	Fault confirmation	Troubleshooting
1、Whether the parameters set on P06.94 and P06.95 are reasonable	➢ Confirm whether the Settings of P06.94 and P06.95 are reasonable	Set P06.94 and P06.95 according to the actual situation

（53）Er.653 FLASH erasure failed

Fault occurrence conditions：

Fault reason	Fault confirmation	Troubleshooting
1、The Flash erasure of the black box failed.		Return to factory for repair.

（54）Er.701 Bus Error.

Fault occurrence conditions：

Fault reason	Fault confirmation	Troubleshooting
1、The bus reports a fault 100ms after failing to receive the PDO (Process Data Object) from the master station.	Check whether P10.07 BIT3 is selected/enabled	Verify master station communication

（55）Er.702 ECAT feed line dropout protection

Fault occurrence conditions：

Fault reason	Fault confirmation	Troubleshooting
The bus communication has been disconnected	When troubleshooting, determine whether the issue lies with the servo's network port, the network cable, or the master station	Replace the servo drive, network cable, or master station

（56）Er.711 Leakage Current Protection

Fault occurrence conditions：

The servo drive or motor has a leakage current issue

Fault reason	Fault confirmation	Troubleshooting
Leakage current detected in the servo system or motor	➢ Measure the voltage between the machine casing and ground。 ➢ After swapping the live (L) and neutral (N) conductors of the machine, measure the voltage between the equipment enclosure and ground again. If a significant voltage variation is observed between the two measurements, leakage current is likely the	Conduct a visual inspection of the cable assembly: Look for aged/broken wires and degraded insulation

	cause. If no substantial change is detected in the voltage readings, the phenomenon is attributable to induced voltage (electrostatic induction).	

7.1.4 Use INFn.42 or INFn.78 command to reset faults with error codes below 100

During system operation, it is common practice to reset both the fault and the associated drive controller simultaneously. For instance, when an ER.005 fault occurs, the drive must also be reset to fully clear the error condition.

When using INFn.42 or INFn.78 to reset faults with error codes below 100, the drive controller will be automatically reset as part of the procedure.

7.1.5 Motor overload protection

The motor load ratio is defined as (output torque percentage Un013) / (overload value P10.02). There exists a relationship between the motor's output load ratio and its continuous operating time, namely, the higher the motor load ratio, the shorter the continuous operating time. Once the continuous operating time is exceeded, a motor overload fault will be reported.To establish a closer connection between motor overload protection and the motor's rated current, a new overload protection method, P10.39 (enabled via BIT4 of P10.07), has been added on the basis of the old overload protection method represented by P10.02. After filling in a value for P10.39, the overload value is automatically set internally as a percentage calculated by multiplying the motor overload coefficient P10.39 by the motor rated current P00.01 and then dividing by the drive rated current P01.03. The higher this value is, the more difficult it is to trigger an overload report, and the higher the requirement for the motor's overload capacity.

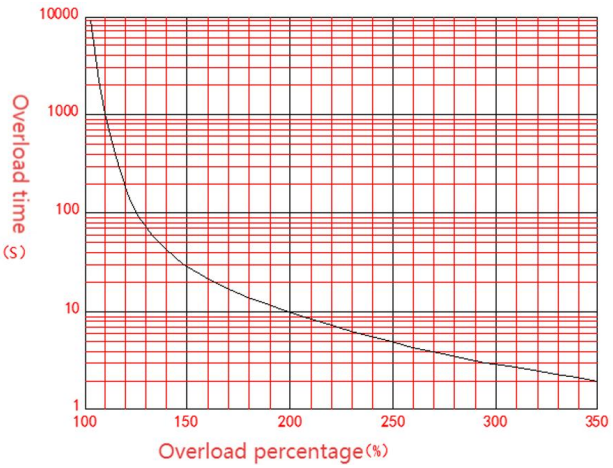
The duration of overload is determined based on the magnitude of the motor load ratio. For the old overload method represented by P10.02, it operates according to the corresponding relationship in the following formula. For instance, if the current motor load ratio is 1.1, the motor can run continuously for 1000 seconds without triggering an overload alarm.For the new overload method using P10.39, it functions according to the overload coefficient set in P10.39. For example, if P10.39 is set to 110% (this coefficient is equivalent to the load ratio in the old method, meaning 110% corresponds to a 1.1-times load ratio), the motor can also run continuously for 1000 seconds without triggering an overload alarm.

$$\text{Motor load ratio} = \frac{\text{Torque output percentage } Un013}{\text{Overload value.}P10.02}$$

$$\text{Torque output percentage} = \frac{\text{Actual current}}{\text{Drive rated current}} \times 100\%$$

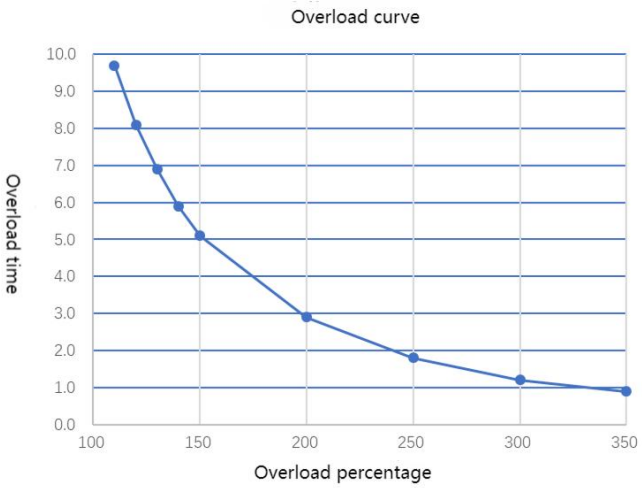
Different overload curves can be selected by setting the parameter P10.11 for overload curve selection. This function is only valid when the ARM firmware version is 0.104 or higher.

➢ Overload curve.0：



Overload ratio	Continuous operation time.（s）
1.1	1000
1.2	200
1.4	42
1.7	18
2.1	8.4
2.4	5.5
2.7	4.0
3.0	2.9

➢ Overload curve1：



Overload ratio	Continuous operation time.（s）
1.1	9.7
1.2	8.1
1.4	5.9
1.5	5.1
2.0	2.9
2.5	1.8
3.0	1.2
3.5	0.9

The relevant parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.02 1002 0x2010_2H	S16	PVT	RW	Immediately	%	100	0~200	Not
	Parameter Name：Overload value							

	Description：Set the overload protection point Normally, this value should be set as the percentage of the motor's rated current (P00.01) divided by the drive's rated current (P01.03). The higher this value is, the more difficult it becomes to trigger an overload alarm, and the higher the overload capacity requirement for the motor. Immediately takes effect. When BIT4 of P10.07 is set to 1, overload protection is implemented using P10.39; otherwise, overload protection is implemented using P10.02。							
P10.39 1039 0x2010_27H	S16	PVT	RW	Reset	%	100	1~300	Not
	Parameter Name：Motor overload coefficient Description：Motor overload coefficient (%). It is generally set to 100%. Internally, the overload value is automatically set as the percentage calculated by multiplying the motor overload coefficient (P10.39) by the motor's rated current (P00.01) and then dividing by the drive's rated current (P01.03). The higher this value is, the more difficult it becomes to trigger an overload alarm, and the higher the overload capacity requirement for the motor. Takes effect upon power-on. When BIT4 of P10.07 is set to 1, overload protection is implemented using P10.39; otherwise, overload protection is implemented using P10.02。							

7.1.6 Brake resistor overload protection

The servo system performs braking based on the actually set resistance value and resistance power, utilizing the rated power of the resistor for braking. For a 220V drive, when the DC bus voltage exceeds 380VDC, the energy dissipation braking circuit can be activated by setting parameters. For a 380V drive, when the DC bus voltage exceeds 680VDC, the energy dissipation braking circuit can similarly be activated by setting parameters. Under braking at rated power and with a heat dissipation coefficient of zero, continuous braking can be sustained for 33 seconds. If the braking time is exceeded, a brake resistor overload fault will be reported. When the brake resistor is not in operation and the heat dissipation coefficient is not zero, heat dissipation will occur according to the set heat dissipation coefficient. If the heat dissipation coefficient is set to 100%, heat can be dissipated from maximum to zero in 10 seconds. For general brake resistor selection, please refer to the following table. The actual resistor used must be calculated based on on-site operating conditions.

Input power supply	Noise filter（A）	Rated current（A）	Recommended braking resistor.		
			Resistance value（Ω）	Resistor power（W）	Minimum automatic resistance（Ω）
Single-phase 220V	5	3	350	150	25
	5	6	150	300	25
Three-phase 380V	10	3.8	500	500	150

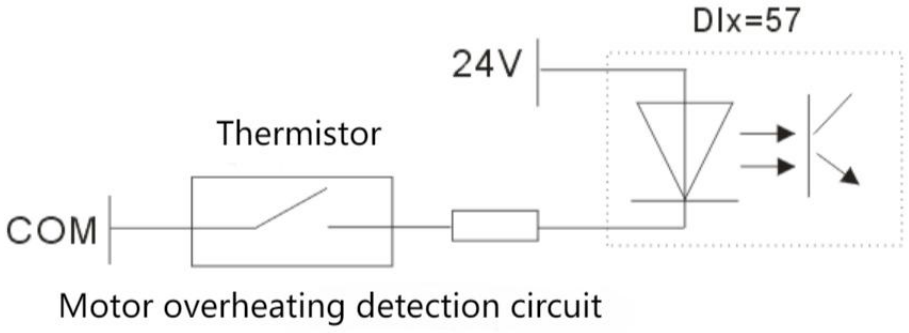
The relevant parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.21 221	S16	PVT	RW	Immediatel	Ω	0	0~3276.7	Not

0x2002_15H				y				
	Parameter Name：Resistance value of the braking resistor							
P02.22 222 0x2002_16H	S16	PVT	RW	Immediatel y	KW	0	0~3276.7	Not
	Parameter Name：Maximum power of the braking resistor Description：The maximum power of the braking resistor (in kW) should be set to 5-10 times the rated power							
P02.23 223 0x2002_17H	S16	PVT	RW	Immediatel y	%	50	0~100	Not
	Parameter Name：Heat dissipation coefficient of the braking resistor							

7.1.7 Motor overheating protection

Set the DI (Digital Input) function bit to INFn.57, and simultaneously connect an external motor overheating detection circuit. The motor overheating detection circuit employs PTC protection, with its schematic diagram shown below. When the output of the external motor overheating detection circuit pulls this DI to an active state, the drive reports a motor overheating fault Er.600.



7.2 Brake output function

The brake is a mechanism that prevents the servo motor shaft from moving when the servo drive is in a non-operational state, keeping the motor in a locked position to ensure that the moving parts of the machinery do not shift due to their own weight or external forces.

For servo motors equipped with a brake, if the brake output OUTFn.24 is assigned to a specific terminal, the brake function will be automatically enabled. It is important to note that the active level for the brake function terminal can only be set to Low level effective. Otherwise, the brake may release during power-on, leading to unintended movement.

The relevant output function numbers are as follows.

Bit number	Bit description.

OUTFn.24	Brake Output: When inactive, the brake power supply is disconnected, the brake engages, and the motor remains in a locked position. When active, the brake power supply is connected, the brake releases, and the motor is free to rotate.

7.2.1 Brake engagement process

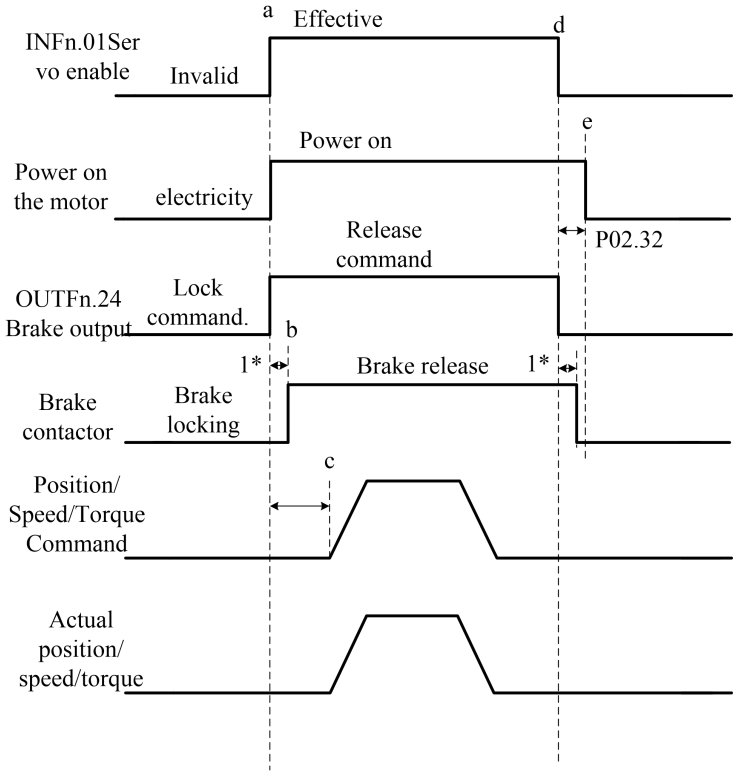
The brake engagement process can be divided into two scenarios: the first is the static brake engagement process, and the second is the dynamic brake engagement process.

The static brake engagement sequence refers to the brake engagement process that occurs when the disable command (i.e., INFn.01 switches from ON to OFF) is input at the moment the motor speed is below 20 rpm.

The dynamic brake engagement sequence refers to the brake engagement process that occurs when the disable command (i.e., INFn.01 switches from ON to OFF) is input at the moment the motor speed is above 20 rpm.

- Static brake engagement process

The brake engagement process that occurs at the moment when INFn.01 switches from ON to OFF, with the motor speed below 20 rpm, is as follows:



At the start, the brake is in a locked state. At time point a, the PLC sends a servo enable signal (INFn.01). Upon receiving the enable signal, the servo immediately energizes the motor, causing it to lock up, and simultaneously issues a brake release command (OUTFn.24).

After waiting for a duration of 1* (a specific time period), at time point b, the brake contactor completes its action, and the brake is released.

Starting from when the servo drive receives the enable signal, at time point c (this time is determined by the customer when issuing the command, that is, a delay is set after the brake signal is generated before sending the command), the servo drive begins to accept position/speed/torque commands, and the motor starts to rotate.

After the motor finishes rotating and reaches time point d, the PLC sends a disable signal. When the servo detects that the motor speed drops below 20 rpm, it initiates a static braking process, immediately issuing a brake locking signal. After a delay of 1* time, the brake contactor completes its action, the brake is locked, and then at time point e, the motor is de-energized.

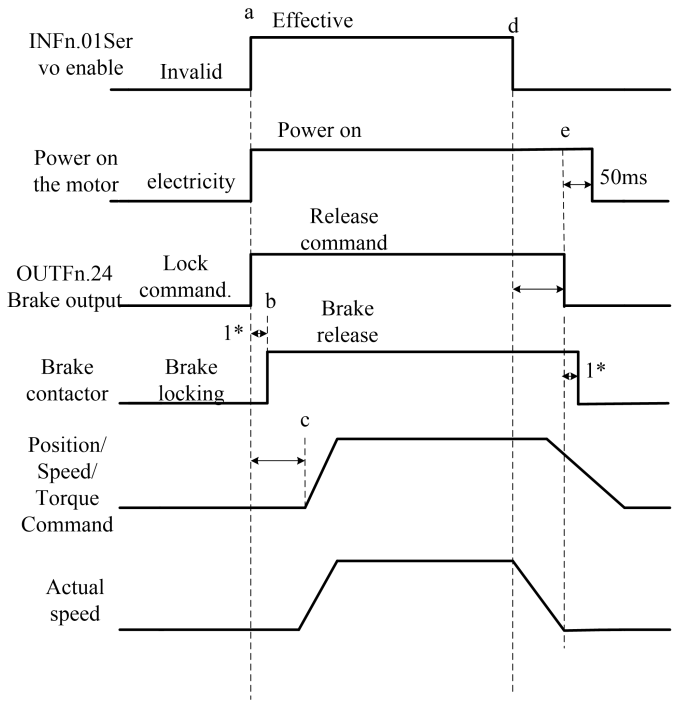
Note: 1* refers to the time duration from the moment the brake signal is sent out by the servo to the actual actuation of the brake contactor.

P02.32 represents the power-on holding time of the driver after the brake is locked, which prevents the mechanical moving parts from shifting due to their own weight or external forces after the servo is powered off.

Note: After enabling the driver, a delay period should be observed before issuing torque or speed commands. Similarly, when disabling the driver, the position/speed/torque commands must ensure that the motor is braked.

- Braking process under dynamic conditions.

When the servo enable signal switches from ON to OFF, if the current motor speed exceeds 20 rpm, the driver will initiate a dynamic braking process. After the servo enable is turned off, the motor will decelerate to 0 at the rate specified by P02.16 (rapid deceleration time), and then the brake lock signal will be output.



The relevant parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.31 231 0x2002_1FH	S16	PVT	RW	Immediately	rpm	30	0~3276.7	Not
	Parameter Name：Brake zero-speed threshold. Description：The brake lock signal is output when the motor speed falls below the value set in P02.31.							
P02.32 232 0x2002_20H	S16	PVT	RW	Immediately	ms	150	0~32767	Not
	Parameter Name：Power-on holding time. Description：After outputting the brake lock signal, the servo will continue to maintain the power-on time specified by P02.32. This parameter is only applicable when the brake output function is enabled.							

7.3 Description of Dynamic Braking Function

Dynamic braking is categorized into hardware dynamic braking and software dynamic braking. Hardware dynamic braking is activated or deactivated based on the value of the bus voltage or determined by the setting of P02.19. Software dynamic braking, on the other hand, is triggered during fault reporting or when exceeding limit positions, enabling rapid deceleration and shutdown by applying the current specified in P02.18 (percentage of dynamic braking current for the drive).

7.3.1 Hardware dynamic braking

The hardware dynamic braking function of the VC120 servo (this function is not standard but optional, requiring hardware support) involves the servo drive continuously monitoring the DC bus voltage in real-time after power-on. When the DC bus voltage reaches a specific threshold, the servo drive internally triggers the closing and opening of a relay to short-circuit phases U and V in the motor's phase sequence.

When the servo drive detects that the DC bus voltage exceeds 70% of the rated voltage, the relay for hardware dynamic braking will open, resulting in an open circuit between phases U and V. When the detected voltage falls within the range of 65% to 70% of the rated voltage, the relay will maintain its previous operating state; if it was previously closed, it will remain closed, and if it was previously open, it will remain open. When the detected DC bus voltage drops below 65% of the rated voltage, the drive will close the relay for hardware dynamic braking, short-circuiting phases U and V of the motor's phase sequence, thereby significantly reducing braking time.

After power-on, hardware dynamic braking can be enabled through parameter P02.19. When the servo drive detects that the DC bus voltage exceeds 70% of the rated voltage, the relay for hardware dynamic braking will open, resulting in an open circuit between phases U and V. If P02.19 (enable hardware dynamic braking) is set to 1 and the drive encounters a fault while operating the motor, hardware dynamic braking will only take effect when the motor speed is less than or equal to 1430 rpm. This is to prevent damage to the servo in the event of dynamic braking being applied at high speeds.

7.3.2 Software dynamic braking

When the drive lacks the hardware dynamic braking function and you want the motor to stop quickly in the event of a fault, software dynamic braking can be utilized. Software dynamic braking is activated by setting P02.10 (Servo Class II Fault Shutdown Mode) = 5, or P02.11 (Servo Class III Fault Shutdown Mode) = 5, or P02.12 (Over-travel Shutdown Mode) = 5, in conjunction with P02.18 (Drive Dynamic Braking Current Percentage). For example, if P02.10 is set to 5 and P02.18 is set to 100, when an ER.117 fault occurs, the servo will apply 100% of the servo's rated current to rapidly stop the motor.

7.4 Instruction Manual for Absolute Encoder

The absolute encoder not only detects the motor's position within a single revolution but also counts the number of rotations, capable of memorizing 16-bit multi-turn data. It offers two single-turn resolution options: 17-bit and 24-bit. A 17-bit single-turn resolution generates 131,072 encoded values per revolution, while a 24-bit single-turn resolution produces 16,777,216 encoded values per revolution. The absolute encoder system provides two

operational modes: incremental mode and absolute mode, which can be modified via P00.18. In incremental mode, the absolute encoder functions as an incremental encoder, eliminating the need for a battery, not memorizing the rotation count, and requiring a homing operation each time. In absolute mode, a battery is required, the rotation count is memorized, and only a single homing operation to the origin is needed. However, the motor's travel is limited; specifically, after the encoder is first connected to the battery, the motor can rotate a maximum of 32,767 turns in the forward direction and 32,767 turns in the reverse direction relative to this reference point. Exceeding these limits will trigger an encoder overflow fault.

For the absolute mode of the absolute encoder system, when the battery is powered on for the first time, the drive will report an Er.227 error (battery power failure fault). The drive needs to be powered off and then on again, followed by a homing operation to the origin. After homing, the servo will record the mechanical zero offset (i.e., the distance between the mechanical zero position and the encoder zero position). At this point, the relationship between the mechanical position and the encoder position is as follows:

Mechanical position.=Encoder position.-Mechanical zero offset

It should be noted that when using an absolute encoder, after homing, the encoder position does not reset to zero. At this time, there is a mechanical zero offset between the mechanical position and the encoder position. In the multi-segment position command mode, all command values refer to mechanical positions, and the unit is the user-defined position unit.

When the battery voltage drops too low, the drive will report an Er.605 error (low battery voltage fault). In this case, the battery must be replaced when the drive is powered on.

The relevant parameters are as follows：

<table>
<tr><th>Address</th><th>Type</th><th>Mode</th><th>Visit</th><th>Take effect</th><th>Unit</th><th>Default</th><th>Range</th><th>Other</th></tr>
<tr><td>P00.08
8
0x2000_8H</td><td>S16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>0</td><td>0~12</td><td>Not</td></tr>
<tr><td></td><td colspan="8">Parameter Name：Encoder type
Description：
1: 17-bit absolute encoder
6: 23-bit Tamagawa (multi-turn)
7: 23-bit Tamagawa (single-turn)
8: 17-bit Tamagawa (single-turn)</td></tr>
<tr><td>P00.18
18
0x2000_12H</td><td>S16</td><td>P</td><td>RW</td><td>Reset</td><td>-</td><td>0</td><td>0~1</td><td>Not</td></tr>
<tr><td></td><td colspan="8">Parameter Name：Absolute system Mode
Description：
0 - Incremental mode: Suitable for systems requiring continuous motion in a specific direction with unlimited travel distance. Either incremental encoders or absolute encoders can be used.
1 - Absolute mode: Suitable for systems with limited travel distance that require position memory after power failure. An absolute encoder with power-off position memory must be used.</td></tr>
</table>

P00.37 37 0x2000_25H	S32	P	RO	-	Motor encoder position.	-	-2147483648~2147483648	Not
	Parameter Name：Lower 32 bits of mechanical origin offset							
P00.39 39 0x2000_27H	S32	P	RO	-	Motor encoder position.	-	-2147483648~2147483648	Not
	Parameter Name：Upper 32 bits of mechanical origin offset.							
P00.41 41 0x2000_29H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Absolute encoder battery failure. Description： BIT0: Mask battery alarm BIT1: Mask battery fault BIT2: Reserved BIT3: Reserved BIT4: Mask revolution count overflow fault BIT5: Reserved BIT6: Mask BISSC encoder status abnormal Er246 alarm							
P03.90 390 0x2003_5AH	S32	PVT	RO	Immediately	User unit	0	-	Not
	Parameter Name：Mechanical position.							

7.5 Function description of electronic tag

To facilitate the use of our company's servo drives and motors by customers, the VC120 servo has been enhanced with an electronic tag function. When the electronic tag function is enabled, the VC120 servo will automatically load motor parameters from the motor encoder's internal memory upon power-up. The electronic tag function is enabled by setting BIT14 of P01.54 to 0. If you wish to match the servo with motors from other manufacturers, you must first disable the electronic tag function (i.e., set P01.54 to 1) before proceeding with the

matching process.

7.6 Multifunctional parameters

The existence of multifunctional parameters allows a single function to be adapted to different scenarios through adjustments to these parameters. This enables us to respond flexibly to the diverse needs of our customers in various scenarios.

<table>
<tr><th>Address</th><th>Type</th><th>Mode</th><th>Visit</th><th>Take effect</th><th>Unit</th><th>Default</th><th>Range</th><th>Other</th></tr>
<tr><td rowspan="2">P01.46
146
0x2001_2EH</td><td>U16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>8706</td><td>0~65535</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Multifunctional parameters
Description：
BIT0: Enable AI Auto-Calibration
BIT1: Factory Test DO (Do Not Modify)
BIT2: Reserved
BIT3: Reserved
BIT4: Reserved
BIT5: Reserved
BIT6: Reserved
BIT7: When =1, the bus-type servo operates as a general-purpose servo, ignoring bus commands and accepting internal position or internal speed commands instead.
BIT8: Reserved
BIT9: When set to 1 for general-purpose servos, homing does not apply offset; the origin is directly set to the offset position.
BIT10: Reserved
BIT11: When =1, the relay disconnects under low voltage conditions (less than 0.65 * 1.1414 of rated voltage); when =0, the relay remains closed once connected and will not disconnect.
BIT12: Reserved
BIT13: Reserved
BIT14: Reserved</td></tr>
<tr><td rowspan="2">P01.51
151
0x2001_33H</td><td>U16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>2</td><td>0~65535</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Multifunctional Parameter 2
Description：
BIT0: When =0, use the new torque feedforward to calculate torque feedforward based on position commands; when =1, use the old torque feedforward to calculate torque feedforward based on speed commands.
BIT1: When =0, enable torque feedforward for P720=0/1; when =1, disable torque feedforward for</td></tr>
</table>

<table>
<tr><td></td><td colspan="8">P720=0/1.
BIT2: Reserved
BIT3: Reserved
BIT4: Reserved
BIT5: Reserved
BIT6: When =0, enable low-speed bandwidth correction; when =1, disable low-speed bandwidth correction for backward compatibility.
BIT7: Reserved
BIT8: Reserved
BIT9: When =1, disable the acceleration filtering of the absolute encoder (when enabled, the acceleration filtering of the absolute encoder becomes ineffective).
BIT10: Reserved
BIT11: Reserved
BIT12: Reserved
BIT13: When =1, enable the saving of the P02.35 parameter.
BIT14: Reserved</td></tr>
<tr><td>P01.52
152
0x2001_34H</td><td>U16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>1024</td><td>0~65535</td><td>Not</td></tr>
<tr><td></td><td colspan="8">Parameter Name：Multifunctional Parameter 3
Description：
BIT0: When =0, overflow occurs at ±32,767.
BIT1: Reserved
BIT2: When =1, jogging in speed mode is forced jogging (not superimposed jogging).
BIT3: When =1, disable the absolute encoder position error interpolation function.
BIT4: When set to 1, the unit for position error is changed to 1/10,000,000 of a revolution; otherwise, the unit for position error is 1/10,000 of a revolution.
BIT5: When set to 1, pulse commands use electronic gear ratio 1 × electronic gear ratio 2, while multi-segment positioning uses electronic gear ratio 1. The final user unit conversion also uses electronic gear ratio 1.
BIT6: Reserved
BIT7: Reserved
BIT8: Reserved
BIT9: Enable automatic reset function when recovering from the Er103 voltage error.
BIT10: When set to 1, the new torque feedforward and speed feedforward are not turned off.
BIT11: Reserved
BIT12: When =1, enable retaining position error during mode switching; when =0, always clear position error during mode switching.
BIT13: Reserved
BIT14: When =1, the AI bias is added to the original voltage. When =0, the AI is processed as follows: (AI input voltage in mV - bias in mV - zero drift in mV), then dead zone processing is applied, followed by division by 10,000 and amplification. When =1, the AI is processed as follows: (AI input voltage in mV - zero drift in mV), then dead zone processing is applied, followed by adding the bias in mV, division by</td></tr>
</table>

<table>
<tr><td></td><td colspan="8">10,000, and amplification</td></tr>
<tr><td rowspan="2">P01.53
153
0x2001_35H</td><td>U16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>1024</td><td>0~65535</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Multifunctional Parameter 4
Description：
BIT0: When =1, shields the 105 fault triggered by Z-point jump variations.
BIT1: When =1, enables the position error dead zone.
BIT2: Reserved
BIT3: Reserved
BIT4: Reserved
BIT5: Reserved
BIT6: Enables dynamic modification of multi-segment position and speed command functions.
BIT7: Reserved
BIT8: Reserved
BIT8-BIT7=1: Reserved
BIT8-BIT7=2: Reserved
BIT8-BIT7=3: Reserved
BIT9: Reserved
BIT10: Reserved
BIT11: When =0, overcurrent protection uses a decimation rate of 16; otherwise, it uses a decimation rate of 8.
BIT12: When =1, speed limits are effective in all modes.
BIT13: Whether to reset the controlword to its default value (0) upon reconnection. When set to 0, the controlword is set to 0 during reconnection.
BIT14: When =1, the torque limit is expressed as a percentage of the motor's rated current, and it requires that the motor's rated current be less than the drive's rated current</td></tr>
<tr><td rowspan="2">P01.54
154
0x2001_36H</td><td>U16</td><td>PVT</td><td>RW</td><td>Immediately</td><td>-</td><td>1024</td><td>0~65535</td><td>Not</td></tr>
<tr><td colspan="8">Parameter Name：Multifunctional Parameter 5
Description：
BIT0: When enabled, in torque mode, if the speed limit is exceeded, the maximum torque will be applied to reduce the speed.
BIT1: Reserved
BIT2: Reserved
BIT3: Reserved
BIT4: Reserved
BIT5: When =1, enabling this function will reset Class 0 faults and faults reported during initialization processes such as encoder battery errors, resetting the servo.
BIT6: Reserved
BIT7: Reserved
BIT8: Reserved</td></tr>
</table>

	BIT9: Reserved BIT10: When enabled, battery faults can only be reset via the FN000 function on the control panel; power cycling or other methods cannot reset the fault. BIT11: Reserved BIT12: Reserved BIT13: Reserved BIT14: When =1, enables the electronic tag function

7.7 Explanation for setting the protection parameter P10.07

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.07 1007 0x2010_7H	S16	PVT	RW	Immediately	-	80	0~32767	Not
	Parameter Name：Multifunctional Parameter Description： BIT1: Reserved BIT2: When =1, enables RST phase-loss protection. BIT3: Enables single-axis incoming line disconnection protection. BIT4: Enables master station disconnection protection. BIT5: When =0, enables the legacy overload method and makes motor rated current settings irrelevant; when =1, uses the motor overload coefficient from parameter 1039. BIT6: When =1, torque commands are based on the motor's rated value. BIT7: When =1, software disables STO (Safe Torque Off) protection. If an STO unit is installed, STO must be hardware-disabled for the servo to operate. BIT8: Reserved BIT9: When =0, absolute positioning is prohibited before homing; otherwise, a fault is reported. When =1, absolute positioning is allowed before homing. BIT10: Reserved BIT11: Reserved BIT12: Reserved BIT13: Reserved BIT14: Reserved							

The bit functions described above will be explained as follows:

BIT2=1 enables RST phase-loss protection: RST phase-loss protection is only available when BIT2 is set to 1.

BIT3 enables single-axis incoming line disconnection protection: When BIT3=1, single-axis incoming line disconnection protection is enabled, meaning that if the incoming line is disconnected, the servo will report an ER.702 fault.

BIT4 enables master station disconnection protection: When BIT4=1, master station

disconnection protection is enabled, meaning that if the master station goes offline, the servo will report an ER.701 fault.

BIT5: When =0, the overload method specified in P10.02 is used, which is independent of the motor rated current value set in P00.01. A value is calculated by comparing the motor rated current with the servo rated current and then entered into P10.02. When =1, the overload method specified in P10.39 is used, which is related to the motor rated current value in P00.01. It calculates the overload percentage by internally multiplying P10.39 by the motor rated current (P00.01) and dividing by the servo rated current (P01.03). (By default, the new overload method specified in P10.39 is used.)

BIT6: When =1, torque commands (P05.03, P05.05) are expressed as a percentage of the motor rated current; otherwise, they are expressed as a percentage of the servo rated current.

BIT7=1 software disables STO protection: This can only be applied to the software SYO. If an STO unit is installed, STO must be hardware-disabled for the servo to operate.

BIT9: When =0, before jogging in absolute position mode under multi-segment positioning mode, a homing operation must be performed; otherwise, an ER.205 fault will be reported. When =1, jogging in absolute position mode under multi-segment positioning mode can be performed without a homing operation.

Chapter 8 Adjustment

8.1 Control loop gain adjustment

The control loop gain includes speed loop proportional gain, speed loop integral gain, and position loop proportional gain. There are seven modes for control loop gain adjustment. You can select one of these modes to adjust the gains.The first mode fixes the use of the first set of gains.The second mode allows switching between the first set and the second set of gains.The third mode automatically calculates a suitable set of gains for the normal mode based on the set stiffness level.The fourth mode automatically calculates a suitable set of gains for the positioning mode based on the set stiffness level.The fifth mode automatically calculates the gains by setting the bandwidths of the speed loop and position loop.The sixth mode adjusts the gains according to the non-tuning parameter P07.78.The seventh mode switches between the first set and the second set of bandwidth parameters based on switching conditions.

First Mode: Fixed Use of the First Set of Gains: In this mode, users can manually modify the three values P07.03, P07.04, and P07.05 to optimize control performance.

Second Mode: Switching Between the First and Second Sets of Gains: Based on the switching conditions defined by P07.24 and other relevant parameters, this mode enables switching between the first and second sets of gains.

Third and Fourth Modes: Both modes automatically calculate a suitable set of gains based on the set stiffness level and the self-learned load inertia. The difference lies in that the gains calculated in the third mode are primarily intended for the normal mode, while those

calculated in the fourth mode are mainly for the positioning mode.

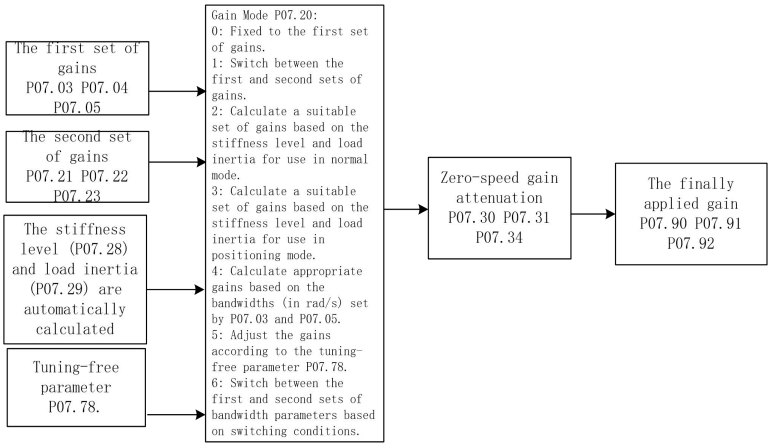
Fifth Mode: Automatic Gain Calculation by Setting Bandwidths: This mode automatically calculates the gains by setting the bandwidths of the speed loop and position loop.

Sixth Mode: Tuning-Free Function: Gain adjustment is performed based on the tuning-free parameter P07.78.

Seventh Mode: Switching Between the First and Second Sets of Bandwidth Parameters Based on Switching Conditions: This mode switches between the first and second sets of bandwidth parameters according to the switching conditions (it will automatically switch the first and second sets of gains to the bandwidth-based approach).

When utilizing the 3rd, 4th, 5th, or 6th gain adjustment methods, it is essential to properly configure the following parameters: motor rated current (P00.01), motor rated torque (P00.25), motor rotor inertia (P00.27), load inertia ratio (P07.29), and drive rated current (P01.03).

Furthermore, the servo drive features a zero-speed gain attenuation/amplification function. Specifically, when the motor speed falls below the zero-speed attenuation threshold (P07.32), the speed loop proportional/integral gains, position loop proportional gain, and current loop proportional/integral gains can be reduced or increased to a certain percentage. Zero-speed gain attenuation effectively prevents high-frequency motor vibrations at zero speed, while zero-speed gain amplification significantly accelerates positioning time at low speeds.



Example of gain switching: When the gain switching condition P07.24 = 2, the gain switching level P07.25 = 2000, and the gain switching hysteresis P07.26 = 100, the gain switching conditions are as follows: Using the speed command as the fundamental switching criterion, when the speed command increases and exceeds 2100 (P07.25 + P07.26), the system switches to the second set of gains; conversely, when the speed command decreases and falls below 1900 (P07.25 - P07.26), the system switches back to the first set of gains.

Remark: The units of parameters P07.25 and P07.26 vary depending on the selection of P07.24 (gain switching condition).

The relevant parameters are as follows：

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.01 701 0x2007_1H	S16	PVT	RW	Immediately	-	49	0~32767	Not
	Parameter Name：Current loop proportional gain							
P07.02 702 0x2007_2H	S16	PVT	RW	Immediately	-	26	0~32767	Not
	Parameter Name：Current loop integral gain							
P07.03 703 0x2007_3H	S16	PV	RW	Immediately	-	188	0~32767	Not
	Parameter Name：Speed loop proportional gain							
P07.04 704 0x2007_4H	S16	PV	RW	Immediately	-	18	0~32767	Not
	Parameter Name：Speed loop integral gain							
P07.40 740 0x2007_28H	S16	PV	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Speed loop derivative gain							
P07.05 705 0x2007_5H	S16	PV	RW	Immediately	-	37	0~32767	Not
	Parameter Name：Position loop proportional gain							
P07.06 706 0x2007_6H	S16	P	RW	Immediately	%	100	0~800	Not
	Parameter Name：Percentage of maximum output speed for the position loop							
P07.08 708 0x2007_8H	S16	PV	RW	Immediately	ms	10	0~63	Not
	Parameter Name：Torque feedforward filter time constant							
P07.09 709 0x2007_9H	S16	P	RW	Immediately	-	10	0~32767	Not
	Parameter Name：Velocity feedforward filter time constant							
P07.10 710 0x2007_AH	S16	PV	RW	Immediately	-	244	0~32767	Not

	Parameter Name：Torque feedforward coefficient							
P07.11 711 0x2007_BH	S16	P	RW	Immediately	%	90	0~300	Not
	Parameter Name：Velocity feedforward coefficient							
P07.12 712 0x2007_CH	S16	PVT	RW	Immediately	-	0	0~8	Not
	Parameter Name：Torque filter Type Description： 0 - Low-pass filter 1 - Notch filter 2 - No filter 3 - Cascade of low-pass and notch filters 4 - Automatically calculate filter parameters 5 - Automatically calculate parameters for two notch filters 6 - Automatically calculate parameters for one notch filter 7 - Automatically calculate parameters for two notch filters only once 8 - Automatically calculate parameters for one notch filter only once							
P07.20 720 0x2007_14H	S16	PVT	RW	Immediately	-	4	0~6	Not
	Parameter Name：Gain adjustment Mode Description： 0 - Fixed first set of gains 1 - Switch between the first and second sets of gains based on switching conditions 2 - Set gains according to stiffness level and load inertia, Normal Mode 3 - Set gains according to stiffness level and load inertia, Positioning Mode 4 - Automatically calculate gains based on the configured speed loop bandwidth (P07.03), position loop bandwidth (P07.05), and inertia ratio 5 - Adjustment-free, controlled based on parameter P07.78 6-Switch between the first and second sets of bandwidth parameters based on switching conditions							
P07.21 721 0x2007_15H	S16	PVT	RW	Immediately	-	800	0~32767	Not
	Parameter Name：Second set of speed loop proportional gain							
P07.22 722 0x2007_16H	S16	PVT	RW	Immediately	-	10	0~32767	Not
	Parameter Name：Second set of speed loop integral gain							
P07.23 723	S16	PVT	RW	Immediately	-	200	0~32767	Not

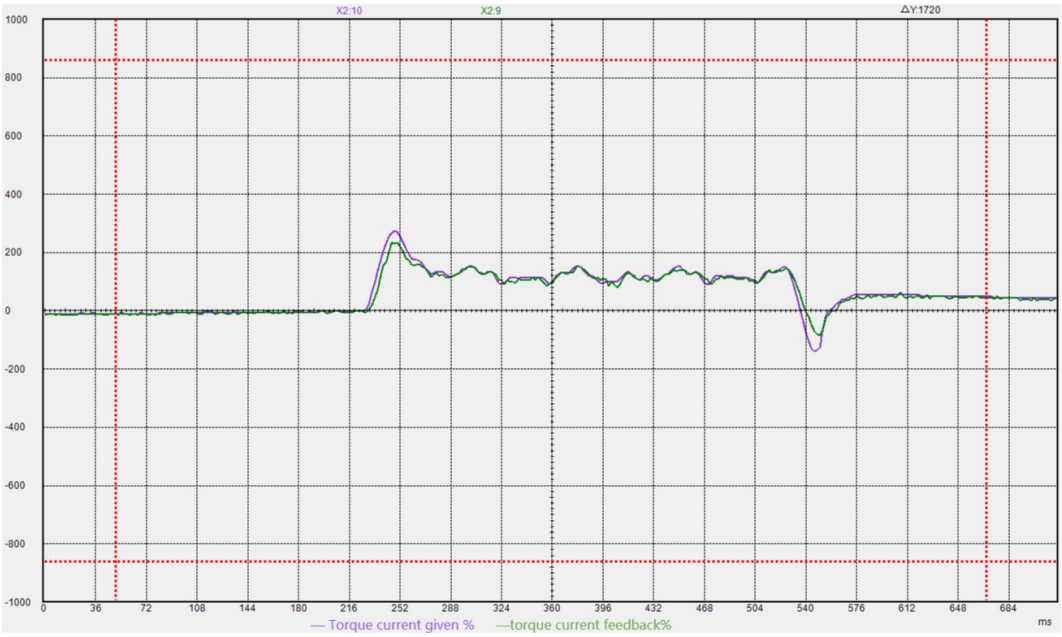
0x2007_17H				y				
	Parameter Name：Second set of position loop proportional gain							
P07.24 724 0x2007_18H	S16	PVT	RW	Imme diately	-	0	0~8	Not
	Parameter Name：Gain switching conditions Description： 0 - IO switching; Switch via INFn.41. Use the second set of gains when active. 1 - Switch to the second set of gains when the torque command is high; Switch to the second set of gains when the torque command exceeds (gain switching level P07.25 + gain switching hysteresis P07.26); switch back to the first set of gains when the torque command falls below (gain switching level - gain switching hysteresis). 2 - Switch to the second set of gains when the speed reference command is high; Switch to the second set of gains when the speed command exceeds (gain switching level (rpm) + gain switching hysteresis (rpm)); switch back to the first set of gains when the speed command falls below (gain switching level - gain switching hysteresis). 3 - Switch to the second set of gains when the acceleration command is high; Switch to the second set of gains when the acceleration command (rpm/s) exceeds (gain switching level + gain switching hysteresis); switch back to the first set of gains when the acceleration command falls below (gain switching level - gain switching hysteresis). 4 - Switch to the second set of gains when the speed error is high; Switch to the second set of gains when the speed error (rpm) exceeds (gain switching level + gain switching hysteresis); switch back to the first set of gains when the speed error falls below (gain switching level - gain switching hysteresis). 5 - Switch to the second set of gains when the filtered position error is high; Switch to the second set of gains when the filtered position error (unit: motor encoder pulses) exceeds (gain switching level + gain switching hysteresis); switch back to the first set of gains when the filtered position error falls below (gain switching level - gain switching hysteresis). 6 - Switch to the second set of gains when positioning is complete; switch to the first set of gains when positioning is not complete. 7 - Reserved 8 - DO output switches bandwidth. When 725=0, DO1 output switches bandwidth (use first set when active). When 725=1, DO2 output switches bandwidth							
P07.25 725 0x2007_19H	S16	PVT	RW	Immed iatel y	-	0	0~32767	Not
	Parameter Name：Gain switching criteria Description： The actual switching action is jointly influenced by both the threshold level and hysteresis conditions. Depending on the specific gain switching criteria, the unit of the switching threshold level will vary accordingly							
P07.26 726 0x2007_1AH	S16	PVT	RW	Immed iatel y	-	0	1~5	Not
	Parameter Name：Gain switching hysteresis							

	Description：The actual switching action is jointly influenced by both the threshold level and hysteresis conditions. Depending on the specific gain switching criteria, the unit of the switching hysteresis will vary accordingly							
P07.27 727 0x2007_1BH	S16	PVT	RW	Immediately	ms	10	0~32767	Not
	Parameter Name：Gain switching time Description：In Position Control Mode, if P07.23 (second position loop gain) is significantly greater than P07.05 (first position loop gain), set the time required to switch from P07.05 to P07.23 after the switching action is triggered							
P07.28 728 0x2007_1CH	S16	PVT	RW	Immediately	-	10	0~31	Not
	Parameter Name：Rigidity level							
P07.29 729 0x2007_1DH	S16	PVT	RW	Immediately	-	2	0~32767	Not
	Parameter Name：Load inertia ratio							
P07.30 730 0x2007_1EH	S16	V	RW	Immediately	%	50	0~3276.7	Not
	Parameter Name：Zero-speed velocity gain attenuation/amplification							
P07.31 731 0x2007_1FH	S16	P	RW	Immediately	%	100	0~3276.7	Not
	Parameter Name：Zero-speed position gain attenuation/amplification							
P07.32 732 0x2007_20H	S16	PVT	RW	Immediately	rpm	10	0~32767	Not
	Parameter Name：Zero-speed attenuation threshold Description：Zero-speed attenuation threshold: When the rotational speed is below this value, attenuation/amplification is performed according to P07.30 and P07.31							
P07.33 733 0x2007_21H	S16	PVT	RW	Immediately	PVT	500	0~32767	Not
	Parameter Name：Acceleration/deceleration time during inertia learning							
P07.35 735 0x2007_23H	S16	PVT	RW	Immediately	-	0	0~3	Not
	Parameter Name：Inertia learning options Description： 0 - Do not automatically match speed and position loop gains after inertia learning is completed							

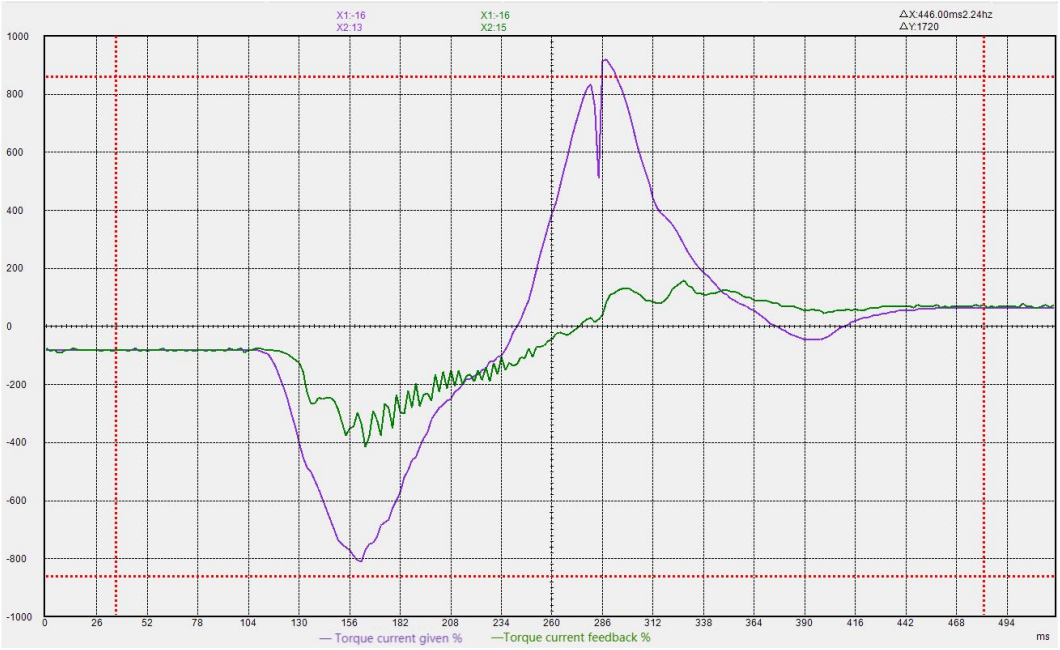
	1 - After inertia learning is completed, match a set of gains according to the rigidity level P07.28							
P07.38 738 0x2007_26H	S16	PVT	RW	Immediately	%	100	0~3000	Not
	Parameter Name：Vibration detection threshold percentage Description：Self-tuning vibration detection threshold percentage							
P07.39 739 0x2007_27H	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：Vibration detection value							
P07.78 778 0x2007_4EH	S16	PVT	RW	Immediately	-	44	0~99	Not
	Parameter Name：Tuning-free parameters Description：A.B format. "A" refers to the rigidity level, with a setting range of 0-7, typically below 4. "B" refers to the inertia level, with a setting range of 0-7, generally around 4							
P07.90 790 0x2007_5AH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：Actual speed loop proportional gain Description：Display the value of the actual speed loop proportional gain							
P07.91 791 0x2007_5BH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：Actual speed loop integral gain Description：Display the value of the actual speed loop integral gain							
P07.92 792 0x2007_5CH	S16	PVT	RO	Immediately	-	-	-	Not
	Parameter Name：Actual position loop proportional gain Description：Display the value of the actual position loop proportional gain							

8.1.1 Adjustment of PI gains for the current loop

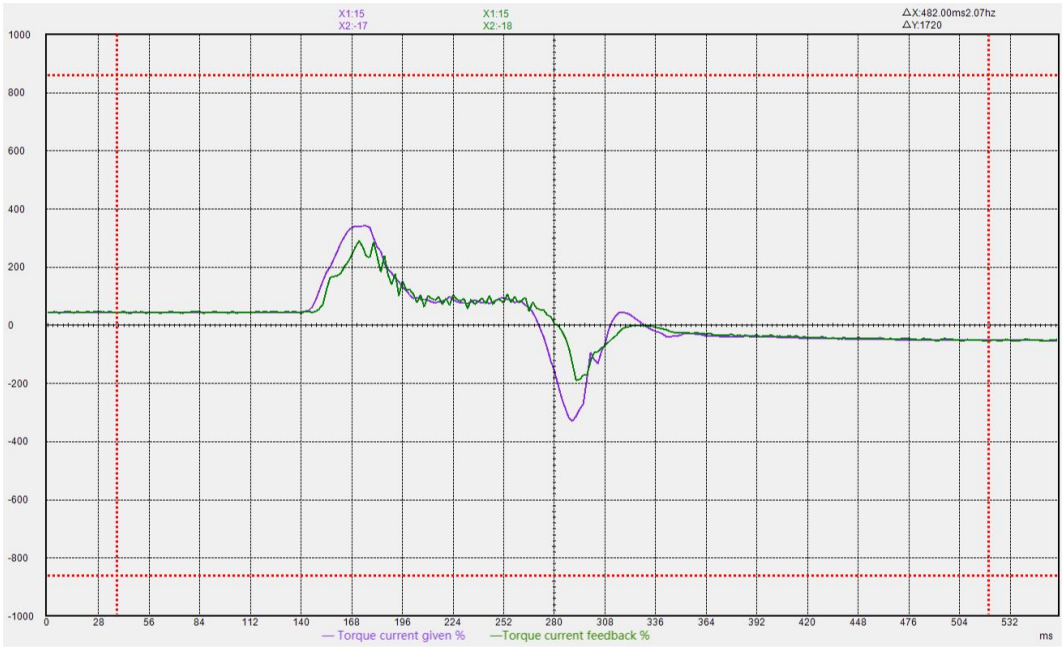
When the proportional gain of the current loop is excessively high, the motor will emit a sizzling or buzzing noise, and there will be high-frequency oscillations in the torque current feedback. Additionally, overcurrent faults are frequently triggered. As shown in the following figure (a notably prominent feature is the current-related noise).



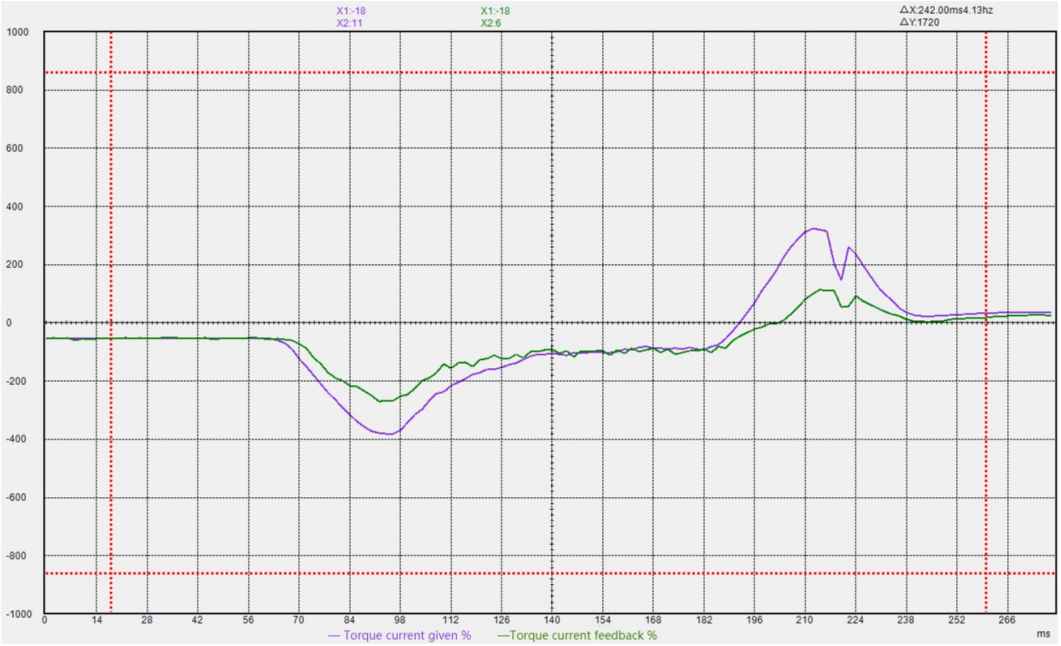
When the proportional gain of the current loop is too small, the motor's current response becomes slow, resulting in insufficient output during rapid acceleration and deceleration processes.



When the integral gain of the current loop is excessively high, low-frequency oscillations are prone to occur in the torque current, and overcurrent faults are likely to be triggered during acceleration and deceleration processes.

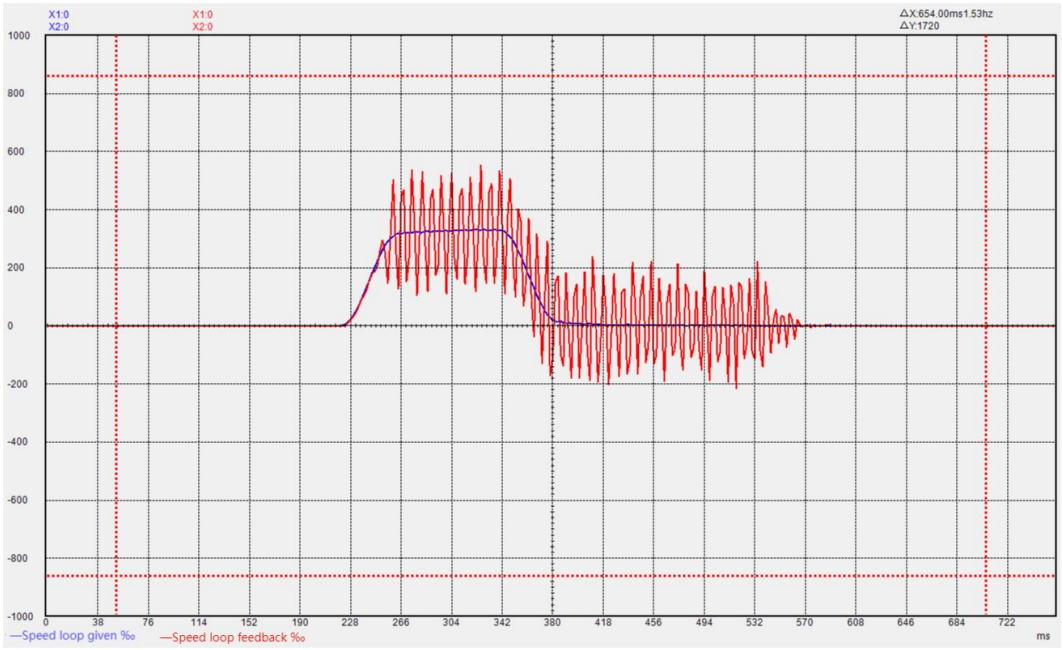


When the integral gain of the current loop is too small, the motor's current response becomes sluggish, resulting in insufficient output during rapid acceleration and deceleration.

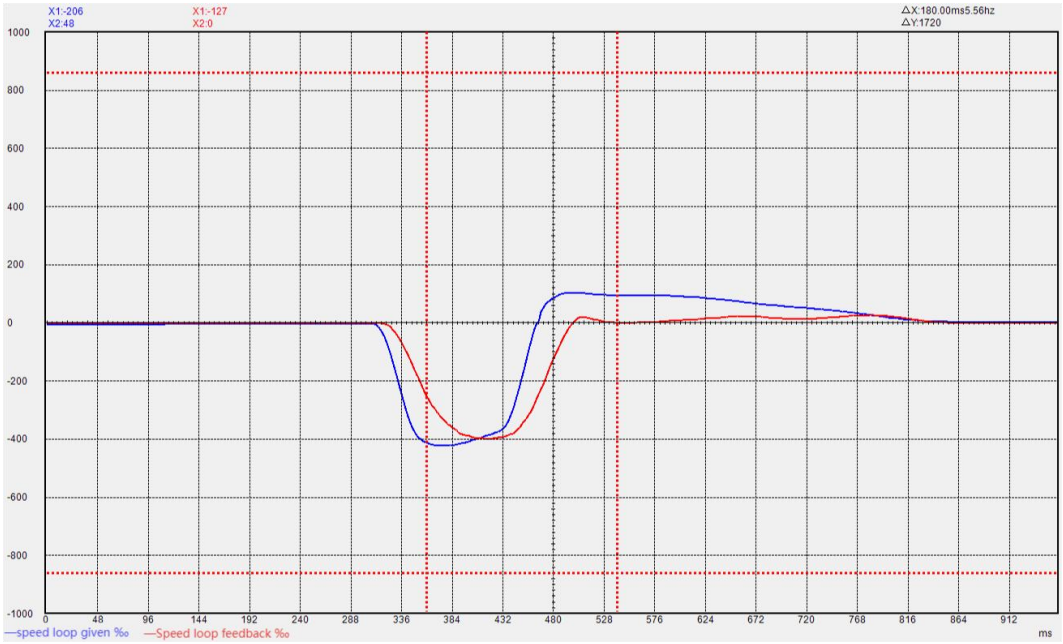


8.1.2 Adjustment of PI gains for the speed loop

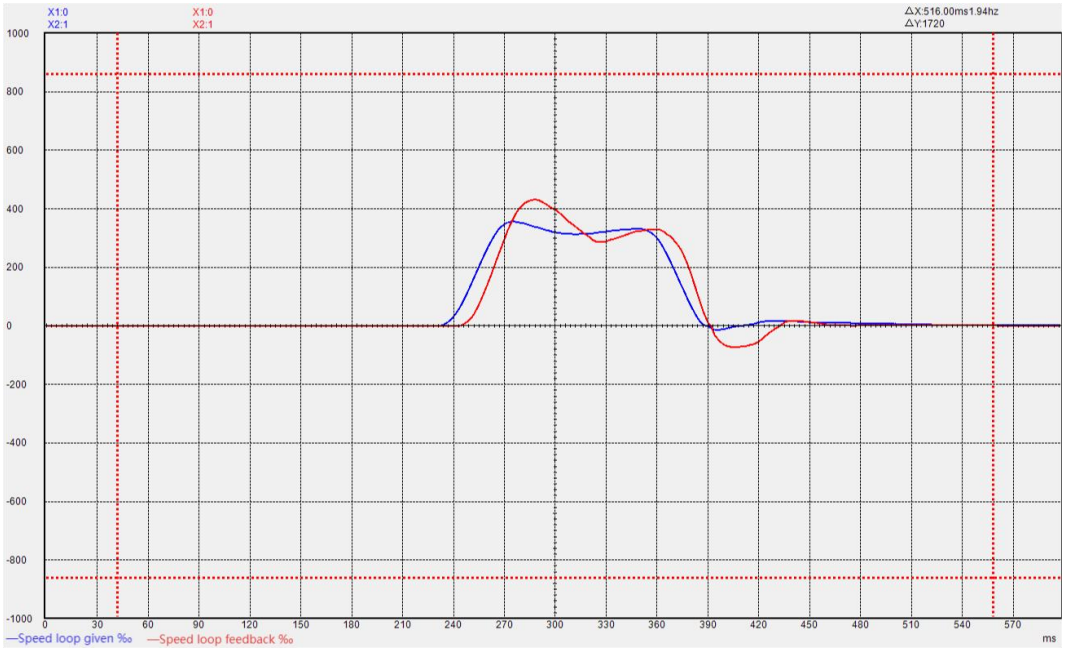
When the proportional gain of the speed loop is excessively high, the motor is prone to producing howling noise, and high-frequency oscillations occur in the speed loop feedback.



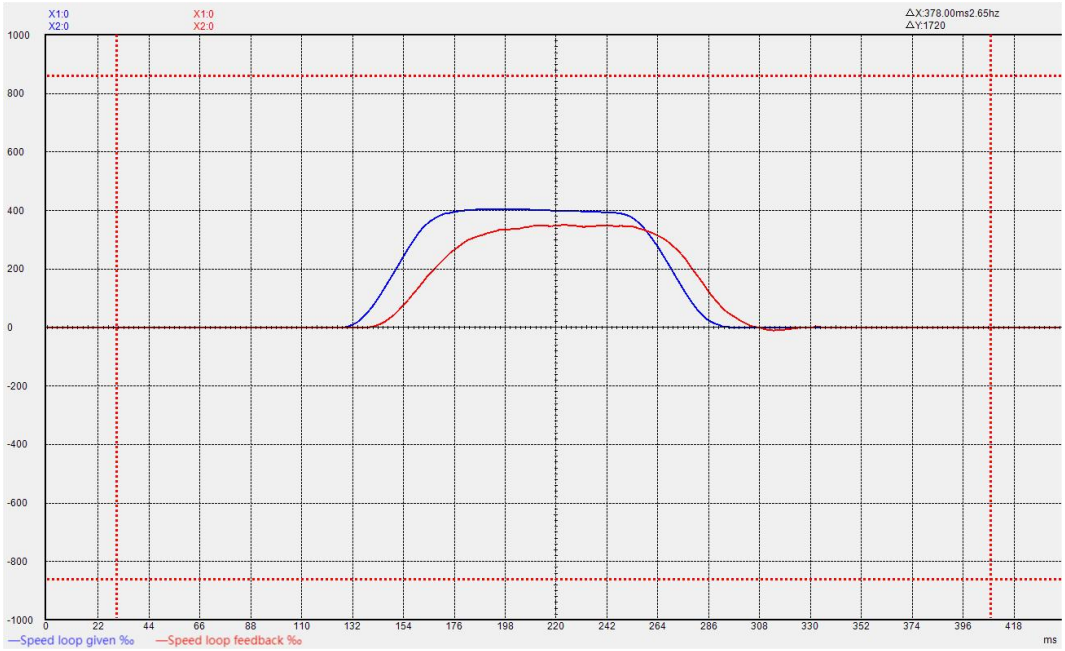
When the proportional gain of the speed loop is too small, the motor exhibits weak stiffness and fails to follow the speed commands accurately.



When the integral gain of the speed loop is excessively high, the motor's stiffness increases, leading to low-frequency speed fluctuations. Specifically, when the set position is set to 0, the motor oscillates back and forth between forward and reverse rotation.

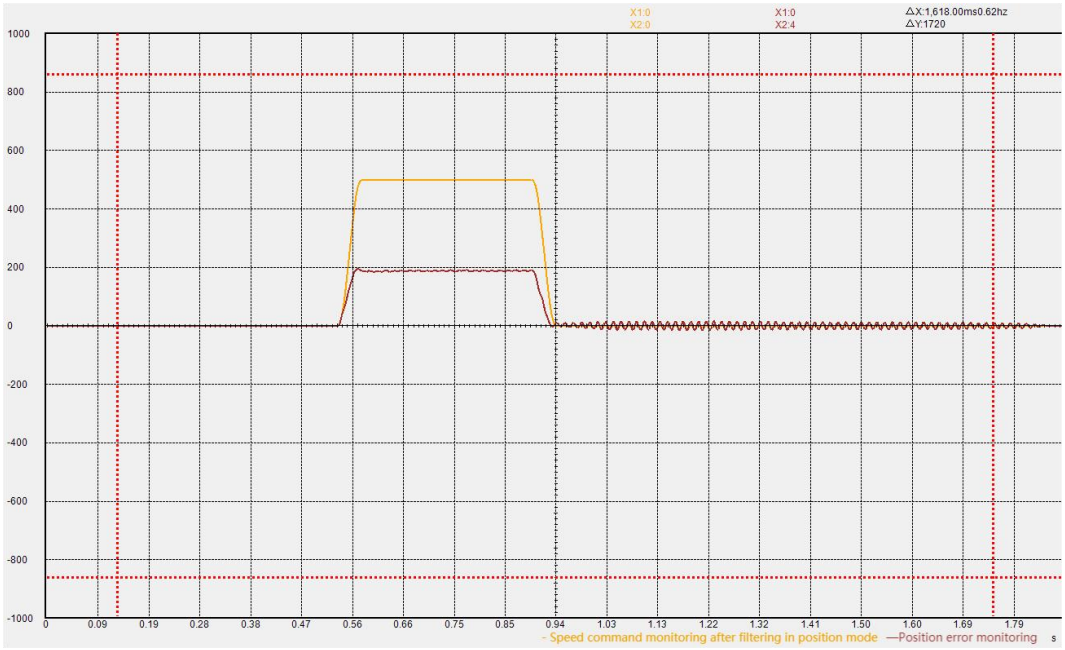


When the integral gain of the speed loop is too small, the motor exhibits weak stiffness and fails to accurately follow the desired speed.

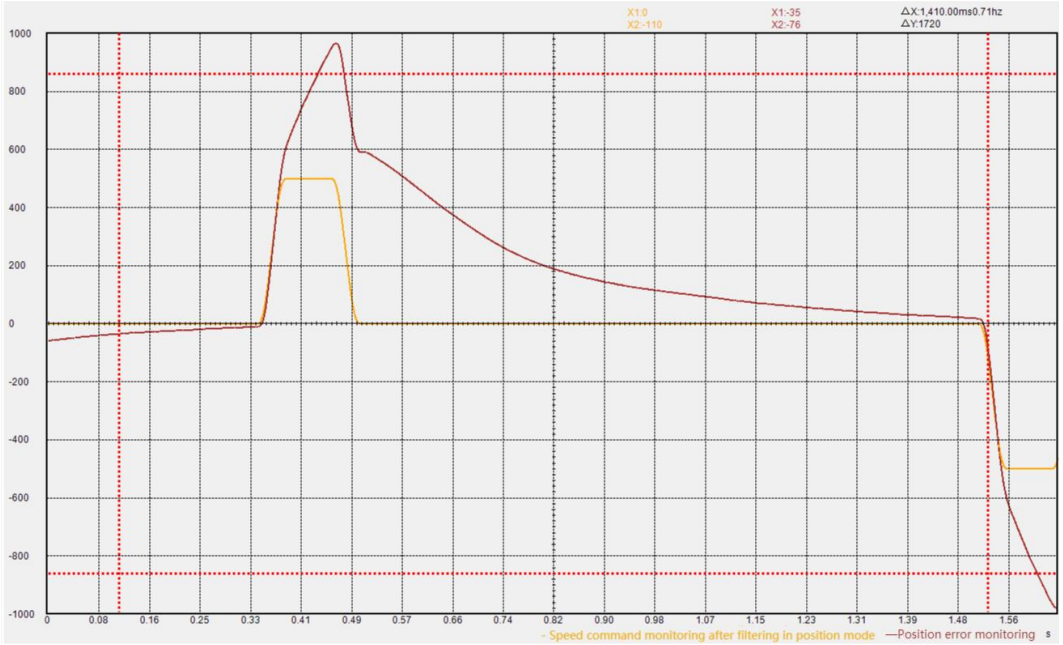


8.1.3 Position loop P gain adjustment

When the proportional gain of the position loop is too large, the motor speed is unstable and it is easy to shake.



When the proportional gain of the position loop is too small, the position arrives very slowly.



8.1.4 List of parameters that need to be adjusted in different gain gain adjustment modes

Gain adjustment mode	Adjustable speed loop/position loop parameters
P07.20=0	P07.03 （Speed loop proportional gain）P07.04（Speed loop integral gain） P07.05（Position loop proportional gain） P07.08 P07.10（Torque feedforward） P07.09 P07.11 （speed feedforward）
P07.20=1	P07.03 P07.04 P07.05P07.08 P07.09 P07.10 P07.11（First set of gains ） P07.21 P07.22 P07.23 P07.24 P07.25 P07.26 P07.27（Second set of gains）

P07.20=2/3	P07.28（Rigidity level） P07.29（ratio of load inertia） P07.08 P07.10 P07.41（Torque feedforward） P07.09 P07.11 （speed feedforward）
P07.20=4	P07.29（ratio of load inertia） P07.03（speed loop bandwidth）P07.04（Speed loop integral gain） P07.05（position loop bandwidth） P07.08 P07.10 P07.41（Torque feedforward） P07.09 P07.11 （speed feedforward）
P07.20=5	P07.78 （No need to adjust parameters） P07.11 P07.09（speed feedforward）

P07.20=0 or P07.20=4, these two modes have the highest adjustability, and the performance that can be adjusted is also the best, which requires a higher degree of user expertise. P07.20=5 This mode has the lowest adjustability and can only meet the general application requirements, and has low requirements for the user's professional level. P07.20=2 is used for Fn006 single parameter self-adjustment.

P07.11 sets the speed feedforward coefficient. If the system requires the follow-up error to be 0, that is, the position error needs to converge to 0 at constant speed, then the value needs to be set to 100.0%. Under normal circumstances, it is sufficient to set it to 50.0%.

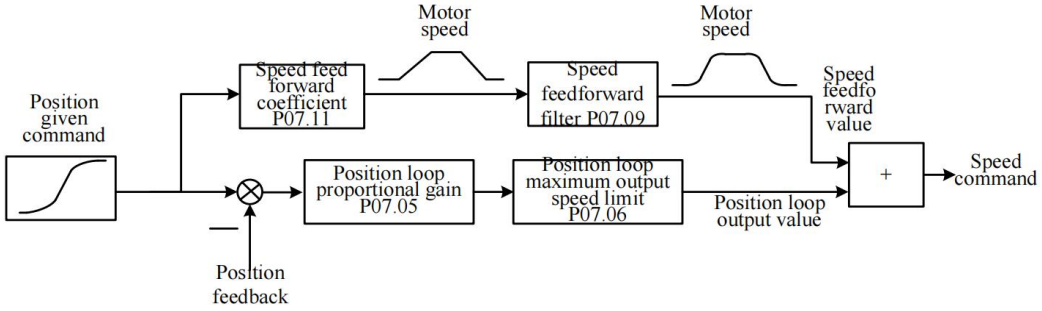
After self-learning the rigidity level through Fn006, if further fine-tuning is required, the bandwidth parameter corresponding to the rigidity level at this time can be set to P07.03, P07.04, P07.05, and P07.20 is set to 4, and then further Adjust P07.03-P07.05 for fine adjustment. When the rigidity level is converted into the corresponding speed loop bandwidth, integral gain, position loop when P07.20=4
Bandwidth is shown in the table below.

Rigidity levelP07.28	Speed loop bandwidth (rad/s) P07.03	Speed loop integral gain P07.04	Position Loop Bandwidth (rad/s) P07.05		Rigidity levelP07.28	Speed loop bandwidth (rad/s) P07.03	Speed loop integral gain P07.04	Position Loop Bandwidth (rad/s) P07.05
0	9	1	2		16	314	31	62
1	12	1	2		17	376	38	75
2	15	2	3		18	471	47	94
3	18	2	4		19	562	56	112
4	22	2	4		20	722	72	144
5	28	3	6		21	879	88	176
6	38	4	8		22	1067	106	213
7	47	5	9		23	1318	131	263
8	57	6	11		24	1570	157	314
9	69	7	14		25	1758	175	351
10	88	8	17		26	1964	196	392
11	113	11	23		27	2135	213	427

12	157	16	31		28	2323	232	464
13	188	19	38		29	2512	251	502
14	219	22	44		30	2826	282	565
15	251	25	50		31	3140	314	628

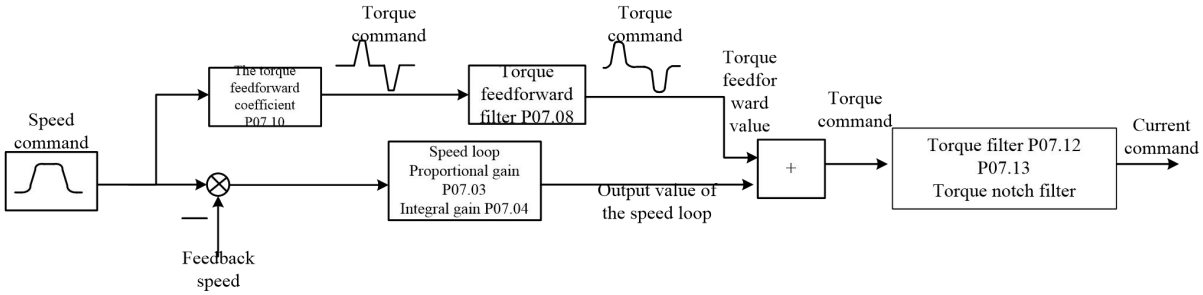
8.2 Feedforward gain adjustment

8.2.1 speed feedforward



Speed feedforward refers to the mathematical operation of the given position command to obtain the speed required by the motor, which is directly given to the speed loop. As shown in the figure above, the position command is input into the servo, and it is directly converted into the speed required by the motor. After filtering, it is superimposed on the speed command. Generally speaking, the speed feedforward coefficient is directly set to 50%, and the speed feedforward filter value is set according to the inertia, generally set to 0-20ms. The maximum output speed limit of the position loop means that the output of the position loop is limited within plus or minus percent P07.06. When the speed feedforward is set to 100%, the position error can converge to 0 when the speed is constant. When it is less than 100%, the position error will occur when the motor is moving.

8.2.2 Torque feedforward



Torque feedforward refers to the mathematical operation of the given speed command, combined with the load inertia, to obtain the torque that the motor needs to output, and directly superimpose it into the torque command. As shown in the figure above, the speed command is input into the servo, and is directly converted into the torque required by the motor according to the torque feedforward coefficient. After filtering, it is superimposed on

the torque command. Generally speaking, the torque feedforward coefficient is determined by the load inertia. The larger the load inertia is, the larger the value will be. This value can be obtained through Fn007 to learn the habit. The torque feedforward filter is also determined by the load inertia, which is generally set to 5-20ms.

When P07.20=0 or 1, the torque feedforward coefficient is equal to the value set by P07.10. When P07.20=2 or 3 or 4, the torque feedforward coefficient adopts the value set by P07.10*P07.41/100. When P07.20=5, the torque feedforward is invalid.

8.3 Filter time adjustment

There are three filter times related to loop control, one is the torque filter time. Under normal circumstances, the torque filter is set to a low-pass filter (P07.12=0). At this time, the larger the torque filter time constant P07.13, the smoother the torque command, which can reduce the high-frequency noise of the motor and bring about The side effect is easy to produce low frequency vibration. This value needs to be increased when the inertia is large.

The second is the speed feedforward filter time. When in position mode, if the position command pulse frequency is low, and the position command filter parameters P03.06 and P03.07 are both 0, the speed feedforward filter needs to be added. It can reduce the speed pulsation of the position command and reduce the noise of the motor. The speed feedforward filter time P07.09 is generally set at about 0-20.

The third one is the torque feedforward filter time P07.08. When there are too many high-frequency components of the torque command, this value needs to be increased, generally set at around 5-20.

8.4 Load torque compensation function

The VC120 servo offers four load torque compensation modes, which are configured via parameter P07.50. When P07.50 is set to 0, the load torque compensation is derived from a fixed value specified in P07.53. When P07.50 is set to 1, the servo automatically estimates the load torque value based on relevant variables with an emphasis on stability. When P07.50 is set to 2, the servo also automatically estimates the load torque value based on relevant variables but prioritizes responsiveness for compensation. When P07.50 is set to 5, the instantaneous compensation upon enabling is based on the load current value at the moment of the previous disable.

The servo automatically estimates the load torque in the following manner. Based on the actual torque and motor speed, combined with the inertia coefficient P07.52, the servo calculates the load torque. This calculated load torque then undergoes filtering (P07.51) and amplification (P07.54) before being directly superimposed onto the motor's output torque value. Typically, P07.52 is set equal to the torque feedforward coefficient P07.10. The torque feedforward filter (P07.51) is generally configured within the range of 5-20 ms, and the torque compensation gain (P07.54) is commonly set to 100%.

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.50 750 0x2007_32H	S16	PVT	RW	Immediately	-	0	0~5	Not
	Parameter Name：Torque compensation mode Description： 0 - Torque compensation is sourced from a fixed value P07.53 1 - Automatic compensation (with an emphasis on stability; adjust parameters P07.43, P07.54, P07.51, and P07.52) 2 - Automatic compensation (with an emphasis on responsiveness; adjust parameters P07.43 and P07.54) 3 - Reserved 4 - Reserved 5 - Automatic identification mode 2							
P07.43 743 0x2007_2BH	S16	PVT	RW	Immediately	-	100	10~1000	Not
	Parameter Name：Torque compensation gain 1							
P07.51 751 0x2007_33H	S16	PVT	RW	Immediately	ms	0	-1000~1000	Not
	Parameter Name：Torque compensation frequency compensation Description：The higher the frequency, the smaller the filtering effect							
P07.52 752 0x2007_34H	S16	PVT	RW	Immediately	HZ	100	1~1000	Not
	Parameter Name：Torque compensation inertia compensation Description：Torque compensation inertia compensation (takes effect upon re-enabling)							
P07.53 753 0x2007_35H	S16	PVT	RW	Immediately	HZ	0	-32767~32767	Not
	Parameter Name：Fixed value for torque compensation Description：Fixed value for torque compensation (takes effect upon re-enabling)							
P07.54 754 0x2007_36H	S16	PVT	RW	Immediately	%	100	0~300	Not
	Parameter Name：Torque compensation percentage Description：Torque compensation percentage (takes effect upon re-enabling)							

8.5 Mechanical resonance suppression function

If the mechanical characteristics of the equipment have a resonance point at a certain frequency, when the gain is increased, it may cause the motor to resonate, and the resonance frequency is generally above 200Hz. In this case, the servo notch filter + torque low-pass filter can be used to solve the problem. The servo provides 4 sets of notch filters (acting on the position loop) and a set of torque low-pass filters to suppress the resonance signal. When P07.12 is set to 0, a low-pass filter is used alone to suppress resonance. When P07.12 is set to 1, a notch filter is used alone to suppress resonance. When P07.12 is set to 3, a low-pass filter and a notch filter are used for resonance suppression. When P07.12 is set to 4, once the servo detects oscillation greater than 200Hz, it will automatically turn on a low-pass filter and a notch filter to suppress the resonance. The vibration detection threshold is set by P07.38. The smaller the value is, the more sensitive it is to vibration and the easier it is to detect vibration. When high-frequency mechanical resonance occurs, it is preferred to use the method of automatically inputting the notch filter (P07.12 is set to 4). If it cannot be solved, P07.13-P07.19 and P07.44-P07.49 can be manually set.

Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.12 712 0x2007_CH	S16	PVT	RW	Immediately	-	0	0~8	Not
	Parameter Name：Torque filter type Description： 0 - Low-pass filter 1 - Notch filter 2 - No filter 3 - Cascade of low-pass and notch filters 4 - Automatically calculate filter parameters 5 - Automatically calculate parameters for two notch filters 6 - Automatically calculate parameters for one notch filter 7 - Automatically calculate parameters for two notch filters only once 8 - Automatically calculate parameters for one notch filter only once							
P07.13 713 0x2007_DH	S16	T	RW	Immediately	-	0.8	0~327.67	Not
	Parameter Name：Time constant of the torque low-pass filter							
P07.14 714 0x2007_EH	S16	PVT	RW	Immediately	HZ	0	0~4000	Not
	Parameter Name：Frequency of notch filter 1							
P07.15	S16	PVT	RW	Immed	%	10	0~100	Not

715 0x2007_FH				iatel y				
	Parameter Name：Depth of notch filter 1 Description：The smaller the value, the deeper the notching effect							
P07.16 716 0x2007_10H	S16	PVT	RW	Immed iatel y	%	50	0~100	Not
	Parameter Name：Width of notch filter 1 Description：Notch width, expressed as a percentage relative to the center frequency							
P07.17 717 0x2007_11H	S16	PVT	RW	Immed iatel y	HZ	0	0~4000	Not
	Parameter Name：Frequency of notch filter 2 Description：Center frequency of the notch filter							
P07.18 718 0x2007_12H	S16	PVT	RW	Immed iatel y	%	10	0~100	Not
	Parameter Name：Depth of notch filter 2 Description：The smaller the value, the more pronounced the notching effect, ranging from 0 to 100.0							
P07.19 719 0x2007_13H	S16	PVT	RW	Immed iatel y	%	50	0~100	Not
	Parameter Name：Width of notch filter 2 Description：Notch width, expressed as a percentage relative to the center frequency							
P07.44 744 0x2007_2CH	S16	PVT	RW	Immed iatel y	HZ	0	0~4000	Not
	Parameter Name：Frequency of notch filter 3 Description：Center frequency of notch filter							
P07.45 745 0x2007_2DH	S16	PVT	RW	Immed iatel y	%	10	0~100	Not
	Parameter Name：Depth of notch filter 3 Description：The smaller the value, the more pronounced the notching effect, with a range of 0-100.0							
P07.46 746 0x2007_2EH	S16	PVT	RW	Immed iatel y	%	50	0~100	Not
	Parameter Name：Width of notch filter 3 Description：Notch width, expressed as a percentage relative to the center frequency							
P07.47 747 0x2007_2FH	S16	PVT	RW	Immed iatel y	HZ	0	0~4000	Not

	Parameter Name：Frequency of notch filter 3 Description：Center frequency of notch filter							
P07.48 748 0x2007_30H	S16	PVT	RW	Immediately	%	10	0~100	Not
	Parameter Name：Depth of notch filter 3 Description：The smaller the value, the more pronounced the notching effect, with a range of 0-100.0							
P07.49 749 0x2007_31H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name：Width of notch filter 4 Description：Notch width, expressed as a percentage relative to the center frequency							

8.6 Low frequency vibration suppression

When the motor drives a large inertia flexible load for high-speed positioning, if there is continuous low-frequency vibration below 50Hz. It can be processed by the low frequency vibration suppression function of the servo and the position command filter function. The servo provides 1 set of low frequency suppression notch filter (acting on the speed loop), 1 set of position command notch filter and 1 set of position command low pass filter to deal with the relevant low frequency vibration. The frequency of the low frequency resonance can be analyzed by VECObserver.

It should be noted that if the filter of the position command is increased, the motor motion will lag, thereby increasing the position error during tracking, and it may report that the position error is too large Er203. At this time, the position error threshold needs to be appropriately increased.

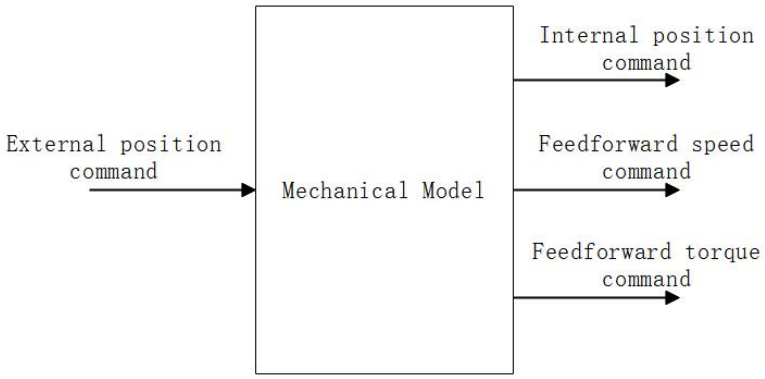
Related parameters are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.55 755 0x2007_37H	S16	PVT	RW	Immediately	HZ	0	0~1000	Not
	Parameter Name：Frequency of the low-frequency rejection notch filter Description：When set to 0, this notch filter is ineffective							
P07.56 756 0x2007_38H	S16	PVT	RW	Immediately	%	10.0	0~100	Not
	Parameter Name：Depth of the low-frequency rejection notch filter Description：The smaller the value, the more pronounced the notching effect of the filter, ranging from 0 to 100							
P07.57 757	S16	PVT	RW	Immediately	%	50	0~100	Not

0x2007_39H				y				
	Parameter Name：Width of the low-frequency rejection notch filter Description：The smaller the value, the more pronounced the notching effect							
P07.58 758 0x2007_3AH	S16	PVT	RW	Immediately	%	0	0~1000	Not
	Parameter Name：Frequency of the position command notch filter Description：Frequency of the low-frequency suppression notch filter							
P07.59 759 0x2007_3BH	S16	PVT	RW	Immediately	%	0	0~100	Not
	Parameter Name：Depth of the position command notch filter Description：The smaller the value, the more pronounced the notching effect of the filter, ranging from 0 to 100							
P07.60 760 0x2007_3CH	S16	PVT	RW	Immediately	%	0	0~100	Not
	Parameter Name：Width of the position command notch filter Description：Notch width, expressed as a percentage relative to the center frequency							
P03.07 307 0x2003_7H	S16	P	RW	Immediately	ms	5	0~32767	Not
	Parameter Name：Time constant of the position setpoint low-pass filter Description：Time parameter of the position setpoint LPF							
P03.19 319 0x2003_13H	S32	P	RW	Immediately	0.0001 rpm	30000	0~2147483648	Not
	Parameter Name：Excessive position error value Description：Excessive position error value. When set to 0, no protection against excessive position error is activated. For rotary motors, the unit is 0.0001 revolutions, and for linear motors, the unit is micrometers (μm)							

8.7 Model Predictive Control Capability

Model predictive control means that the system directly calculates the new position command, speed command, and torque command feed forward to the position loop, speed loop, and torque loop according to the external position command, combined with the built-in mechanical model.



Under position mode control, the servo presets 4 model predictive control methods, namely single inertia model predictive control, dual inertia model predictive control, single inertia model predictive control (no model predictive position command filtering), dual inertia model predictive control (model-free predicted position command filtering). Single inertia system refers to the rigid connection between the motor and the load, such as screw connection. The dual inertia system refers to the connection between the motor and the load with less rigidity, such as the pulley connection. The 4 model control modes are selected by the first bit of P07.61. The factory default does not use model predictive control, but uses ordinary feedforward control. When the model predictive control is enabled, the ordinary speed feedforward P07.10 and torque feedforward P07.11 are invalid. The relevant parameters of model predictive control are as follows.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.61 761 0x2007_3DH	S16	PVT	RW	Enable take effect	-	0	0~9999	Not
	Parameter Name：Advanced control function selection Description： AAA.B Format. When AAA = 0, standard feedforward control is employed, with feedforward being regulated by parameters such as P07.10, P07.11, etc. When AAA = 1, single-inertia model predictive control is utilized. When AAA = 2, dual-inertia model predictive control is applied. When AAA = 3, single-inertia model predictive control is used (without model predictive position command filtering). When AAA = 4, dual-inertia model predictive control is adopted (without model predictive position command filtering). When B = 0, the continuous vibration suppression function is not enabled. When B = 1, the continuous vibration suppression function is enabled.							
P07.62 762 0x2007_3EH	S16	PVT	RW	Immediately	-	50.0	1~2000	Not
	Parameter Name：Model predictive gain ranging from 1.0 to 2000.0							

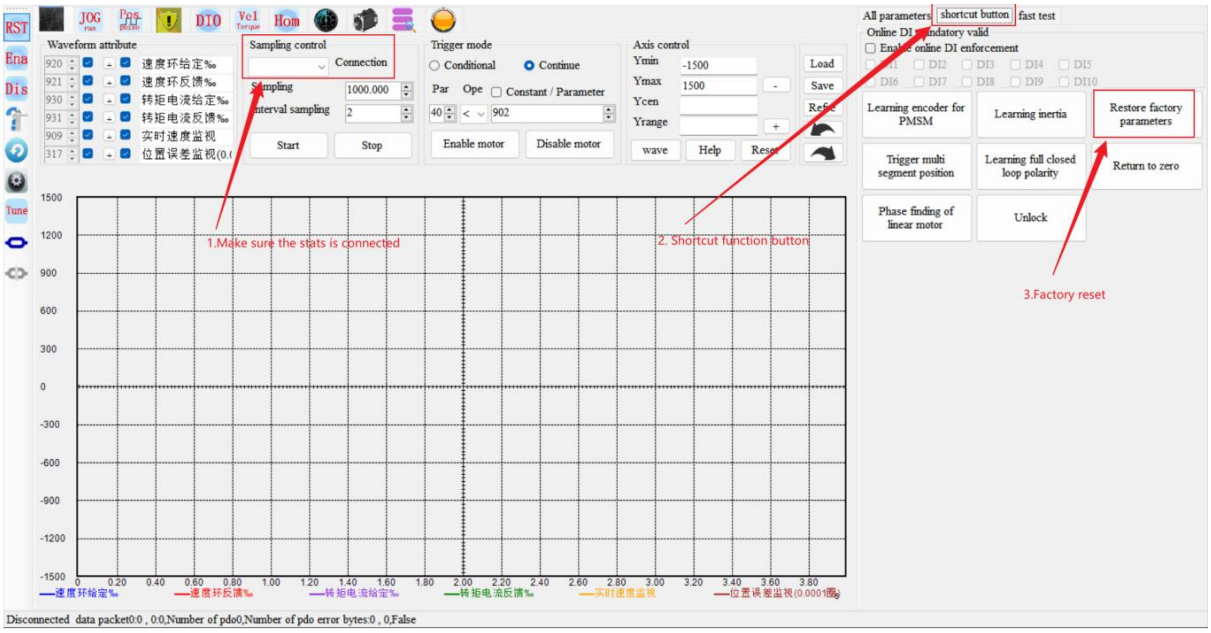
P07.63 763	S16	PVT	RW	Immediately	-	100	50~200	Not
0x2007_3FH	Parameter Name：Width of the low-frequency suppression notch filter Description：The smaller the value, the more pronounced the notch effect							
P07.64 764	S16	PVT	RW	Immediately	%	0	0~1000	Not
0x2007_40H	Parameter Name：Model predictive compensation ranges from 50.0 to 200.0 Description：Model predictive compensation ranges from 50.0 to 200.0. Re-enable to take effect							
P07.65 765	S16	PVT	RW	Immediately	-	100	0~1000	Not
0x2007_41H	Parameter Name：Model predictive inverse gain Description：Model predictive inverse gain. Re-enable to take effect							
P07.66 766	S16	PVT	RW	Immediately	HZ	50	1~250	Not
0x2007_42H	Parameter Name：Model predictive suppression frequency 1 ranges from 1.0 to 250.0 Description：Model predictive suppression frequency 1 ranges from 1.0 to 250.0. Re-enable to take effect							
P07.67 767	S16	PVT	RW	Immediately	HZ	70	1~250	Not
0x2007_43H	Parameter Name：Model predictive suppression frequency 2 ranges from 1.0 to 250.0 Description：Model predictive suppression frequency 2 ranges from 1.0 to 250.0. Re-enable to take effect							
P07.68 768	S16	PVT	RW	Immediately	rpm	100	0~1000	Not
0x2007_44H	Parameter Name：Model predictive feedforward velocity Description：Model predictive feedforward velocity. Re-enable to take effect							
P07.69 769	S16	PVT	RW	Immediately	-	50	0~2000	Not
0x2007_45H	Parameter Name：Model predictive gain 2 Description：Model predictive gain 2. Re-enable to take effect							
P07.70 770	S16	PVT	RW	Immediately	-	50	50~200	Not
0x2007_46H	Parameter Name：Model predictive compensation 2 Description：Model predictive compensation 2. Re-enable to take effect							

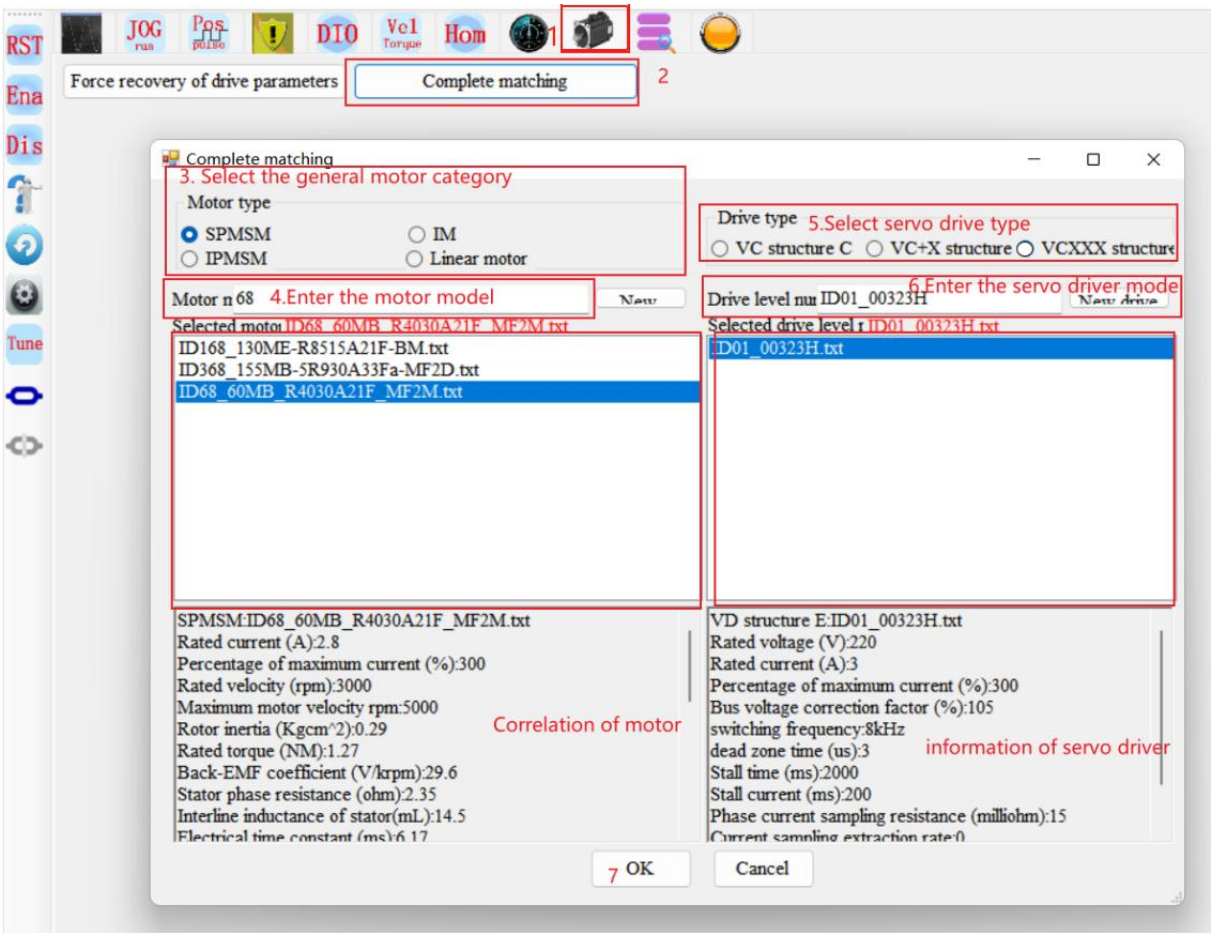
Chapter 9 Commissioning

9.1 Factory debugging matching motor steps

1．Connect the motor power cable and encoder cable, and connect the RS232 monitoring cable;

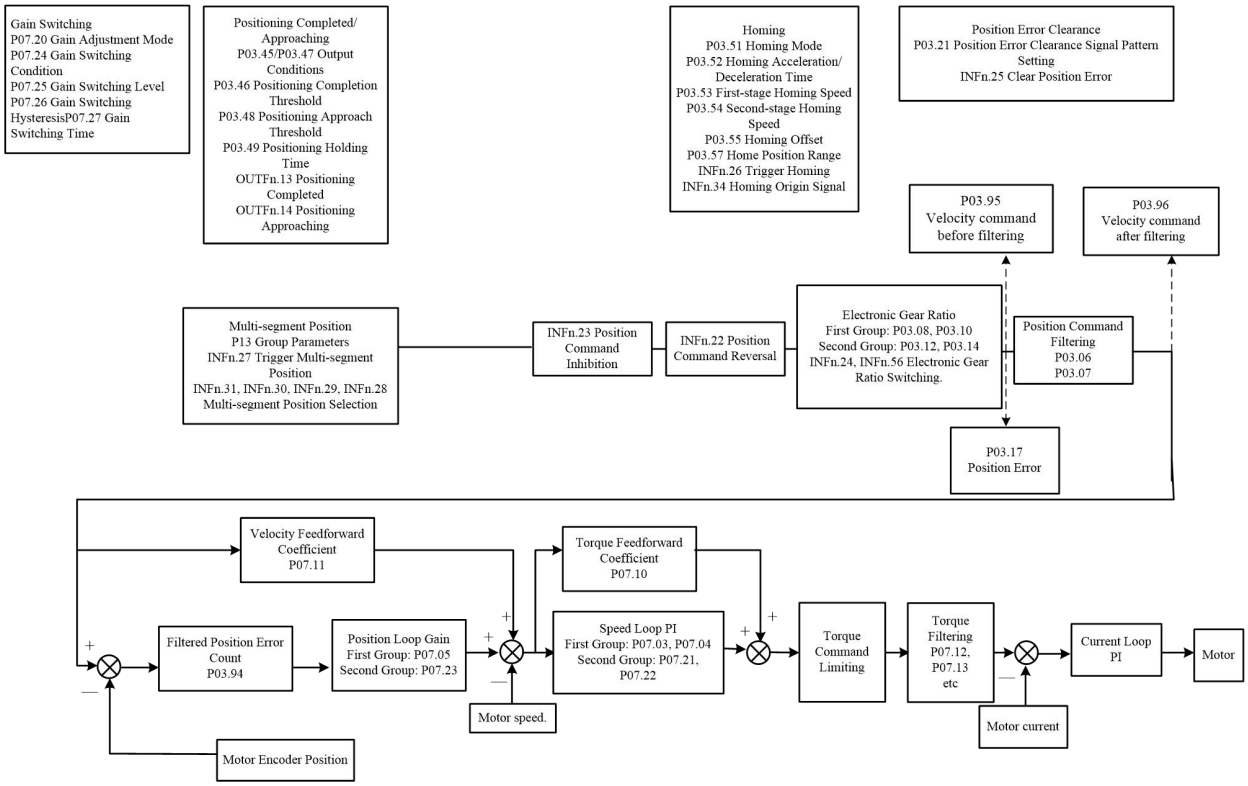
2. Open VECObserve and follow the steps below.




RST
Ena
Dis
Tune
JOG
Pos
DIO
Vel
Hom
1
2
Force recovery of drive parameters
Complete matching
Complete matching
3. Select the general motor category
Motor type
SPMSM
IM
IPMSM
Linear motor
Drive type
5.Select servo drive type
VC structure C
VC+X structure
VCXXX structure
Motor n 68
4.Enter the motor model
New
Drive level nu ID01_00323H
6.Enter the servo driver mode
Selected motor ID68_60MB_R4030A21F_MF2M.txt
Selected drive level r ID01_00323H.txt
ID168_130ME-R8515A21F-BM.txt
ID368_155MB-5R930A33Fa-MF2D.txt
ID68_60MB_R4030A21F_MF2M.txt
ID01_00323H.txt
SPMSM:ID68_60MB_R4030A21F_MF2M.txt
Rated current (A):2.8
Percentage of maximum current (%):300
Rated velocity (rpm):3000
Maximum motor velocity rpm:5000
Rotor inertia (Kgcm^2):0.29
Rated torque (NM):1.27
Back-EMF coefficient (V/krpm):29.6
Stator phase resistance (ohm):2.35
Interline inductance of stator(mL):14.5
Correlation of motor
VD structure E:ID01_00323H.txt
Rated voltage (V):220
Rated current (A):3
Percentage of maximum current (%):300
Bus voltage correction factor (%):105
switching frequency:8kHz
dead zone time (us):3
Stall time (ms):2000
Stall current (ms):200
Phase current sampling resistance (milliohm):15
information of servo driver
7 OK
Cancel

9.2 Location Mode Debugging Guidelines

9.2.1 Position Mode Block Diagram



9.2.2 Preliminary analysis of the curve

Set the servo drive to position mode, the position comes from multiple positions, run one of the positions, and record the waveform, as shown in Figure 1, the first curve is the planned speed command curve, after filtering, the filtered speed command curve is obtained , the larger the filter time constant, the more serious the lag of the filtered speed command, but the softer. Ideally, the actual velocity curve should coincide with the filtered velocity curve, which is the control target of the position loop. The position error is the accumulated value of the speed command minus the actual speed. Obviously, due to the lag of the filtering, the position error will become larger, and in the later stage of the filtering, the position error curve should coincide with the filtered position error curve. The filtered position error refers to the accumulated value of the filtered speed command minus the actual speed. As mentioned above, ideally, the actual speed curve should be coincident with the filtered speed curve, which means that the filtered speed The position error is always 0 under ideal conditions, but in fact, in the early stage of acceleration, the actual speed will lag behind the filtered speed command, that is to say, in the early stage of acceleration, the filtered position error will continue to increase, and after reaching a constant speed , the filtered position error gradually

converges to zero, the speed of convergence depends on the gain of the position loop, the greater the gain, the faster the convergence. As shown in Figure 2 below.

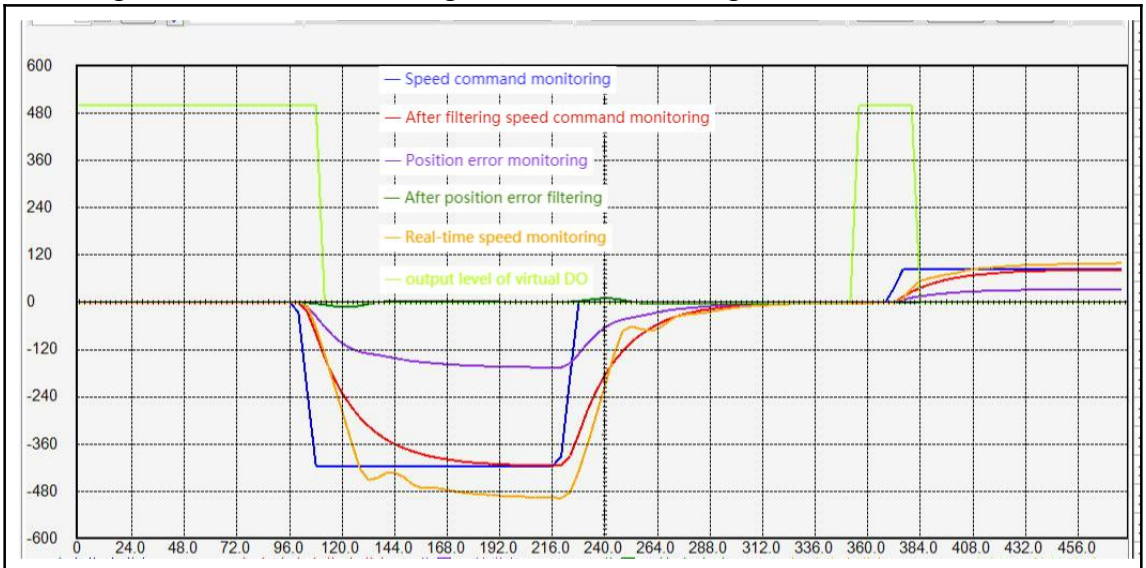


Figure 1 All curves

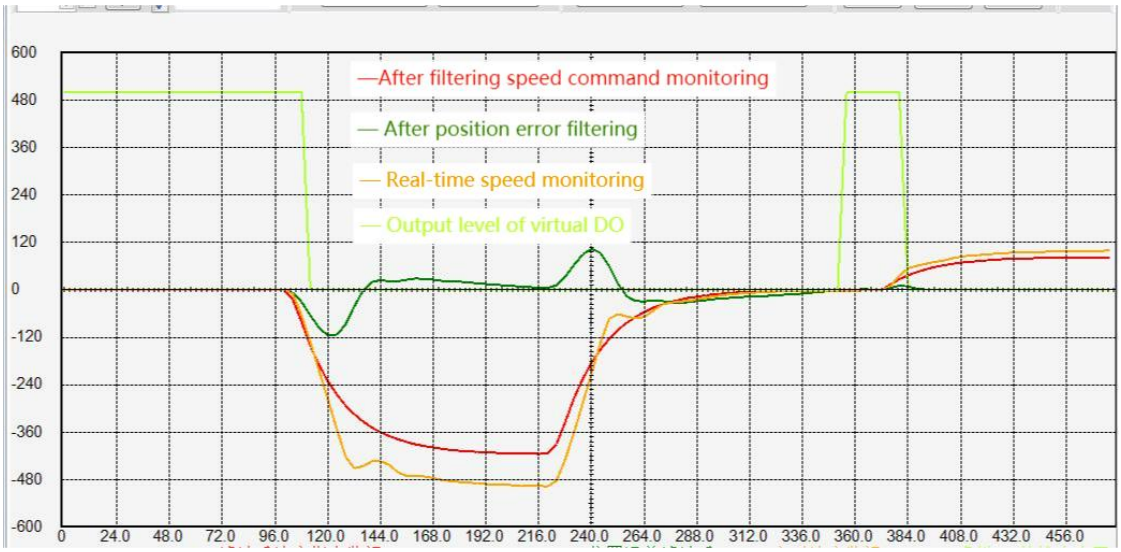
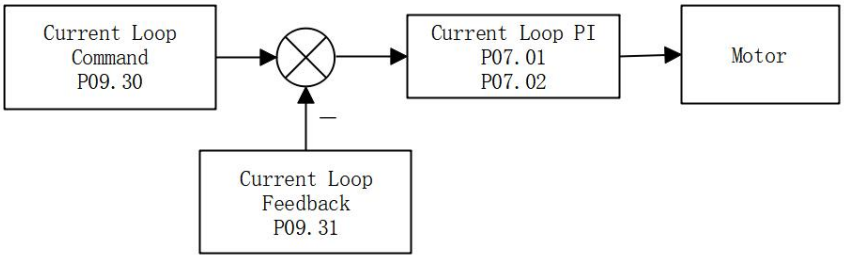


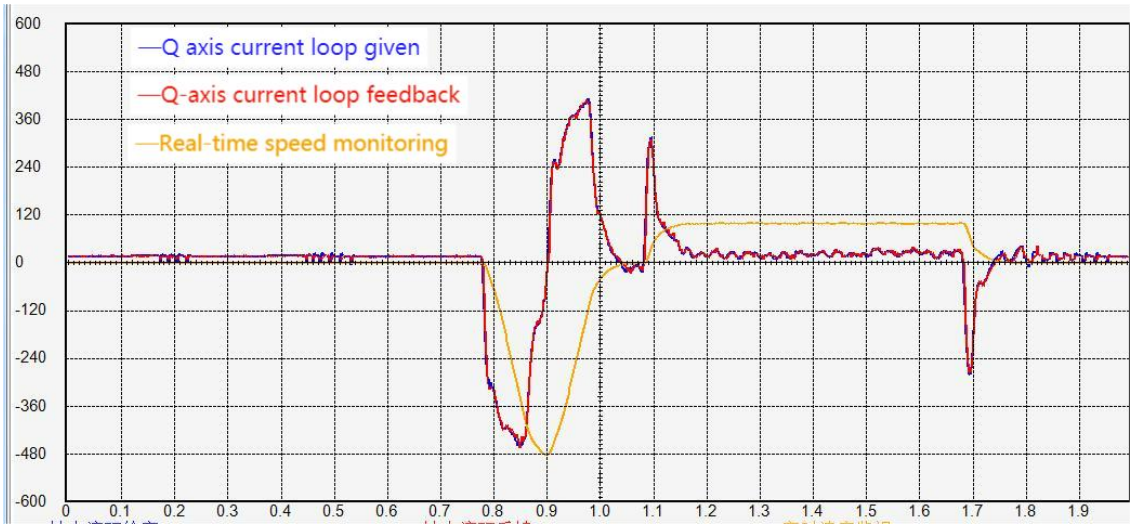
Figure 2 The filtered position error curve will increase during the acceleration process, converge during the constant speed process, and increase during the deceleration process, and eventually converge to 0. The contour of the actual speed curve is equal to the value of the filtered speed command curve. Contour plus the contour of the filtered position error curve.

9.2.3 Current loop understanding and tuning

For brushless DC motors, under the condition of no excitation, the greater the current, the greater the output torque. The two are in a proportional relationship. The magnitude of output torque can be monitored through P09.31.

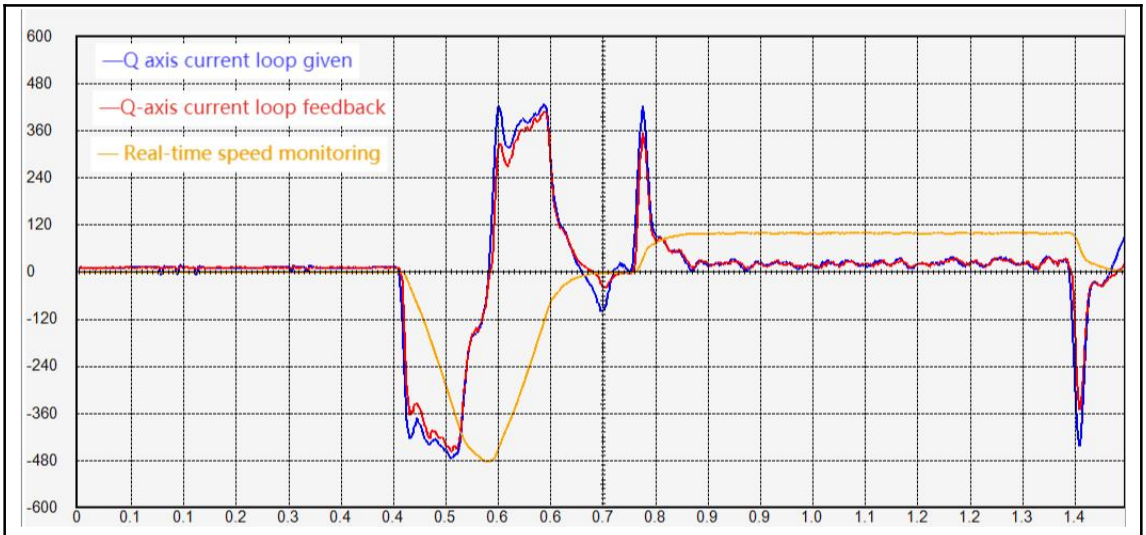


The control goal of the current loop PI is to ensure that the actual motor current (Q-axis current loop feedback) tracks the current command (Q-axis current loop given). As shown in the picture below. The Q-axis current loop feedback tracks the Q-axis current loop reference.

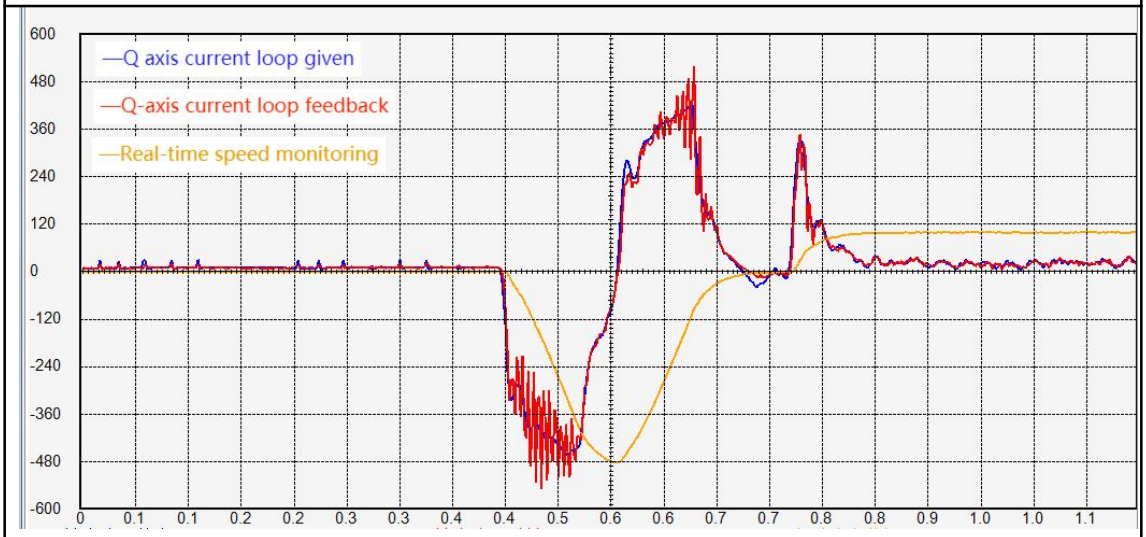


If these two curves are not tracked well, P07.01 and P07.02 need to be adjusted manually. The principle of current loop adjustment is，**Increase the proportional gain and integral gain as much as possible. However, if the current feedback has high frequency oscillation, the proportional gain P07.01 should be appropriately reduced. If the current feedback has low frequency oscillation, the current loop integral gain P07.02 should be reduced. If the two curves are not close, increase P07.01 and P07.02 appropriately. P07.01 and P07.02 are generally adjusted between 100-300, and the integral gain is generally smaller than the proportional gain.**

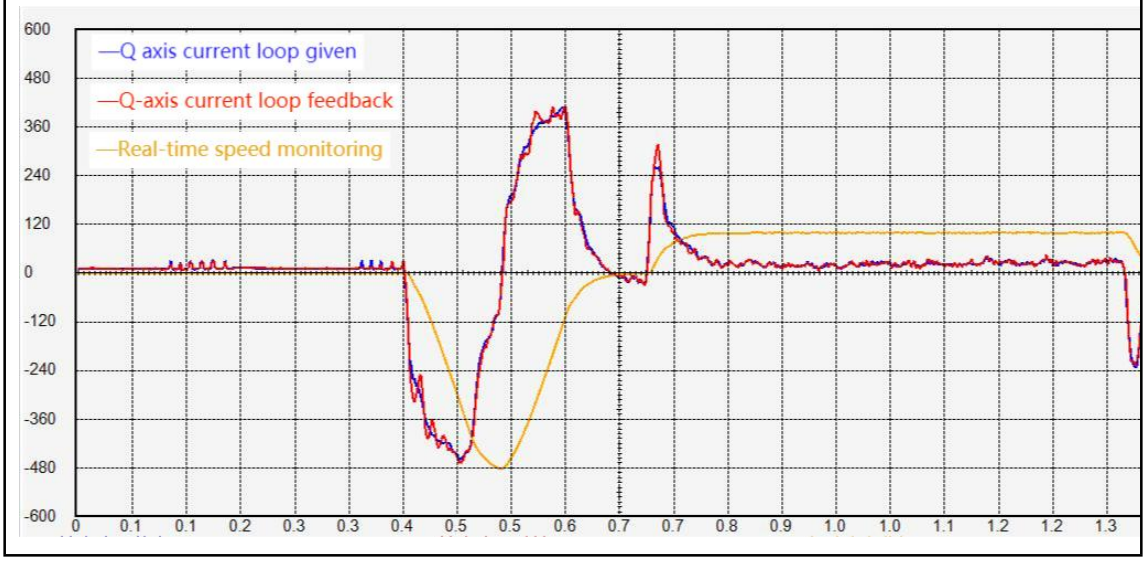
There are two kinds of current oscillations, one is high frequency oscillation and the other is low frequency oscillation. High frequency oscillation is caused by too large proportional gain P07.01. Low frequency oscillation is caused by too large integral gain P07.02.



Q-axis current setting and feedback are not close, and there is a static error, then appropriately increase P07.01 and P07.02

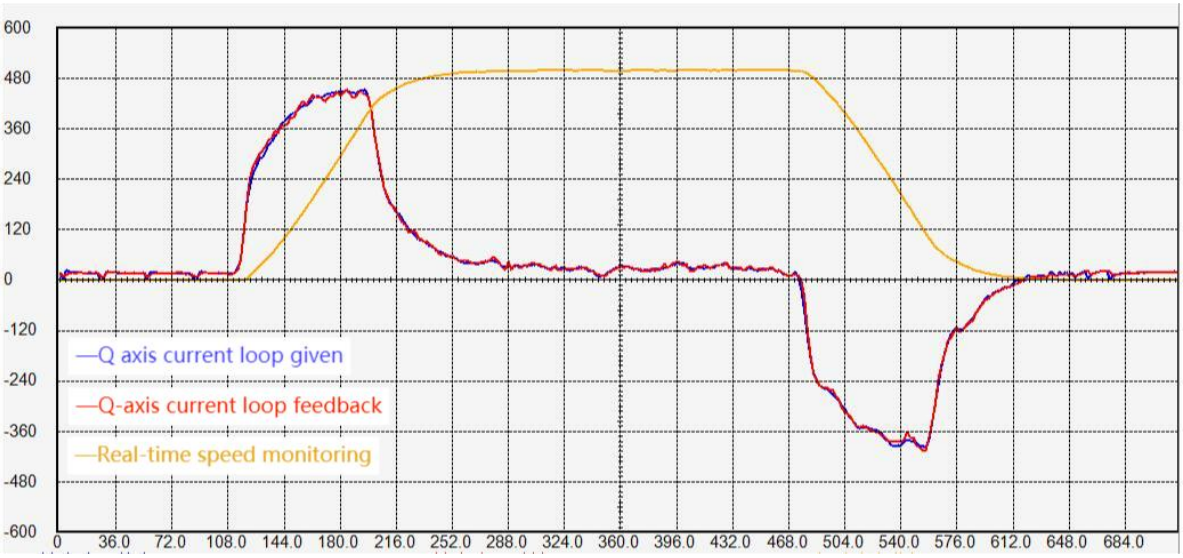


The Q-axis current has high frequency oscillation, so it is necessary to reduce the current loop proportional gain P07.01 and integral gain P07.02

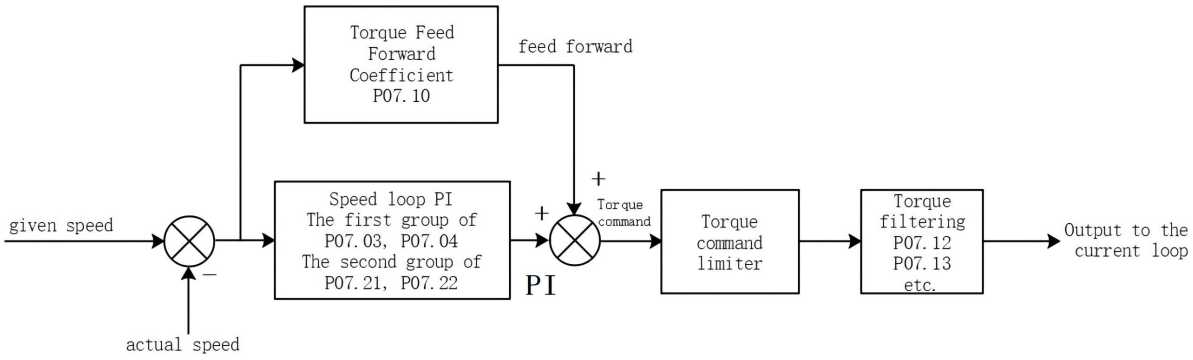


The Q-axis current has low frequency oscillation, and it is necessary to reduce the current loop integral gain P07.02

The larger the current command amplitude, the larger the output torque. Specifically, the greater the forward current command (more positive), the greater the output forward torque; the greater the reverse current command (more negative), the greater the output reverse torque. When the current command is close to 0, the output torque is also close to zero. As shown in the figure below, the motor speed is 0 at the beginning, and the motor torque is close to 0. After that, the motor torque increases in the positive direction, and the motor starts to accelerate. The greater the motor forward torque, the greater the motor acceleration, and then the forward torque is slow. Slowly reduce to zero, the motor speed remains constant and does not increase. After that, the motor torque gradually decreases to negative, and the motor begins to decelerate. The greater the negative motor torque, the greater the motor deceleration. The final motor torque is 0, and the motor speed remains unchanged.



9.2.4 Speed loop understanding and tuning



The input of the speed loop is the given speed and the feedback actual speed, and the output is the torque command. The goal is to make the feedback actual speed track the given speed by adjusting the torque. The torque command consists of two parts, one is feedforward and the other is speed loop PI output. The torque feedforward is obtained by multiplying the

acceleration of the given speed by a torque feedforward coefficient, and the speed loop PI can quickly eliminate the error between the given speed and the actual speed.

There is a filter after the torque command output, usually low-pass filter (P07.12=0). The function of low-pass filtering is to reduce torque jump and reduce motor noise. Generally speaking, the larger the torque filter time constant P07.13, the smaller the motor noise, but it may cause low-frequency fluctuations in the torque. Generally speaking, the larger the load inertia is, the larger the required torque filter time constant P07.13, and the larger the speed loop proportional gain.

Torque feedforward coefficient P07.10 and torque filter time constant P07.13 can be obtained through inertia self-learning, and generally do not need to be adjusted. It is mainly necessary to adjust the proportional gain and integral gain of the speed loop PI.

The adjustment principles of speed loop proportional gain P07.03 and integral gain P07.04 are:

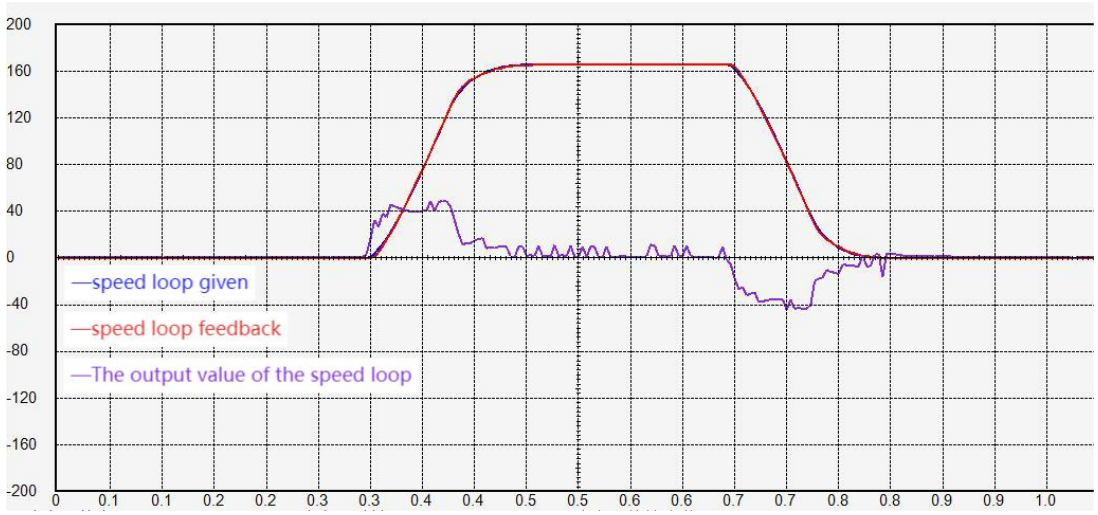
1、 **The speed loop proportional gain is generally more than 10 times greater than the integral gain, and the speed loop proportional gain is adjusted between 1000-10000, and the speed loop integral gain is generally adjusted between 20-500. If the integral gain is too large relative to the proportional gain, it is easy to cause low-frequency fluctuation of the rotational speed. The specific performance is that the speed has been reversed and cannot converge.**

2、 **When the inertia is large, the proportional gain of the speed loop needs to be increased.**

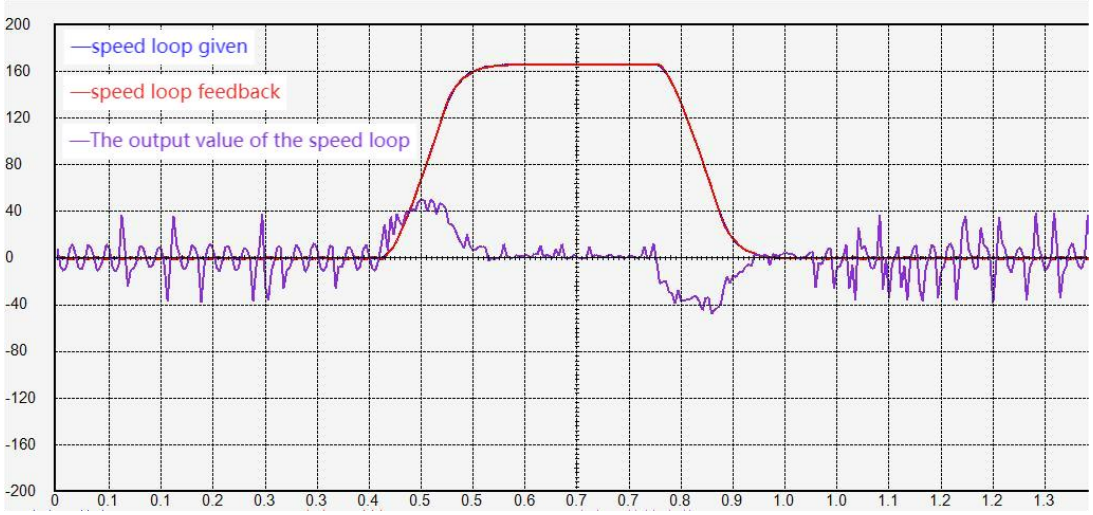
3、 **When the proportional gain of the speed loop is too large, abnormal noise will occur during the static process of the motor.**

4、 **When the integral gain of the speed loop is too large, the motor speed is always forward and reverse, and it cannot converge.**

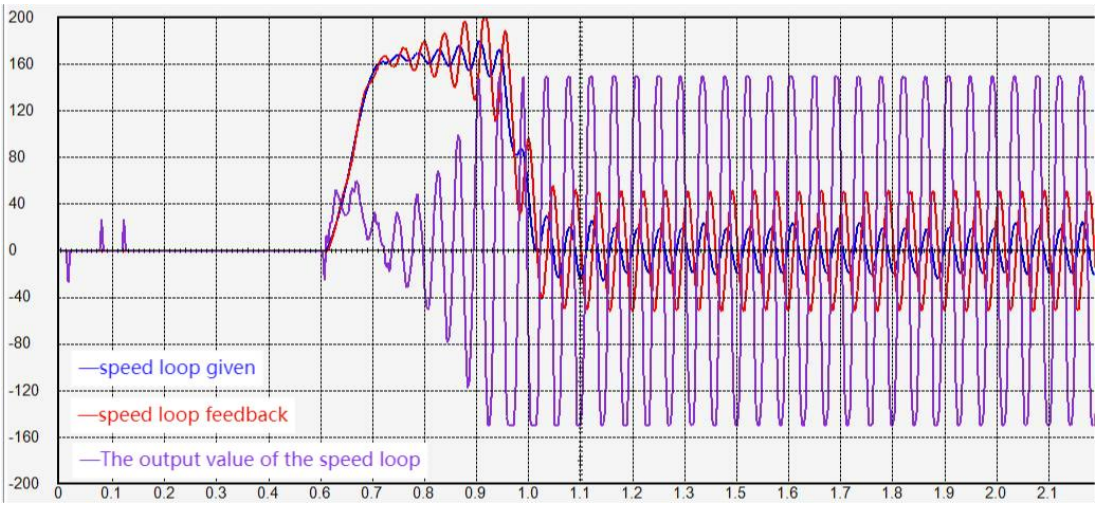
5、 **The speed loop proportional gain and integral gain are too small, the given speed and the feedback speed cannot be coincident, the motor rigidity is very small, especially soft.**



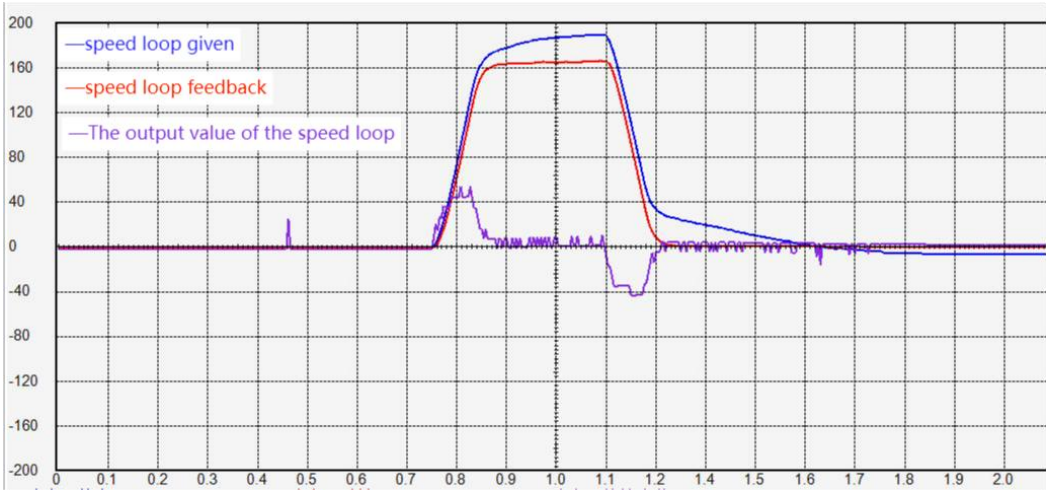
Adjust for better speed reference and feedback.



If the proportional gain of the speed loop is too large, the motor will generate noise, and the output of the speed loop will fluctuate when it is static.



The integral gain of the speed loop is too large, the motor cannot stop all the time, and the forward and reverse rotations shake.



The speed loop gain is too small, the speed loop reference and feedback cannot be

coincident, and the motor has no rigidity and is particularly soft.

9.2.5 Position loop understanding and adjustment

The position loop gain is generally set to 100-500. If the position loop proportional gain is too large, it is easy to cause the motor to shake. If it is too small, the convergence rate of the position error is slow.

Chapter 10 Introduction to EtherCAT Protocol

10.1 Introduction to the EtherCAT physical layer

EtherCAT is a high-performance, low-cost, easy-to-apply, and flexible topology industrial Ethernet technology that can be used in industrial field-level ultra-high-speed I/O networks, using standard Ethernet physical layers, transmission media twisted pair or optical fiber (100Base-TX or 100Base-FX). The EtherCAT system consists of a master station and a slave station. The realization of the master station only needs a common network card, and the slave station needs a dedicated slave station control chip. EtherCAT is one network to the end, and the protocol processing goes straight to the I/O layer. In order to support a wider variety of devices and a wider range of application layers, EtherCAT has established the following application protocols:

- CoE(CAN application protocol based on EtherCAT)
- SoE(Servo Drive Profile in accordance with IEC 61800-7-204)
- EoE(EtherCAT for Ethernet)
- FoE(EtherCAT implements file reading)

Slave devices do not need to support all communication protocols, instead, they simply select the communication protocol that best suits their application. VECServo supports CoE application protocol.

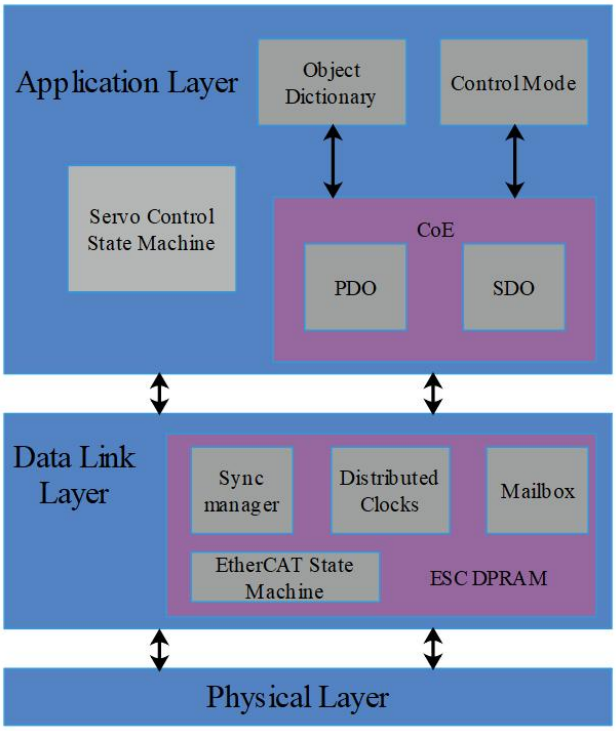
10.2 EtherCAT Communication Basics

EtherCAT, as the underlying communication protocol, does not define the middle layer and application layer protocols. On the basis of the EtherCAT bottom layer protocol, VECServo implements the related protocols of CiA301 and CiA402. These protocols include the Service Data Object Protocol SDO, the Process Data Object Protocol PDO, and the Standard 402 Motion Control Protocol. as shown in the table below.

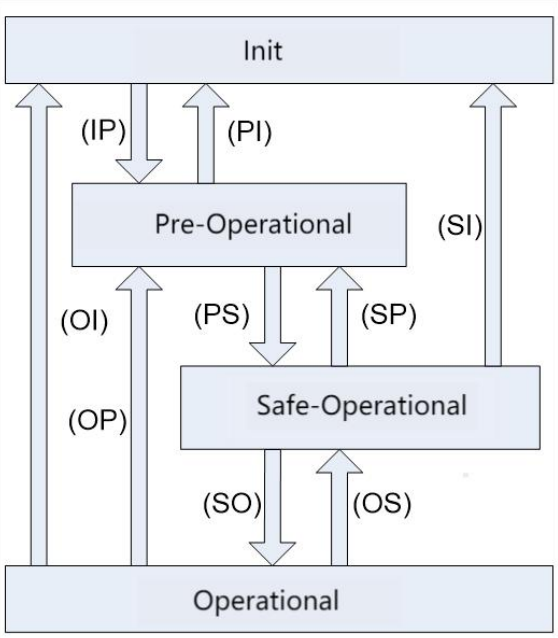
Protocol type		Detailed Description
application layer	SDO	SDO Request, SDO Response
	PDO	1 variable TPDO mapping, 1 variable RPDO, 6 fixed RPDO, 6 fixed TPDO
	CiA402	Contour Position Mode（PP） Contour speed mode（PV） Contour Torque Mode（PT） Interpolate position mode（IP） Return to zero mode（HM） Periodic Sync Position Mode（CSP） Periodic Synchronous Velocity Mode（CSV）

		Periodic Synchronous Torque Mode（CST）
data link layer	ESC	Mailbox, Sync Manager (SM), Distributed Clock (DC), EtherCAT State Machine (ESM)
physical layer	Transfer Protocol	100BASE-TX (IEEE802.3)
	maximum distance	80M
	Communication Interface	RJ45 IN、RJ45 OUT

The upper layer of VEC ECAT bus type servo adopts CANopen bus protocol, and its internal communication structure is shown in the figure below.



Among them, the application layer object dictionary contains: communication parameters, application data, and PDO mapping data. The PDO process data object contains the real-time data during the running process of the servo drive, and can be read and written periodically. For SDO mailbox communication, some communication parameter objects and PDO process data objects are accessed and modified aperiodically. The servo state machine mainly controls the state of the servo drive. The control state machine of the servo drive includes: start state, unready state, switch disabled state, ready to close switch state, closed switch state, enable motor running state, Activate emergency stop state, fault state, respond to fault state, and state control of servo drive is described in detail in the next chapter. The EtherCAT state machine includes initialization state, pre-operation state, safe operation state, and operation state. Its switch mechanism is as follows:



VEC EtherCAT bus type servo supports 4 states and is responsible for coordinating the state relationship between the master station and the slave station application program during initialization and operation.

Init：initialization, abbreviated as I;

Pre-Operational：Pre-Operational, abbreviated as P;

Safe- Operational：Safe- Operational, abbreviated as S;

Operational：Operational, abbreviated as O.

When transitioning from the initialization state to the running state, it must be transformed in the order of "Initialization->Pre-Operational->Safe Operational->Operational", and it is not allowed to skip the level.

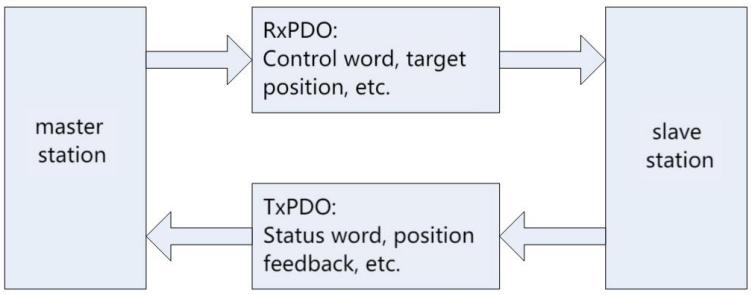
It is possible to leapfrog transitions when returning from the running state. The state transition operation and initialization process are as follows:

States and state transitions	Operate
initialization (I)	There is no communication at the application layer, and the master station can only read and write the ESC register
IP	The master station configures the slave station site address; Configure the mailbox channel; Configure the DC distributed clock; Request "pre-operational" status.
Pre-Operational(P)	Application Layer Mailbox Data Communication (SDO)
PS	The master station uses the mailbox to initialize the process data mapping; The master station configures the SM channel used by the process data communication; The master station configures FMMU; Request a "safe operating state".

Safe-Operational(S)	There is process data communication, but only read input data is allowed, no output signal is generated(SDO、TPDO)
SO	The master sends valid output data; to request a "running state".
Operational (O)	All inputs and outputs are valid; Mailbox communications are still available. (SDO、TPDO、RPDO)

10.3 Process data PDO

The transmission of real-time process data follows the "producer-consumer" model. PDO can be divided into RPDO (Reception PDO), the slave station receives the command of the master station through RPDO; and TPDO (Trasmission PDO), the slave station feeds back its own state through TPDO.



10.3.1 PDO mapping parameters

PDO mapping is used to establish the mapping relationship between object dictionary and PDO. 1600h~17FFh are RPDOs, 1A00h~1BFFh are TPDOs, there are 6 RPDOs and 5 TPDOs for selection in the VEC servo drive, as shown in the following table:

RPDO (6)	1600h	Mutable mapping
	1701h~1705h	Fixed mapping
TPDO (5)	1A00h	Mutable mapping
	1B01h~0x1B04h	Fixed mapping

a） Fixed PDO mapping

VEC Servo provides 5 fixed RPDOs and 4 fixed TPDOs for use.

Typical usage examples of these RPDOs and TPDOs are shown in the table below.

Available Servo Modes	PP CSP
1701h (RPDO258)	Map object (3 groups of 8 bytes)
	6040h(Control Word) 607Ah(Target Position)

	60B8h(Probe Function) 60FEh(Digital Output Function)
1B01h (TPDO258)	Mapping object (8 groups of 24 bytes)
	603Fh(error code) 6041h(status word) 6064h(position feedback) 6077h(Torque feedback) 60F4(position deviation) 60B9(Probe state) 60BA(Probe 1 latched position) 60BC(Probe 2 latching position) 60FD(DI status)

Available Servo Modes	PP PV PT CSP CSV CST
1702h (RPDO259)	Mapping object (7 groups of 19 bytes)
	6040h(control word) 607Ah(target position) 60FFh(target speed) 6071h(target torque) 6060h(Mode selection) 60B8h(Probe function) 607Fh(maximum speed)
1B02h (TPDO259)	Mapping object (9 groups of 25 bytes)
	603Fh(error code) 6041h(status word) 6064h(position feedback) 6077h(Torque feedback) 6061h(Mode display) 60B9(Probe state) 60BA (Probe 1 rising edge position feedback) 60BC (Probe 2 rising edge position feedback) 60FD(DI status)

Available Servo Modes	PP PV CSP CSV
1703h (RPDO260)	Mapping object (7 groups of 17 bytes)
	6040h(control word) 607Ah(target position) 60FFh(target speed)

	6060h(Mode selection) 60B8h(Probe function) 60E0h(Forward torque limit) 60E1h(Negative torque limit)
1B03h (TPDO260)	Mapping object (10 groups of 29 bytes)
	603Fh(error code) 6041h(status word) 6064h(position feedback) 6077h(Torque feedback) 60F4(position deviation) 6061h(Mode display) 60B9(Probe state) 60BA (Probe 1 rising edge position feedback) 60BC (Probe 2 rising edge position feedback) 60FD(DI status)

Available Servo Modes	PP PV PT CSP CSV CST
1704h (RPDO261)	Mapping object (9 groups of 23 bytes)
	6040h(control word) 607Ah(target position) 60FFh(target speed) 6071h(target torque) 6060h(Mode selection) 60B8h(Probe function) 607Fh(maximum speed) 60E0h(Forward torque limit) 60E1h(Negative torque limit)
1B02h (TPDO259)	Map object (9 groups of 25 bytes)
	603Fh(error code) 6041h(status word) 6064h(position feedback) 6077h(Torque feedback) 6061h(Mode display) 60B9(Probe state) 60BA (Probe 1 rising edge position feedback) 60BC (Probe 2 rising edge position feedback) 60FD(DI status)

Available Servo Modes	PP PV CSP CSV
1705h (RPDO262)	Mapping object (8 groups of 19 bytes)
	6040h(control word) 607Ah(target position) 60FFh(target speed) 6060h(Mode selection) 60B8h(Probe function) 60E0h(Forward torque limit) 60E1h(Negative torque limit) 60B2h(Torque offset)
1B04h (TPDO261)	Mapping object (10 groups of 29 bytes)
	603Fh(error code) 6041h(status word) 6064h(position feedback) 6077h(Torque feedback) 6061h(Mode display) 60F4(position deviation) 60B9(Probe state) 60BA (Probe 1 rising edge position feedback) 60BC (Probe 2 rising edge position feedback) 606C(speed feedback)

b） Variable PDO mapping

VECServo provides 1 variable RPDO and 1 variable TPDO for the user to use.

Variable PDO	indexes	Maximum number of mappings	longest byte	Default mapping object
RPDO1	1600h	10 pieces	40	6040(control word) 60FF(target speed)
TPDO1	1A00h	10 pieces	40	6041(status word) 6064(position feedback) 60B9(Probe state) 60BA (Probe 1 rising edge position feedback) 60BC (Probe 2 rising edge position feedback) 603F(error code) 60FD(DI status)

10.3.2 Synchronous management of PDO assignment settings

In EtherCAT periodic data communication, the process data can contain multiple PDO mapping data objects. The data objects 0x1C10 ~ 0x1C2F used by the CoE protocol define the PDO mapping object list of the corresponding SM (synchronous management channel). Multiple PDOs can be mapped in different In the sub-index, VECServo drives support 1 RPDO allocation and 1 TPDO allocation, as shown in the following table:

Index	Sub index	Content
0x1C12	01h	Select to use one of 0x1600, 0x1701~0x1705 as the actual RPDO used
0x1C13	01h	Select to use one of 0x1A00, 0x1B01~0x1B04 as the actual TPDO used

10.3.3 Configuration of PDO

The PDO mapping parameter contains information pointing to the process data corresponding to the PDO that the PDO needs to send or receive, including the index, sub-index and the length of the mapping object. The sub-index 0 records the number of objects N specifically mapped by the PDO. The data length of each PDO can be up to 4*N bytes, and one or more objects can be mapped at the same time. Sub-index 1~N is the mapping content. The contents of the mapping parameters are defined as follows.

Number of digits	31	……	16	15	……	8	7	……	0
Meaning	index			sub index			length of object		

The index and sub-index jointly determine the position of the object in the object dictionary, and the object length indicates the specific bit length of the object, expressed in hexadecimal, namely:

length of object	Bit length
08h	8 bit
10h	16 bit
20h	32 bit

For example, the mapping parameter representing the 16-bit control word 6040h-00 is 60400010h.

VECServo PDO configuration follows the following process:

The mapping configuration of PDO follows a specific process, which is performed as follows:

① Invalid PDO. Write 0 to the 00h sub-index of 1C12h (or 1C13h); clear the original mapping content. Write "0" to the 00h sub-index of the mapping object to clear all the original mappings of the PDO;

② Write the contents of the PDO map. Write mapping parameter sub-indexes 1 to 10 according to the above mapping definition;

③ Write the total number of mapping objects in this PDO. Write the number of mappings to the mapping object sub-index 0;

④ Valid PDO. Write 1 to the 00h subindex of 1C12h (or 1C13h).

It is important to note that:

PDO configuration can only be designed when the EtherCAT communication state machine is in pre-operation (Pro-Operation, panel display 2), otherwise an error will be reported.

PDO configuration parameters cannot be stored in EEPROM, therefore, after each power-on, be sure to reconfigure the mapping object, otherwise, the mapping object is the drive default parameter

An SDO fault code is returned when the following actions are performed:

Modify the PDO parameters in the non-pre-operation state;

A value other than 1600/1701~1705 is pre-written in 1C12;

A value other than 1A00/1B01~1B04 is pre-written in 1C13.

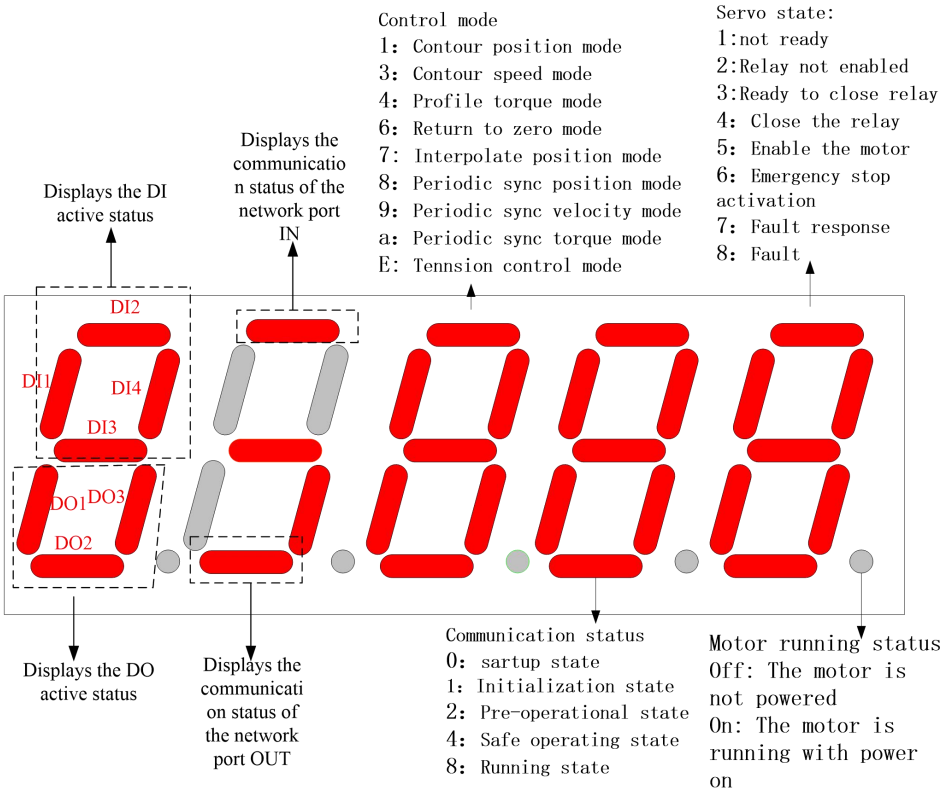
10.4 Service Data SDO

EtherCAT service data SDO is used to transmit non-periodic data, such as the configuration of communication parameters, the configuration of servo drive operating parameters, etc. In VECServo drives, SDO requests and SDO responses are supported.

10.5 Distributed Clock

Distributed clocks allow all EtherCAT devices to use the same system time, thus controlling the synchronous execution of the tasks of each device. The slave device can generate a synchronization signal according to the synchronized system time. In VECServo drives, DC Sync mode and SM Sync mode are supported. The sync period in DC sync mode is controlled by SYNC0. The cycle range varies according to different sport modes.

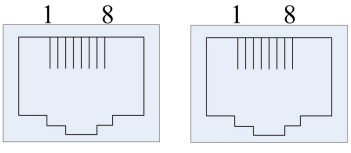
10.6 Indication of drive communication status



10.7 Basic Features of EtherCAT Physical Layer

10.7.1 Interface information

The EtherCAT grid cable is connected to the network port terminal with metal shielding layer, and there are input (IN) and output (OUT) interfaces. The electrical characteristics conform to IEEE 802.3, ISO 8877 standards.



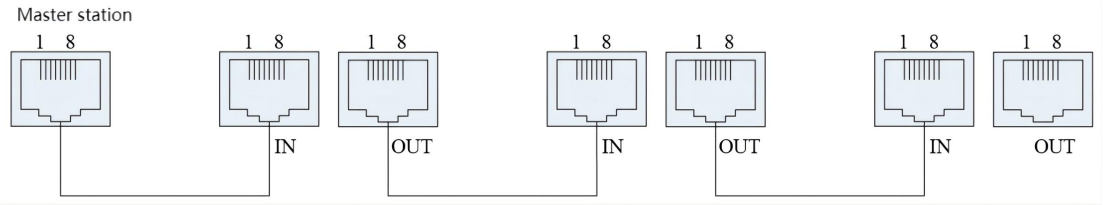
Pin No.	Define	Description
1	TX+	Data Sending+
2	TX-	Data Sending -
3	RX+	Data Receiving+
4	NULL	Dangling
5	NULL	Dangling
6	RX-	Data Receiving-

7	NULL	Dangling
8	NULL	Dangling

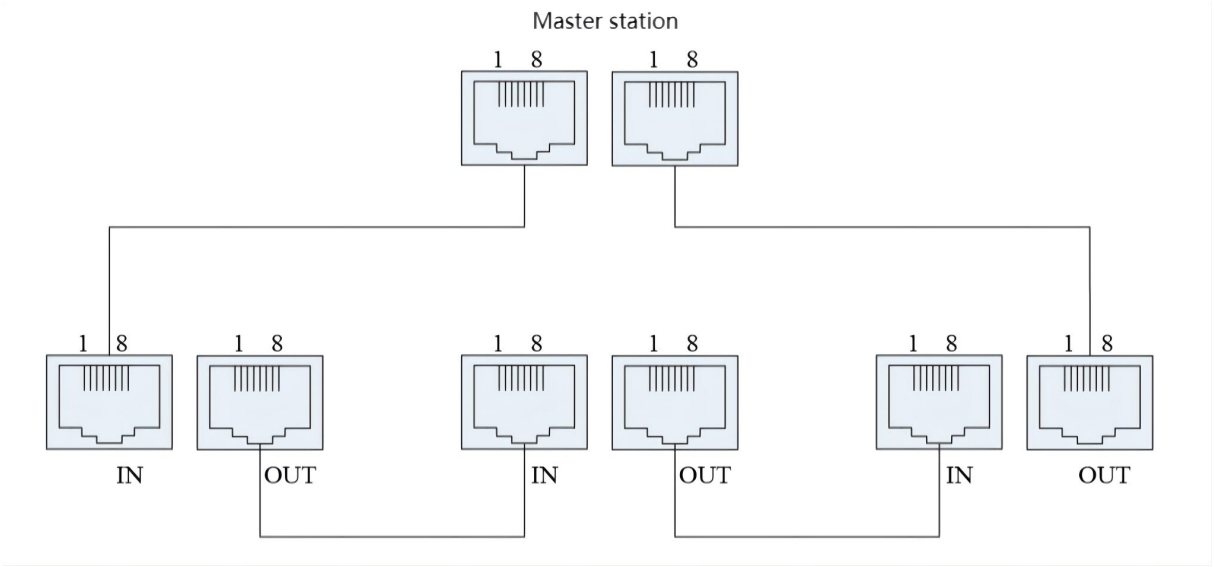
10.7.2 Topological Connection

The EtherCAT communication topology is flexible and basically has no restrictions. The servo has IN and OUT interfaces, and the topology connection is as follows.

（1）Linear connection:



（2）Redundant ring connection:



11.7.3 Communication cable

EtherCAT communication cables use Ethernet Category 5 (100BASE-TX) network cables or high-strength shielded network cables. When using this servo driver, it is also necessary to use a shielded network cable, and the length should not exceed 80m. Shielding the network cable will enhance the anti-interference ability of the system.

10.8 Object Dictionary

The object dictionary is the most important part of the device specification. It is an ordered set of parameters and variables that contain all the parameters of the device description and the state of the device's network. A set of objects that can be accessed over a network in an ordered, predefined manner. The CANopen protocol uses an object dictionary

with a 16-bit index and an 8-bit sub-index. The structure of the object dictionary is shown in the following table.

index	Object Description
0x0000	reserve
0x0001~0x009F	Various data types (standard data types like Boolean, Integer16)
0x00A0~0x0FFF	reserve
0x1000~0x1FFF	Objects specified by CiA301 communication sub-protocol
0x2000~0x5ffff	Objects specified by the device manufacturer
0x6000~0x9ffff	Objects specified by CiA402 communication sub-protocol

The mapping relationship between the VECServo driver function code and the object dictionary is as follows:

Object Dictionary Index = 0x2000 + Function code parameter group number

Object Dictionary Subindex = Hexadecimal of offset within function code group

For example, function code P02.10 corresponds to the object of the object dictionary as 0x2002-0A. The object of the object dictionary corresponding to function code P10.11 is 0x200A-0B.

There are three types of objects in the object dictionary. The first type is a variable type object. The variable type object contains a variable and has no sub-index. The types of variables include unsigned 8-bit, signed 8-bit, unsigned 16-bit, signed 16-bit, unsigned 32-bit, signed 32-bit. The second type is an array object. The array object contains an array. All numbers in the array have the same data type, which can be an unsigned 16-bit array or a signed 32-bit array, etc. Array objects contain multiple sub-indexes, where the first sub-index is the size of the array. For example, for an array-type object with an array length of 2, the value of the first sub-index is fixed to 2, followed by two sub-indexes, which store the two values in the array respectively. The third type is a structural object. The structural object contains a structure, and the data types in the structure are inconsistent. Structure objects contain multiple sub-indexes, where the first sub-index is the number of variables in the structure. The following sub-indexes store all the variables in the structure respectively.

10.9 Objects related to CiA301 protocol

Object 1000h: Device Type

indexes	1000h
name	device type
object type	Variables
data type	unsigned 32 bit
PDO mapping	mappable
read and write properties	read-only
Defaults	0x192

set range	0x192
detail description	device type

Object 1001h: Error register

indexes	1001h
name	error register
object type	Variables
data type	unsigned 8 bit
PDO mapping	mappable
read and write properties	read-only
Defaults	0
set range	0~255
detail description	error register

Object 1008h: Manufacturer's device name

indexes	1008h
name	Manufacturer device name
object type	array of characters
data type	character
PDO mapping	not mappable
read and write properties	read-only
Defaults	“VECServo”
set range	
detail description	Manufacturer device name

Object 1009h: Manufacturer's hardware version

indexes	1009h
name	Manufacturer's hardware version
object type	array of characters
data type	character
PDO	not mappable

mapping	
read and write properties	read-only
Defaults	“1.0”
set range	
detail description	Manufacturer's hardware version

Object 100Ah: Manufacturer's software version

indexes	100Ah
name	Manufacturer's software version
object type	array of characters
data type	character
PDO mapping	not mappable
read and write properties	read-only
Defaults	“5.11”
set range	
detail description	Manufacturer's software version

Object 1018h: Device ID

indexes	1018h
name	Device ID
object type	array type
data type	unsigned 32 bit
PDO mapping	not mappable
read and write properties	read-only

index_sub-index	1018h_00
name	Manufacturer ID
data type	unsigned 32 bit
PDO mapping	not mappable
read and write	read-only

properties	
Defaults	0x919

index_sub-index	1018h_01
name	Product ID
data type	unsigned 32 bit
PDO mapping	not mappable
read and write properties	read-only
Defaults	0

index_sub-index	1018h_02
name	version number
data type	unsigned 32 bit
PDO mapping	not mappable
read and write properties	read-only
Defaults	0

index_sub-index	1018h_03
name	serial number
data type	unsigned 32 bit
PDO mapping	not mappable
read and write properties	read-only
Defaults	0

Object 1C00h: Available sync manager number

indexes	1C00h
name	Available sync manager numbers
object type	Array variables
data type	unsigned 8 bits
PDO mapping	not mappable
read and write properties	read-only

Object 1C32h: Output Sync manager parameters

indexes	1C32h

name	output sync manager parameters
object type	record type
PDO mapping	not mappable
read and write properties	Readable and writable
detail description	output sync manager parameters

Object 1C33h: Input sync manager parameters

indexes	1C33h
name	Enter sync manager parameters
object type	record type
PDO mapping	not mappable
read and write properties	Readable and writable
detail description	Enter sync manager parameters

Objects 1600h, 1701h-1705h: mapping parameters of RPDO1~RPDO4

sub index	meaning
Subindex=0	The total number of variables in the RPDO map
Subindex=1	the mapped value of the 1st variable
Subindex=2	the mapped value of the 2st variable
Subindex=3	the mapped value of the 3st variable
..	..
Subindex=n	the mapped value of the n st variable

The "mapped value of the n-th variable" is a 32-bit variable, which is constituted as follows.

31~16	15~8	7-0
the index of the mapped variable	the subindex of the mapped variable	bit length of the mapped variable

Objects 1A00h, 1B01h-1B04: mapping parameters of TPDO1~TPDO4

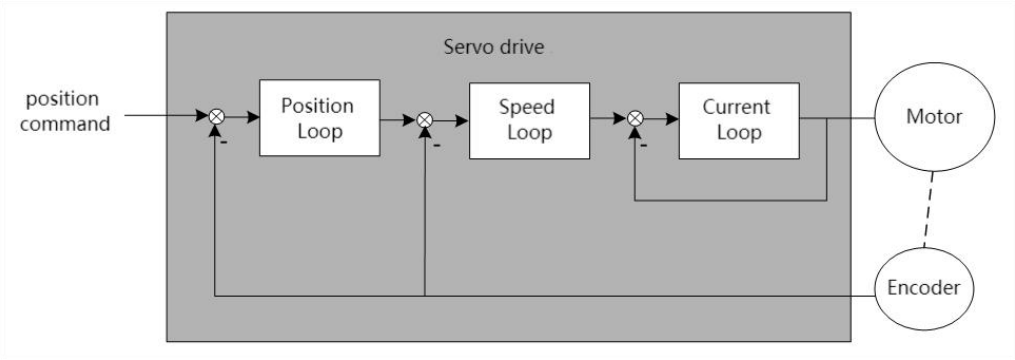
sub index	meaning
Subindex=0	The total number of variables in the TPDO map
Subindex=1	the mapped value of the 1st variable
Subindex=2	the mapped value of the 2st variable
Subindex=3	the mapped value of the 3st variable
..	..
Subindex=n	the mapped value of the n st variable

The "mapped value of the n-th variable" is a 32-bit variable, which is constituted as follows.

31~16	15~8	7-0
the index of the mapped variable	the subindex of the mapped variable	bit length of the mapped variable

Chapter 11 EtherCAT Control Mode

Servo system consists of three main parts: servo driver, motor and encoder.



The servo driver is the control core of the servo system. By processing the input signal and feedback signal, the servo driver can control the precise position, speed and torque of the servo motor, that is, the position, speed, torque and mixed control mode. Among them, position control is the most important and most commonly used control mode of servo system.

Each control mode is briefly described as follows:

Position control refers to controlling the position of the motor through position commands. The target position of the motor is determined by the total number of position commands, and the rotation speed of the motor is determined by the frequency of the position command. The position command can be given by the combination of external pulse input, the total number of internal given position commands + speed limit. Through the internal encoder (the servo motor has its own encoder) or the second encoder (full closed-loop control), the servo drive can realize fast and precise control of the mechanical position and speed. Therefore, the position control mode is mainly used in occasions requiring positioning control, such as manipulators, placement machines, engraving, milling and engraving (pulse sequence commands), CNC machine tools, etc.

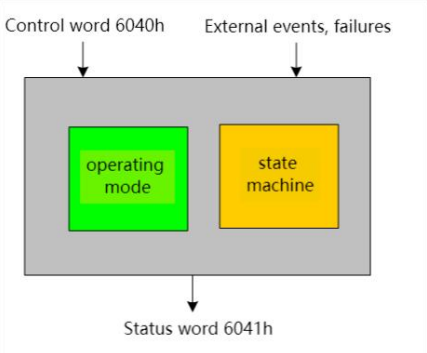
Speed control refers to controlling the speed of the machine through the speed command. Through digital, analog voltage or communication given speed command, the servo drive can achieve fast and precise control of the mechanical speed. Therefore, the speed control mode is mainly used to control the rotation speed. If you want to use the host computer to achieve speed control, you can input the output of the host computer as a speed command to the servo drive, such as an analog engraving and milling machine.

Torque control refers to controlling the output torque of the motor through the torque command. The torque command is given by digital, analog voltage or communication. The torque control mode is mainly used in devices that have strict requirements on the force of the material, such as some tension control occasions such as rewinding and unwinding devices. The torque given value should ensure that the force of the material is not affected by the change of the winding radius.

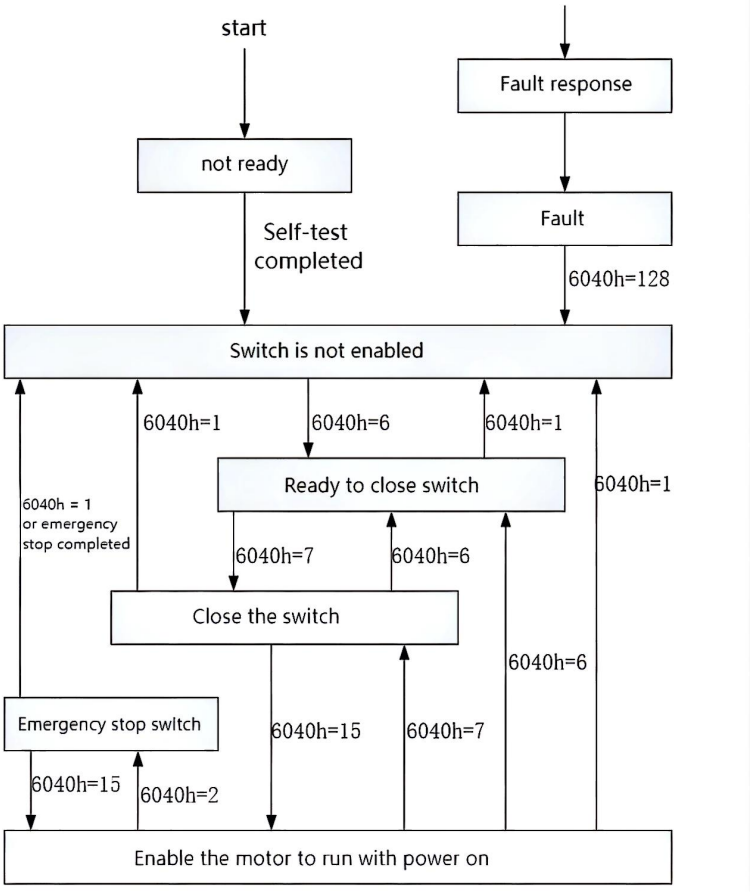
11.1 Drive Status Control

11.1.1 State switching mechanism

The CiA402 protocol specifies the state switching mechanism of the servo. The master station controls the status of the servo through the control word 6040h, and the servo feeds back the status information of the servo through the status word 6041h.



The state switching of the servo follows the following switching mechanism.



As can be seen from the figure, if you want to enable the drive, you need to write 6->7->15 to 6040h in turn.

When the break is enabled, 7 needs to be written to 6040h. If emergency stop is required in the case of enabling, you need to write 2 to 6040h, and automatically switch to the disabled

switch state after the emergency stop is completed.

The motor is energized when the motor is running, emergency stop activated, and fault response.

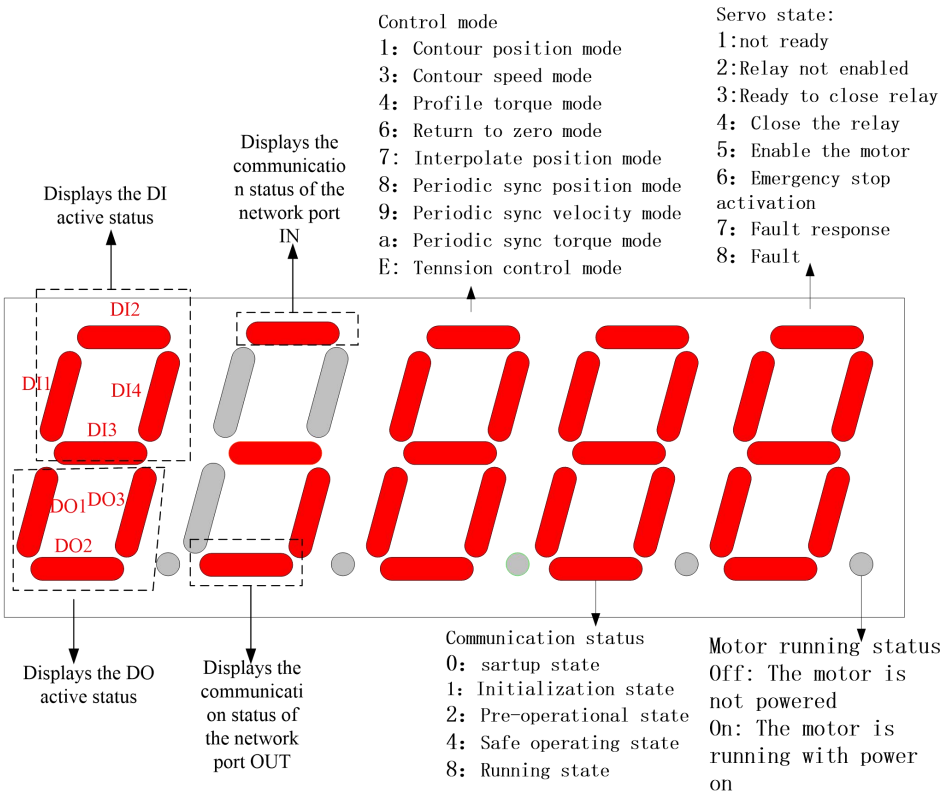
It should be noted that, according to the CiA402 protocol, the master station can control the action of the internal switch of the servo through the control word. Considering the safety factor, the VEC servo does not open the control authority of the internal switch. The internal switch is controlled internally by the servo. In order to maintain the VEC servo's support for the CiA402 protocol, modifying 6040h only changes the internal state of the servo, and does not produce actual switching actions.

11.1.2 Status display of EtherCAT bus servo

In this mode, the status of the drive is displayed, and there are several statuses as follows.

Status name	Status introduction	panel display
reset state	The driver enters this state after power-on initialization or re-reset and restart.	rSt
ready state	When the servo initialization is completed and the hardware detection has no fault, it will enter the ready state	E884
running state	When the driver is enabled, the motor is powered on	E885.
fault state	The driver reported a fault, and the panel displays the reported fault code	Er.xxx

In the non-fault state of the status display, the panel can be set to display a specific variable through P02.05. The default status is shown below.



11.1.3 Related objects

Control word 6040h

indexes	6040h
name	control word
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0-65535

6040h bit definition table.

15~9	8	7	6~4	3	2	1	0
reserve	pause	↑ Fault reset	Control mode specific bits	Enable	Emergency stop (0 is valid)	Pow er-on	switch closed

Note: If you need to enable the driver, you need to write 6->7->15 in sequence in 6040h. If you need to disable enable, write 7 directly in 6040h.

Control mode specific bits are defined as follows.

bits	control mode			
	Contour Position Mode	Return to zero mode	Interpolate mode	Contour speed mode
4	↑ Trigger position execution	↑ Trigger back to zero ↓ stop returning to zero	Unused	Unused
5	update immediately	Unused	Unused	Unused
6	Absolute (0)/Relative (1) position mode	Unused	Unused	Unused

Status word 6041h

indexes	6041h
name	state
Object type	Variables
Data type	unsigned 16 bits
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	0-65535

Status word 6041h bit definition table.

0	ready to close the switch
1	Close the switch

2	Enable the servo			
3	Fault			
4	voltage enable			
5	emergency stop			
6	Switch closure disabled			
7	warning			
8	-			
9	1			
10	goal reached			
11	-			
	Contour position mode	Return to zero mode	Interpolate mode	Contour speed mode
12	Trigger position confirmation	Return to zero complete	Interpolation mode active	zero speed
13	track down bugs	return to zero error	-	-
14	-	-	-	-
15	-	-	-	-

In different states, the values corresponding to 6041h are shown in the table below. where x represents any binary value.

Binary value of 6041h	state of representation
xxxx xxxx x0xx 0000	not ready
xxxx xxxx x1xx 0000	switch not enabled
xxxx xxxx x01x 0001	ready to close the switch
xxxx xxxx x01x 0011	Close the switch
xxxx xxxx x01x 0111	Enable the motor to run with power on
xxxx xxxx x00x 0111	Quick emergency stop effective
xxxx xxxx x0xx 1111	Fault response is valid
xxxx xxxx x0xx 1000	Fault

Emergency stop option 605Ah

indexes	605Ah
name	Emergency stop option
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0

set range	-32767-32767
Detailed Description	0：After an emergency stop, free parking 1： Quick stop after emergency stop, and then enter the "disable switch state" 2：Slowly stop after emergency stop, and then enter the “disable switch state” 3：Quick stop after emergency stop, keep enabled 4：Slow stop after emergency stop, keep enabled

Failure response option 605Eh

indexes	605Eh
name	Failure options
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-32767-32767
Detailed Description	0：Freewheel stop after failure 1：Quick stop after failure, then enter "fault state" 2：Slow stop after failure, then enter "fault state"

Slow stop time 6050h

indexes	6050h
name	Slow deceleration time
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~4294967295
Detailed Description	Unit ms(Time from 0 rpm to rated motor speed)

Fast parking time 6051h

indexes	6051h
name	fast parking time

Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~4294967295
Detailed Description	Unit ms(Time from 0 rpm to rated motor speed)

Digital output function 60FEh

indexes	60FEh
name	Digital output
Object type	Array
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Rw

index_sub-index	60FEh_00
name	60FEh Number of valid sub-indexes
data type	1~2
PDO mapping	not mappable
read and write properties	read-only
Defaults	None

index_sub-index	60FEh_01
name	Force output enabled
data type	unsigned 32 bit
PDO mapping	mappable
read and write properties	RW
Defaults	0

index_sub-index	60FEh_02
name	Enable
data type	unsigned 32 bit
PDO mapping	mappable

read and write properties	RW
Defaults	0

11.2 Drive Mode Control

The servo drive supports 8 control protocols specified by the CiA402 protocol. They are cycle synchronization position mode, cycle synchronization torque mode, cycle synchronization speed mode, contour torque mode, contour position mode, contour speed mode, zero return mode, and interpolation position mode. The control mode is switched by 6060h.

Control mode setting 6060h

indexes	6060h
name	Control mode settings
Object type	Variables
Data type	Signed 8-bits
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	8
set range	-127~127
Detailed Description	0：Reserve 1：Contour position mode 3：Contour speed mode 4：Contour torque mode 5：Reserve 6：Return to zero mode 8：Periodic sync position mode 9：Periodic sync velocity mode 10：Periodic sync torque mode

Control mode display 6061h

indexes	6061h
name	Control mode display
Object type	Variables
Data type	Signed 8-bits
PDO mapping	mappable
Read and	read-only

write properties	
Defaults	8
set range	-127~127
Detailed Description	0：Reserve 1：Contour position mode 3：Contour velocity mode 4：Contour torque mode 5：Reserve 6：Return to zero mode 8：Periodic sync position mode 9：Periodic sync velocity mode 10：Periodic sync torque mode

11.3 Location factors and other common objects

The position unit defined by the CiA402 protocol is the user position unit, but in fact the motor only recognizes the motor encoder unit. Therefore, the position factor 6091h is used to convert the user position unit to the motor encoder unit. 6091h is an array-type object that contains 3 sub-indexes. The 0th sub-index is fixed to 2, the first sub-index is the position factor numerator, and the second sub-index is the position factor denominator. The conversion relationship from user position unit to motor encoder unit is as follows.

$$\text{Motor encoder unit (number of pulses)} = \text{user position unit} \times \frac{\text{Position factor molecule 6091h_01}}{\text{Position factor denominator 6091h_01}}$$

Position factor 6091h

indexes	6091h
name	position factor
object type	array of objects
data type	unsigned 32 bit
PDO mapping	mappable
read and write properties	Readable and writable

index_sub-index	6091h_00
name	6091h Number of valid sub-indexes
data type	unsigned 32 bit
PDO mapping	not mappable
read and write properties	read-only
Defaults	2

index_sub-index	6091h_01
name	position factor molecule
data type	unsigned 32 bit
PDO mapping	mappable
read and write properties	Readable and writable
Defaults	Values set by P03.08

index_sub-index	6091h_02
name	position factor denominator
data type	unsigned 32 bit
PDO mapping	mappable
read and write properties	Readable and writable
Defaults	Values set by P03.10

Current actual position 6064h

indexes	6064h
name	current actual position
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	-2147483647~2147483647
Detailed Description	The current actual position, in user position units

Current actual position 6063h (encoder unit)

indexes	6063h
name	Current actual position (encoder unit)
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-

set range	-2147483647~2147483647
Detailed Description	The current actual position, the unit is (encoder unit)

Real-time speed 606Ch

indexes	606Ch
name	real-time speed
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	-2147483647~2147483647
Detailed Description	Current actual speed, unit: user position unit/S

Real-time rotational speed command 606Bh

indexes	606Bh
name	real-time speed command
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	-2147483647~2147483647
Detailed Description	Real-time speed command (unit: user position unit/S).

Current current percentage 6078h

indexes	6078h
name	Current percentage of current
Object type	Variables
Data type	signed 16 bit
PDO mapping	mappable
Read and write properties	read-only

Defaults	-
set range	-32767~32767
Detailed Description	The percentage of the current current, the actual current is higher than the rated current of the drive, the unit is 0.1%

Current torque percentage 6077h

indexes	6077h
name	Current torque percentage
Object type	Variables
Data type	Signed 16 bits
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	-32767~32767
Detailed Description	The current torque percentage, the actual torque is higher than the rated torque of the drive, the unit is 0.1%

Forward torque limit 60E0h

indexes	60E0h
name	Forward torque limit
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	Value of P05.13
set range	-32767~32767
Detailed Description	Forward torque limit, unit 0.1%

Reverse torque limit 60E1h

indexes	60E1h
name	Reverse torque limit
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable

Defaults	Value of P05.13
set range	-32767~32767
Detailed Description	Reverse torque limit, unit 0.1%

Maximum torque 6072h

indexes	6072h
name	maximum torque
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	Power-on is the value of P05.13, and is limited by P00.24*P00.01/P01.03
set range	-32767~32767
Detailed Description	Maximum torque, unit 0.1%

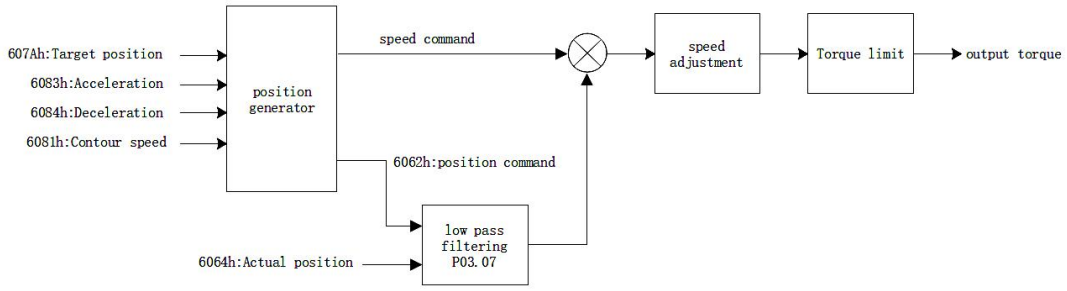
DI status 60FDh

indexes	60FDh
name	DI terminal valid state
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	0~32767
Detailed Description	When P08.42=0, BIT9-BIT0 is directly mapped to the valid state of DI10-DI1 terminals. When P08.42=2, BIT0 is the effective state of the negative limit switch, BIT1 is the valid state of the forward limit switch, BIT2 is the valid state of the origin switch, BIT3-BIT12, mapped to the valid states of DI1 to DI10, The valid state of the BIT16 bit Z point, BIT17 is the effective state of probe 0, BIT18 is the valid state of probe 1.

11.4 Contour Position Mode

11.4.1 Mode Implementation Block Diagram

The position mode is a control mode in which the final target position of the motor is the control target, and is often used to achieve high-precision positioning. The block diagram of the implementation in contour position mode is as follows. The user sets the target position, acceleration, deceleration, and contour speed. The servo plans the position and speed curve according to these parameters. The planning result is input to the position regulator and the speed regulator, and finally moves according to the planned curve. It should be noted that the unit of target position is "user position unit", and the unit of contour velocity is "user position unit/sec". The acceleration unit is "User Position Units/sec/sec". Deceleration is "User Position Units/sec/sec". The conversion from user position units to encoder units needs to be converted by the position factor 6091h.



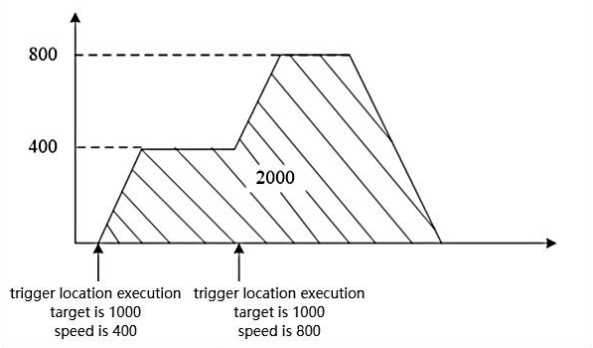
In contour position mode, it is divided into absolute position command and relative position command, which are set by bit6 of control word 6040h. The absolute position command refers to the size of the position command relative to the position of the origin. The relative position command refers to the size of the position command relative to the current position. Therefore, the origin return must be performed before the absolute position command is executed, otherwise a fault will be reported.

For example, it is assumed that 3 stages of absolute position commands are taken, and the initial position is the zero position. First set the target position to 1000, the trigger position is executed, and the motor moves forward 1000. Then set the target position to -1000. After the trigger position is executed, the motor will move in the reverse direction by 2000. At this time, the absolute position of the motor is -1000. Then set the target position to 0. After the trigger position is executed, the motor will move forward 1000 degrees to reach the zero point.

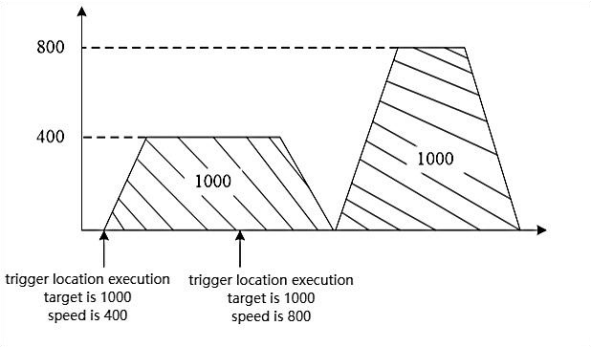
For another example, assuming that the 3-stage relative position command is executed, first set the target position to 1000, the trigger position is executed, and the motor travels 1000 in the forward direction. Then set the target position to -1000. After the trigger position is executed, the motor will go 1000 in the reverse direction, and then set the target position to 3000. After the trigger position is executed, the motor will go 3000 in the forward direction.

The contour position command is also divided into immediate update mode and

non-immediate update mode. The difference between the motion graphics in the two modes is shown in the figure below.



（1）Immediate update mode



（2）Non-immediate update mode

In the immediate update mode, after the trigger position is executed, regardless of whether the motor has completed the previous position, it will immediately switch to the currently set contour position for execution, but the original position will not be discarded, that is, in the relative position mode, the final The walking position is the sum of the previous target position and this target position; in absolute position mode, the final target position is the target position set this time.

In the non-immediate update mode, after the trigger position is executed, if the previous position command has not been executed, the updated position will be executed after the previous position command is executed.

11.4.2 Contour position mode setting process

① First set the mode 6060h=1
② Set the target position to 607Ah, the unit of this value is "User Position Unit"
③ Set the contour speed to 6081Ah, the unit of this value is "user position unit/second"
④ Set acceleration/deceleration, the unit of this value is "user position unit/sec/sec"
⑤ Write 6->7->79->95 to the control word in sequence to execute the relative contour position.
⑥ Read the status word 6041h to get the position arrival flag.

11.4.3 Contour position mode status output

position arrival output

In contour position mode, the output target arrival flag is supported, which is stored in bit10 of status word 6041h. When the real position error is less than the position window 6067h, and the duration window is 6068h, it is considered that the target has arrived, and bit10 of 6041h is set.

Position tracking error

In contour position mode, it supports to output the position tracking error flag. When the actual position error is greater than the maximum tracking position error of 6065h, the position tracking error flag (bit13 of 6041h) is set.

11.4.4 Related objects in outline position mode

Control word 6040h

indexes	6040h
name	Control word
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0-65535

6040h bit definition table.

15~9	8	7	6~4	3	2	1	0
reserve	pause	↑ Fault reset	operating mode specific bits	Enable	Emergency stop (0 is valid)	Power -on	switch closed

Note: If you need to enable the driver, you need to write 6->7->15 in sequence in 6040h. If you need to disable, directly write 7 in 6040h.

The operating mode specific bits are defined as follows.

bits	control mode			
	Contour position mode	Return to zero mode	Interpolate mode	Contour speed mode
4	↑ trigger position execution	↑ Trigger back to zero ↓ stop returning to zero	Unused	Unused
5	update immediately	Unused	Unused	Unused
6	Absolute (0)/Relative (1) position mode	Unused	Unused	Unused

Status word 6041h

indexes	6041h
name	state
Object type	state
Data type	Variables
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	0-65535

Status word 6041h bit definition table.

0	ready to close the switch
1	Close the switch

2	Servo enable			
3	Fault			
4	voltage enable			
5	emergency stop			
6	Switch closure disabled			
7	warning			
8	-			
9	1			
10	goal reached			
11	-			
	Contour Position Mode	Return to zero mode	Interpolate mode	Contour speed mode
12	Trigger position confirmation	Return to zero complete	Interpolation mode active	zero speed
13	track down bugs	return to zero error	-	-
14	-	-	-	-
15	-	-	-	-

In different states, the values corresponding to 6041h are shown in the table below. where x represents an arbitrary binary value.

Binary value of 6041h	state of representation
xxxx xxxx x0xx 0000	not ready
xxxx xxxx x1xx 0000	switch not enabled
xxxx xxxx x01x 0001	switch ready
xxxx xxxx x01x 0011	switch closed
xxxx xxxx x01x 0111	Enabling the motor to run on power
xxxx xxxx x00x 0111	Quick emergency stop effective
xxxx xxxx x0xx 1111	Fault response is valid
xxxx xxxx x0xx 1000	Fault

Target position 607Ah

indexes	607Ah
name	target location
Object type	Variables
Data type	Signed 32-bit
PDO mapping	mappable
Read and write properties	Readable and writable

Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set the target location, the unit is the user location unit

Contour speed 6081h

indexes	6081h
name	Contour speed
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	10000
set range	0~4294967295
Detailed Description	Set the contour speed in contour position mode, the unit is user position unit/second

Acceleration time 6083h

indexes	6083h
name	Acceleration time (ms)
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	500
set range	0~4294967295
Detailed Description	Acceleration under the Set Profile Position Mode, with the unit being "user position unit/second² "

Deceleration time 6084h

indexes	6084h
name	Deceleration time (ms)
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and	Readable and writable

write properties	
Defaults	500
set range	0~4294967295
Detailed Description	Acceleration under the Set Profile Position Mode, with the unit being "user position unit/second² "

Position window 6067h

indexes	6067h
name	position window
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	10
set range	0~4294967295
Detailed Description	Location window, in user location units. When the position error is smaller than the position window and lasts for the position window time, the position arrival signal is output.

Position window time 6068h

indexes	6068h
name	Position window time (ms)
Object type	Variables
Data type	unsigned 16 bits
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	10
set range	0~65535
Detailed Description	Location window time, in ms. When the position error is smaller than the position window and lasts for the position window time, the position arrival signal is output.

Maximum tracking error 6065h

indexes	6065h
name	Maximum tracking error
Object type	Variables
Data type	unsigned 32 bit

PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	30000
set range	0~4294967295
Detailed Description	Maximum tracking error, units :user position units

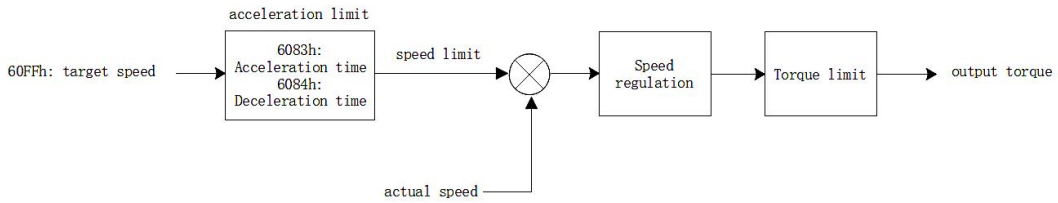
Real-time position command 6062h

indexes	6062h
name	real-time position command
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	-
set range	-2147483647~2147483647
Detailed Description	Real-time position command, the unit is the user position unit

11.5 Contour speed mode

11.5.1Contour velocity mode implementation block diagram

The contour speed mode is a control mode with the motor speed as the control target, and is often used for the main shaft dragging. The implementation of the speed mode is shown in the figure below.



After passing the 60FFh given speed, it is input into the acceleration and deceleration limit link, and the actual given speed command is output. The speed command is subtracted from the actual speed to obtain the speed error, and the speed error is adjusted to output the torque.

11.5.2Contour speed mode setting process

① Set the operating mode 6060h=3
② Set the target speed to 60FFh. The unit for this object is user units/second.
③ Set acceleration and deceleration 6083h, 6084h, the unit of this value is user unit/second.
④ Set 6040h to 6->7->15 in turn
⑤ get servo status 6041h

11.5.3 Contour speed mode status output

Goal reached

When the absolute value of the difference between the target speed 60FFh and the actual speed 606Ch is converted into the motor speed unit, which is smaller than the speed window 606Dh and lasts for the speed window time 606Eh, the target arrival signal is output, and the bit10 of 6041h is set to 1, otherwise it is cleared.

Zero speed output

When the absolute value of the actual speed 606Ch is less than the speed threshold 606Fh, the zero-speed signal is output, and the bit12 of 6041h is set to 1, otherwise it is cleared.

11.5.4 Contour Velocity Mode Related Objects

Target speed 60FFh

indexes	60FFh
name	target speed
Object type	Variables
Data type	Signed 32-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set target speed, unit: "user position unit/second".

Speed window 606Dh

indexes	606Dh
name	speed window
Object type	Variables

Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	100
set range	0~32767
Detailed Description	Speed window, unit 0.1rpm

Speed window time 606Eh

indexes	606Eh
name	speed window time
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	10
set range	0~65535
Detailed Description	Speed window time, unit: ms

Speed threshold 606Fh

indexes	606Fh
name	speed threshold
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	10
set range	0~65535
Detailed Description	Speed threshold, the unit is 0.1rpm

11.5.5 Zero return mode setting process

Note: If it is an absolute encoder, and the Z point is used as the encoder zero point, please pre-set P03.79 - how many pulses the absolute encoder outputs per week.

1、Set 6060h=6 first

2、Set homing offset 607Ch, its unit is user position unit.

3、Set the zero return method 6098h

4、Set the speed of finding the origin switch 6099h_01, the unit is rpm

5、Set the speed of finding Z point 6099h_02, its unit is rpm

6、Set the return-to-zero acceleration and deceleration time to 609Ah, which is the time (ms) required for the motor to go from 0rpm to the rated speed. The actual acceleration time is calculated as follows.

$$\text{Actual acceleration and deceleration time} = \frac{\text{Speed given difference}}{\text{Rated speed}} \times \text{Acceleration and deceleration time}$$

7、Set the control word 6040h to 6->7->15->31 in sequence, and execute the zero return

8、Read status word 6041h

11.5.6 Home mode related status output

Return to zero complete signal

Bit12 of 6041h shows the zero return completion signal. When the zero return signal is triggered, the flag bit is cleared, and the flag bit is set to 1 after the zero return is completed.

target arrival signal

When the bit10 of 6041h is the target arrival signal, when the Halt of 6040h is 1, that is, when it pauses to return to zero, if the speed is 0, the flag is set to 1, otherwise it is cleared. When the Halt of 6040h is 0, the zero return completion signal is 1, and the target arrival signal is also 1, otherwise it is 0.

11.5.7 Return to zero mode related objects

Return to zero method 6098h

indexes	6098h
name	Return to zero method
Object type	Variables
Data type	Signed 8-bit
PDO mapping	mappable
Read and write properties	Readable and writable

Defaults	0
set range	0-35
Detailed Description	Set return to zero method

Zero return speed 6099h

indexes	6099h
name	Zero return speed
Object type	array object
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable

index_sub-index	6099h_00
name	6099h Number of valid sub-indexes
Data type	unsigned 32 bit
PDO mapping	not mappable
Read and write properties	read-only
Defaults	2

index_sub-index	6099h_01
name	find the speed (rpm) of the origin switch
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	P03.53

index_sub-index	6099h_02
name	Speed to find Z point (rpm)
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	P03.54

Homing acceleration 609Ah

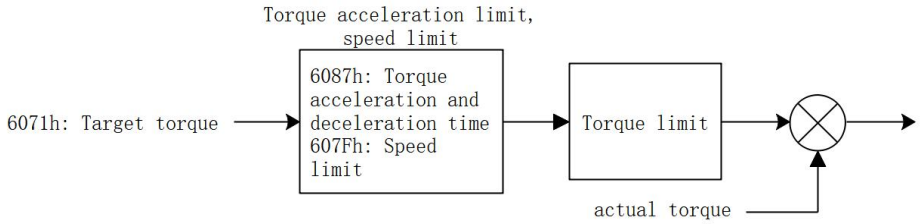
indexes	609Ah
name	Return to zero acceleration and deceleration time
Object type	Variables
Data type	unsigned 32 bit

PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	500
set range	0~4294967295
Detailed Description	Homing acceleration, unit: user unit/s^2 .

11.6 Contour torque mode

11.6.1Contour torque mode implementation block diagram

The contour torque mode is a control mode with the motor output torque as the control target, and is often used for tension control. The implementation of torque mode is shown in the figure below.



After the torque is given through 6071h, it is input to the acceleration and deceleration limit link, and then after the speed limit and torque limit, the actual torque is output.

11.6.2 Profile torque mode setting process

① Set operating mode 6060h=4

② Set the target torque 6071h; the unit of this object is one thousandth of the rated torque

③ Set the acceleration and deceleration time to 6087h, which is the time (ms) required for the motor to go from 0 to rated torque. The actual acceleration time is calculated as follows.

$$\text{Actual acceleration and deceleration time} = \frac{\text{Torque reference difference}}{\text{Rated torque}} \times \text{Acceleration and deceleration time}$$

④ Set 6040h to 6->7->15 in turn

① get servo status 6041h

11.6.3 Contour torque mode related objects

Target torque 6071h

indexes	6071h
name	target torque
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-32767~32767
Detailed Description	Set target torque, unit ‰ rated torque

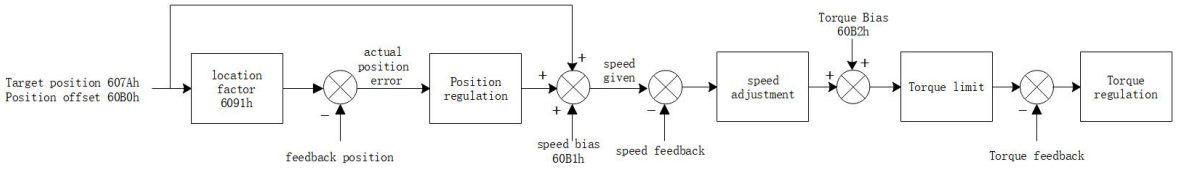
Target torque acceleration and deceleration time 6087h

indexes	6087h
name	Target torque acceleration/deceleration time
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	500
set range	0~4294967295
Detailed Description	Target torque acceleration/deceleration time (ms)

11.7 Periodic Sync Position Mode

11.7.1 Periodic Sync Position Implementation Block Diagram

In the periodic synchronous position mode, the motion controller periodically sends the target position command to the servo through the ECAT bus. After the servo receives the target position command, it uses (target position command + position offset) as the final position command to control the position of the motor. . The implementation of the periodic sync position mode is shown in the following figure.



11.7.2 Periodic sync position mode setting process

① Set operating mode 6060h=8

② Set 6040h to 6->7->15 in turn

③ Periodically send the target position command to the servo, and the servo moves according to the position command

④ Get Servo Status 6041h

11.7.3 Periodic Sync Position Mode Related Objects

Target position 607Ah

indexes	607Ah
name	target position
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set the target position, the unit is the user position unit

Position offset 60B0h

indexes	60B0h
name	position offset
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0

set range	-2147483647~2147483647
Detailed Description	Set the position offset, the unit is the user position unit

Speed offset 60B1h

indexes	60B1h
name	speed bias
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set the speed offset, the unit is user position unit/s

Torque offset 60B2h

indexes	60B2h
name	Torque offset
Object type	Variables
Data type	Signed 16 bits
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-32767~32767
Detailed Description	Set the torque offset, the unit is one thousandth of the rated torque

Position error 60F4h

indexes	60F4h
name	position error
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only

Defaults	0
set range	-2147483647~2147483647
Detailed Description	Position error, in user position units

Position arrives at window 6067h

indexes	6067h
name	position arrival window
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~4294967295
Detailed Description	Position error, in user position units. When the position error 60F4h is smaller than the position arrival window 6067h, and the duration exceeds the position arrival window time threshold 6068h, and the drive is in the running state, BIT10 of the status word 6041h is set to 1.

Position reaches window time threshold 6068h

indexes	6068h
name	position arrival window time threshold
Object type	Variables
Data type	unsigned 16 bits
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~65535
Detailed Description	Time threshold for position arrival window, in ms. When the position error 60F4h is smaller than the position arrival window 6067h, and the duration exceeds the position arrival window time threshold 6068h, and the drive is in the running state, BIT10 of the status word 6041h is set to 1.

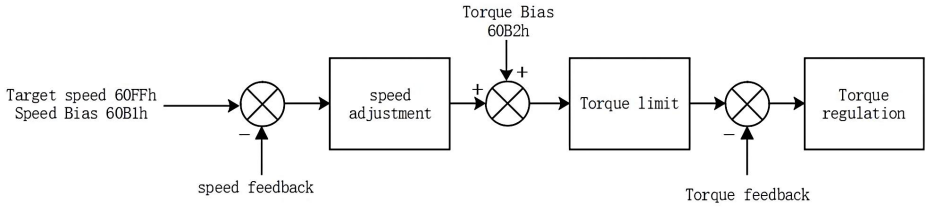
11.7.4 Periodic Sync Position Mode Status Output

When the position error 60F4h is smaller than the position arrival window 6067h, and the duration exceeds the position arrival window time threshold 6068h, and the drive is in the running state, BIT10 of the status word 6041h is set to 1.

11.8 Periodic Sync Speed Mode

11.8.1 Periodic Sync Speed Mode Implementation Block Diagram

In the periodic synchronous speed mode, the motion controller periodically sends the target speed command to the servo. After the servo receives the target speed command, it uses (target speed + speed offset) as the final speed command to control the motor speed. The implementation of the periodic synchronous speed mode is shown in the following figure.



11.8.2Periodic sync speed mode setting process

① Set the operating mode 6060h=9
② Set target speed 60FFh
③ Set 6040h to 6->7->15 in turn
④ Periodically send target speed 60FFh to servo
⑤ Get the servo status 6041h

11.8.3Periodic Sync Velocity Mode Related Objects

Target speed 60FFh

indexes	60FFh
name	target speed
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write	Readable and writable

properties	
Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set the target speed, the unit is user position unit/s

Speed offset 60B1h

indexes	60B1h
name	speed bias
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-2147483647~2147483647
Detailed Description	Set the speed offset, the unit is user position unit/s

Torque Bias 60B2h

indexes	60B2h
name	Torque offset
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-32767~32767
Detailed Description	Set the torque offset, the unit is one thousandth of the rated torque

Speed reaches window 606Dh

indexes	606Dh
name	Speed reaches window
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and	Readable and writable

write properties	
Defaults	0
set range	0~32767
Detailed Description	Set the speed to reach the window, the unit is 0.1rpm When the speed error (converted to units of 0.1 rpm) is less than the speed arrival window 606Dh, and the duration is greater than the speed arrival window time threshold 606Eh, BIT10 of the status word 6041h is set to 1.

Speed reaches window time threshold 606Eh

indexes	606Eh
name	The speed reaches the window time threshold
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~32767
Detailed Description	Set the time threshold for the speed to reach the window, the unit is ms. When the speed error (converted to units of 0.1 rpm) is less than the speed arrival window 606Dh, and the duration is greater than the speed arrival window time threshold 606Eh, BIT10 of the status word 6041h is set to 1.

11.8.4 Periodic Sync Speed Mode Status Output

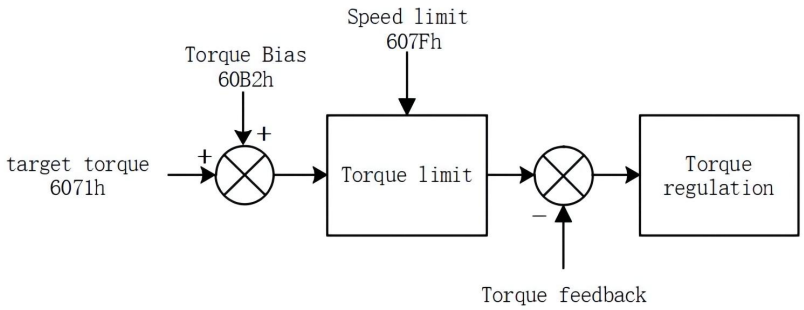
When the speed error (converted to units of 0.1 rpm) is less than the speed arrival window 606Dh, and the duration is greater than the speed arrival window time threshold 606Eh, BIT10 of the status word 6041h is set to 1.

11.9 Periodic Sync Torque Mode

11.9.1 Periodic Sync Torque Implementation Block Diagram

In the periodic synchronous torque mode, the motion controller periodically sends the target torque command to the servo through the ECAT bus. After the servo receives the target torque command, it uses (target torque command + torque offset) as the final torque The

command performs torque control on the motor. The realization of the periodic synchronous torque mode is shown in the following figure.



11.9.2Periodic Sync Torque Mode Setting Process

① Set operating mode 6060h=10
② Set target torque 6071h
③ Set 6040h to 6->7->15 in turn
④ Periodically send torque commands to the servo
⑤ get servo status 6041h

11.9.3 Periodic Sync Torque Mode Related Objects

Target torque 6071h

indexes	6071h
name	Target torque
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	-32767~32767
Detailed Description	Set target torque, unit: rated torque‰

Torque Bias 60B2h

indexes	60B2h
name	Torque offset
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable

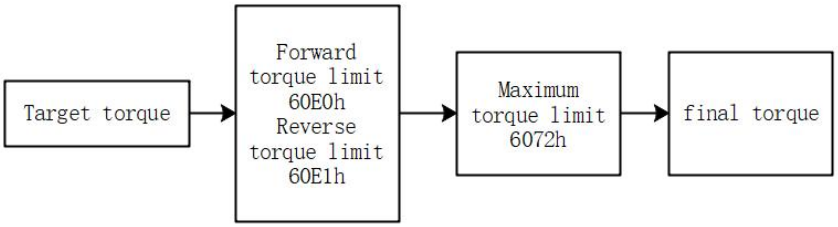
Read and write properties	Readable and writable
Defaults	0
set range	-32767~32767
Detailed Description	Set the torque offset, the unit is one thousandth of the rated torque

Speed limit 607Fh

indexes	607Fh
name	speed limit
Object type	Variables
Data type	unsigned 32 bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~4294967295
Detailed Description	Speed limit, unit: user unit/s

11.10 Torque limit

The torque limit method of all control modes of VEC bus type servo is the same, and the following objects are used to limit the torque.



Forward torque limit and reverse torque limit mean that when the target torque value is greater than the forward torque value, the forward torque limit value is output. When the target torque is smaller than the negative reverse torque value, the negative reverse torque value is output.

The maximum torque limit means that when the target torque is greater than the maximum torque limit value, the maximum torque limit value is output. When the target torque is smaller than the negative maximum torque limit value, the negative maximum torque limit value is output.

When powered on, the forward torque limit value, reverse torque limit value and maximum torque limit value are all initialized to the value of bit P05.13. At the same time, it will also be limited by the motor peak torque P00.24*P00.01/P01.03.

11.10.1 The related objects are as follows

Forward torque limit 60E0h

indexes	60E0h
name	Forward torque limit
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	Initialized to the value of P05.13 after power-on
set range	-32767~32767
Detailed Description	Forward torque limit, unit 0.1%

Reverse torque limit 60E1h

indexes	60E1h
name	Reverse torque limit

Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	Power-on initialization to the value of P05.13
set range	-32767~32767
Detailed Description	Reverse torque limit, unit 0.1%

Maximum torque 6072h

indexes	6072h
name	maximum torque
Object type	Variables
Data type	Signed 16-bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	Power-on is the value of P05.13, and is limited by P00.24*P00.01/P01.03 at the same time
set range	-32767~32767
Detailed Description	Maximum torque, unit 0.1%

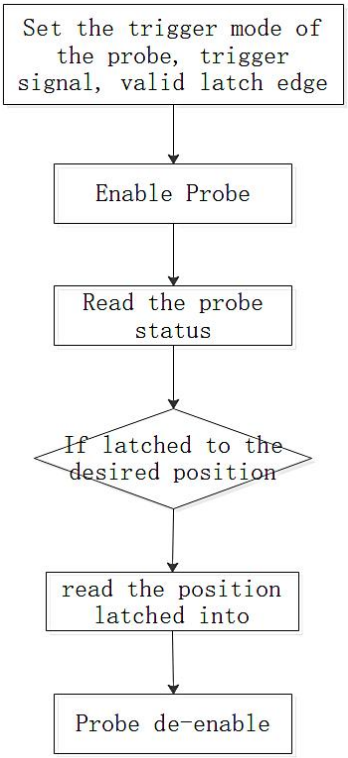
11.11 Probe function

11.11.1Probe function introduction

The probe function is the position latch function. It can latch the position information (encoder unit) when the external DI signal or the motor Z signal changes.The VEC servo supports 2 probes to be enabled at the same time, and can simultaneously record the position information corresponding to the rising edge and falling edge of each probe signal, so that 4 position information can be latched at the same time.Probe 1 can select DI3 or motor Z signal as the probe signal, and probe 2 can select DI4 or motor Z signal as the probe signal.The position information latched by the rising edge of probe 1 is stored in 0x60BA (encoder unit), the position information latched by the falling edge of probe 1 is stored in 0x60BB (encoder unit), and the rising edge of probe 2 The latched position information is stored in 0x60BC (encoder unit), and the position information latched by the falling edge of probe 2 is stored in

0x60BD (encoder unit).It is also possible to set whether each probe has continuous latches or only one latch. Continuous latching refers to latching as long as the probe is enabled and the signal transitions. Latching only once means that after the probe is enabled, only the jumping edge of the first signal is latched, and no matter whether the signal has a jump or not, it will not be latched.

The use of probes must be carried out in strict accordance with the following steps.



11.11.2The related objects are as follows

Set the probe function (0x60B8)

indexes	60B8h
name	Set the probe function
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~65535
Detailed Description	<table><tr><th>Bit</th><th>Function</th><th></th></tr><tr><td>0</td><td>Probe 1 Enable: 0--Probe 1 is</td><td>Bit0~Bit5: related settings of probe 1</td></tr></table>

		disabled 1--Probe 1 enable	◆Note: Once the probe 1 enable signal (the rising edge of bit0 of 60B8h) is valid, the function settings of probe 1 (trigger mode, trigger signal, valid latch edge) cannot be changed, and during the action of probe 1, bit0 of 60B8h must be remain valid. When DI3 is used as the trigger signal of probe 1, its rising edge and falling edge can be enabled at the same time
	1	Probe 1 trigger mode 0-Single trigger, trigger only when the trigger signal is valid for the first time 1-Continuous trigger	
	2	Probe 1 trigger signal selection 0-DI3 input signal 1-Z signal	
	3	RES	
	4	Probe 1 rising edge enable 0--Rising edge is not latched 1--Latch on rising edge	
	5	Probe 1 falling edge enable 0--falling edge is not latched 1--Latching on falling edge	
	6-7	RES	
	8	Probe 2 Enable: 0--probe 2 is not enabled 1--Probe 2 enable	Bit8~Bit15: Probe 2 related settings ◆Note: Once the probe 2 enable signal (the rising edge of bit8 of 60B8h) is valid, the function settings of probe 2 (trigger mode, trigger signal, valid latch edge) cannot be changed, and during the action of probe 2, bit8 of 60B8h must be remain valid. When DI4 is used as the trigger signal of probe 2, its rising edge and falling edge
	9	Probe 2 trigger mode 0-Single trigger, trigger only when the trigger signal is valid for the first time 1-Continuous trigger	
	10	Probe 2 trigger signal selection 0-DI4 input signal 1-Z signal	

	11	RES	can be enabled at the same time.
	12	Probe 2 rising edge enable 0--The rising edge is not latched 1--Latch on rising edge	
	13	Probe 2 falling edge enable 0--falling edge is not latched 1--Latching on falling edge	
	14-15	RES	

Read Probe Status (0x60B9)

indexes	60B9h
name	Read the probe status
Object type	Variables
Data type	unsigned 16-bit
PDO mapping	mappable
Read and write properties	Readable and writable
Defaults	0
set range	0~65535
Detailed Description	

Bit	Function
0	Probe 1 enable flag: 0-Probe 1 has not been enabled 1-Probe 1 has been enabled
1	Whether the rising edge of probe 1 is latched 0-Probe 1 rising edge has not been latched 1-Probe 1 rising edge has been latched
2	Whether the falling edge of probe 1 is latched 0-probe 1 falling edge has not been

		latched 1-Probe 1 falling edge has been latched
	3-5	RES
	6	Probe 1 trigger signal selection 0-DI3 is selected as the latch signal 1-Z is selected as the latch signal
	7	Probe 1 latch signal monitoring 0-Latch signal is low level 1-Latch signal is high level
	8	Probe 2 enable flag: 0-probe 2 is not enabled yet 1-probe 2 is enabled
	9	Whether the rising edge of probe 2 is latched 0-Probe 2 rising edge has not been latched 1-Probe 2 rising edge is latched
	10-12	Whether the falling edge of probe 2 is latched 0-probe 2 falling edge has not been latched 1-Probe 2 falling edge has been latched
	13	RES
	14	Probe 2 trigger signal selection 0-DI4 is selected as the latch signal 1-Z is selected as the latch signal
	15	Probe 2 latch signal monitoring 0-Latch signal is low level 1-Latch signal is high level

Probe 1 rising edge latched position 60BAh (encoder unit)

indexes	60BAh
name	Probe 1 rising edge latched position
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write	read-only

properties	
Defaults	0
set range	-2147483648~2147483647
Detailed Description	The position latched by the rising edge of probe 1, the unit is the encoder unit

Position latched by falling edge of probe 1, 60BBh (encoder unit)

indexes	60BBh
name	Position latched by the falling edge of probe 1
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	0
set range	-2147483648~2147483647
Detailed Description	The position latched by the falling edge of probe 1, the unit is the encoder unit

Probe 2 rising edge latched position, 60BCh (encoder unit)

indexes	60BCh
name	Probe 2 rising edge latched position
Object type	Variables
Data type	signed 32 bit
PDO mapping	mappable
Read and write properties	read-only
Defaults	0
set range	-2147483648~2147483647
Detailed Description	The position latched by the rising edge of probe 2, the unit is the encoder unit

Probe 2 falling edge latched position, 60BDh (encoder unit)

indexes	60BDh
name	Probe 2 falling edge latched position
Object type	Variables
Data type	signed 32 bit

PDO mapping	mappable
Read and write properties	read-only
Defaults	0
set range	-2147483648~2147483647
Detailed Description	The latched position of the falling edge of probe 2, the unit is the encoder unit

Appendix

Detailed parameters

function code group	Summary of parameter groups
Group P00	Motor and Encoder Parameters
Group P01	Drive hardware parameters
Group P02	Basic control parameters
Group P03	position mode parameter
Group P04	Parameters related to the speed mode
Group P05	Related parameters of torque mode
Group P06	DIDO AIAO's related parameters
Group P07	loop control parameters
Group P08	Communication parameters
Group P09	Advanced debugging parameters
Group P10	Fail safe parameters
Group P11	Multi-speed parameters
Group P12	Virtual DI DO parameters
Group P13	Multi-segment position parameters

●Explanation of Mode and Take Effect Methods.：

P：Postion Mode

V：Speed Mode

T：Torque Mode

ImmediatelyTake effect：This indicates that the parameter can be modified while the machine is running, meaning it can be adjusted in any state. The changes take effect immediately after modification.

ResetTake effect：This indicates that after modifying this parameter, the driver needs to

be reset for the changes to take effect.

P00 Group parameters - Motor and encoder parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.01 001 0x2000_1H	S16	PVT	RW	Reset	A	3	0.1~1000	Not
	Parameter Name：Rated current of the motor Description： The rated current of the motor, with the unit being A (Ampere) and a precision of 0.1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.02 002 0x2000_2H	U16	PVT	RW	Reset	rpm or mm/s	3000	1~30000	Not
	Parameter Name：Rated speed of the motor Description： The rated speed of the motor: for rotary motors, the unit is rpm (revolutions per minute); for linear motors, the unit is mm/s (millimeters per second).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.03 003 0x2000_3H	U16	VT	RW	Reset	RPM or mm/s	4,400	1~32767	Not
	Parameter Name：Maximum speed of the motor Description：The maximum speed of the motor: for rotary motors, the unit is rpm (revolutions per minute); for linear motors, the unit is mm/s (millimeters per second)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.04 004 0x2000_4H	S16	PVT	RW	Reset	-	1	0~5	Not

Parameter Name：Definition of the positive direction of the motor

Description：

Setting	Direction of rotation
0	The positive speed of the motor is defined as the clockwise rotation direction of the motor (looking at the motor shaft)
1	The positive speed of the motor is defined as the counterclockwise rotation direction of the motor (looking at the motor shaft)

	2 RES 3 Open-loop SPWM 4 Open-loop SVPWM After setting this parameter, the encoder must undergo re-learning (or re-calibration) before the motor can be enabled for operation. Please wire the motor's UVW power lines according to the manufacturer's standards; otherwise, the motor may rotate in the opposite direction.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.05 005 0x2000_5H	U16	PVT	RW	Reset	-	4	1~30000	Not
	Parameter Name：Number of pole pairs of the motor Description：The number of pole pairs for rotary motors. When selecting a linear motor, the setting is the electrical angle coefficient for the linear motor, which is the coefficient for converting encoder pulses into electrical angles.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.06 006 0x2000_6H	S16	PVT	RW	Reset	-	86	1~32767	Not
	Parameter Name：Motor ID Description：Motor ID。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.08 008 0x2000_8H	U16	PVT	RW	Reset	-	0	0~12	Not

Parameter Name：Motor encoder Type

Description：

Setting	Type of motor encoder
0	Incremental encoder ABZ with UVW
1	17-bit absolute value of Tamagawa multi-turn
2	24-bit Nikon multi-turn absolute value
3	reserve
4	Rotary encoder to incremental
5	Line-saving encoder
6	23-bit absolute value of Tamagawa multi-turn
7	23-bit absolute value of Tamagawa lap
8	17-bit Tamagawa single lap, absolute value
9	Incremental encoder ABZ without UVW

10	12-bit SPI resolver
11	14-bit resolver
12	BISSC

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.09 009 0x2000_9H	U16	PVT	RW	Reset	20ns	20	0~500	Not
	Parameter Name：Motor encoder hardware filter settings(20ns) Description：Motor encoder hardware filter settings，Unit is 20ns.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.10 010 0x2000_AH	S16	PVT	RW	Reset	10ns	5	0~5000	Not
	Parameter Name：Motor encoder software filter time(0.01ms) Description：Speed feedback filtering.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.68 068 0x2000_44H	S16	PVT	RW	Immediately	ms	0	0~30	Not
	Parameter Name：Median filtering time for the motor encoder(ms) Description：Median filtering time for speed sampling of the motor encoder(ms).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.11 011 0x2000_BH	U32	PVT	RW	-	Number of pulses for the motor encoder	10000	100~2147483647	Not
	Parameter Name：Motor encoder resolution Description：Number of pulses per revolution for the motor encoder; set the number of pulses per revolution for the rotary motor encoder.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.13 013 0x2000_DH	S32	PVT	RO	-	Number of pulses for the motor encoder	0	-2147483647~2147483647	Not
	Parameter Name：Motor encoder position(encoder unit) Description：Motor encoder position，encoder Unit。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.17 017 0x2000_11H	S16	PVT	RO	-	-	0	0~32767	Not
	Parameter Name：Motor encoder Hall code value							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.18 018 0x2000_12H	S16	P	RW	Reset	-	0	0~1	Not
	Parameter Name：Absolute value system mode Description：0 - Incremental mode is suitable for systems that require continuous motion in a certain direction with unlimited travel distance. Both incremental encoders and absolute encoders can be used in this mode. 1 - Absolute mode is applicable to systems where the travel is limited and position memory after power failure is required. In this case, absolute encoders with power-off position memory function must be used.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.20 020 0x2000_14H	S16	PVT	RW	Reset	Ohm	1.44	0~300	Not
	Parameter Name：Stator resistance of synchronous motor(Ω) Description：Stator resistance, with a unit of ohm and a precision of 0.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.21	S16	PVT	RW	Reset	mH	3.2	0~300	Not

021 0x2000_15H	Parameter Name：D-axis inductance (Ld) of synchronous motor(mH) Description：D-axis inductance, with a unit of mH and a precision of 0.01.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.22 022 0x2000_16H	S16	PVT	RW	Reset	mH	3.2	0~300	Not
	Parameter Name：Q-axis inductance (Lq) of synchronous motor(mH) Description：Q-axis inductance, with a unit of mH and a precision of 0.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.56 056 0x2000_38H	S16	PVT	RW	Reset	mH	0	0~300	Not
	Parameter Name：Q-axis inductance (Lq) of the synchronous motor at maximum torque(mH) Description：Q-axis inductance (Lq) of the synchronous motor at maximum torque, with a unit of mH and a precision of 0.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.23 023 0x2000_17H	S16	PVT	RW	Reset	V/Krpm	48	0~3000	Not
	Parameter Name：Line back electromotive force (EMF)(V/Krpm) Description：Line back electromotive force (EMF) coefficient, with a unit of V/Krpm and a precision of 0.1.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.24 024 0x2000_18H	S16	PVT	RW	Reset	%	300	0~1000	Password Protected：8421
	Parameter Name：Motor peak current percentage（%） Description：Motor peak current percentage, with a unit of % and a precision of 0.1.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.67 067 0x2000_43H	S16	PVT	RW	Reset	%	600	0~1000	Not
	Parameter Name：Peak torque/thrust percentage of the built-in motor(%) Description：Peak torque percentage of the built-in motor, with a unit of % and a precision of 0.1; for linear motors, it refers to the motor thrust percentage, with the same unit of % and precision							

	of 0.1.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.25 025 0x2000_19H	U32	PVT	RW	Reset	NM	2.39	0~21474836.47	Not
	Parameter Name：Rated torque (Nm) / thrust (N) of the motor Description：Rated torque of the motor: for rotating motors, the unit is Nm with a precision of 0.01; for linear motors, the unit is N with a precision of 0.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.27 027 0x2000_1BH	U32	PVT	RW	Reset	kg*cm^2 or Kg	1.82	0~21474836.47	Not
	Parameter Name：Rotor inertia of the motor (kg*cm²) / mover mass (kg) Description：Rotor inertia of the motor: for rotating motors, the unit is kg·cm² with a precision of 0.01; for linear motors, the unit is kg with a precision of 0.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.29 029 0x2000_1DH	S16	PVT	RW	Reset	-	0	0~2	Not

Parameter Name：Type of motor

Description：

Setpoint	Motor Type
0	Synchronous motor
1	Asynchronous motor
2	Linear motor

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.37 037 0x2000_25H	S32	P	RO	-	Number of pulses for the motor encoder	0	-2147483647~2147483647	Not
	Parameter Name：Lower 32 bits of mechanical origin offset Description：Lower 32 bits of mechanical origin offset.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.39 039 0x2000_27H	S32	P	RO	-	Number of pulses for the motor encoder	0	-2147483647~2147483647	Not
	Parameter Name：Upper 32 bits of mechanical origin offset Description：Upper 32 bits of mechanical origin offset.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.41 041 0x2000_29H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Absolute value system fault masking Description：BIT0: Mask battery alarm; BIT1: Mask battery fault; BIT2: Reserved; BIT3: Reserved; BIT4: Mask revolution overflow fault; BIT5: Mask encoder ID mismatch fault; BIT6: Mask abnormal status ER246 alarm of BISSC encoder; BIT7: Reserved; BIT8: Reserved; BIT9: Reserved; BIT10: Reserved; BIT11: Reserved; BIT12: Reserved; BIT13: Reserved; BIT14: Reserved.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.42 042 0x2000_2AH	S16	PVT	RO	Immediately	%	0	0~32767	Not
	Parameter Name：Motor instantaneous current percentage (%) Description：Ratio of motor instantaneous current value to motor rated current value.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.43 043 0x2000_2BH	S16	PVT	RO	Immediately	%	0	-32767~32767	Not
	Parameter Name：Motor instantaneous power percentage (%) Description：Ratio of motor instantaneous power to motor rated current value.							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P00.44 044 0x2000_2CH	S16	PVT	RO	Immediately	%	0	-32767~32767	Not
	Parameter Name：Motor average load rate (%) Description：Motor average load ratio.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.45 045 0x2000_2DH	S16	PVT	RO	Immediately	%	0	0~32767	Not
	Parameter Name：Maximum motor current percentage within 1 second (%) Description：Maximum motor current percentage within 1 second							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.46 046 0x2000_2EH	S16	PVT	RO	Immediately	%	0	-32767~32767	Not
	Parameter Name：Maximum motor power percentage within 1 second (%) Description：Maximum motor power percentage within 1 second .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.61 061 0x2000_3DH	S16	PVT	RW	Reset	%	0	0~3000	Not
	Parameter Name：Field-weakening percentage of permanent magnet synchronous motor (%) Description：The field-weakening percentage of a permanent magnet synchronous motor (%) is typically around 50%.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.66 066 0x2000_42H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Current loop limiting parameters. Description：There are a total of 5 bits, labeled ABCDE.							

	When the highest-order bit A is set to 1, voltage limit amplitude is disabled; when set to 0, voltage limit amplitude is enabled. Bit B represents the proportional gain (KP) of the field-weakening regulator. Bit C represents the integral gain (KI) of the field-weakening regulator. Bit D sets the amplitude limit for ud, with values 1-9 corresponding to 20% to 100% respectively. Bit E configures the multiplication factor for high-speed phase compensation.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.71 071 0x2000_47H	U16	PVT	RW	Immediately	-	0	0~65535	Security code: 8421
	Parameter Name: Z-point offset , password protection Description: Z-point offset , Encoder Unit.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P00.72 072 0x2000_48H	S16	PVT	RW	Immediately	-	0	0~1	Security code: 8421
	Parameter Name: Encoder AB phase sequence , password protection Description: 0 - Forward ; 1 - Reverse							

P01 Group Parameter - Driver Hardware Parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.01 101 0x2001_1H	U16	PVT	RO	-	-	-	0~65.535	Not
	Parameter Name: ARM Software Version Register Description: ARM Software Version Register.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.26 126	U16	PVT	RO	-	-	-	0~65535	Not
	Parameter Name: Driver Library Version							

0x2001_1AH	Description：ARM Software Version Register.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.03 103 0x2001_3H	S16	PVT	RW	Reset	A	6.0	0.1~3276.7	Password Protected:8422
	Parameter Name：Rated Current of the Driver(A) Description：Rated Current of the Driver.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.04 104 0x2001_4H	S16	PVT	RO	-	A	0	0~3276.7	Not
	Parameter Name：RMS Current of the Driver(A) Description：RMS Current of the Motor.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.05 105 0x2001_5H	S16	PVT	RO	-	A	0	-3276.7~3276.7	Not
	Parameter Name：Instantaneous Current of Phase U(A) Description：Instantaneous Current of Phase A.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.06 106 0x2001_6H	S16	PVT	RO	-	A	0	-3276.7~3276.7	Not
	Parameter Name：Instantaneous Current of Phase V(A) Description：Instantaneous Current of Phase B。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.07 107 0x2001_7H	S16	PVT	RW	-	V	220	100~2000	Not
	Parameter Name：Rated Voltage of the Driver(V) Description：Rated Voltage.							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P01.08 108 0x2001_8H	S16	PVT	RO	-	V	-	0~32767	Not
	Parameter Name：Monitored Busbar Voltage(V) Description：Monitored Capacitor Voltage.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.09 109 0x2001_9H	S16	PVT	RW	Immediately	%	101.2	0~3276.7	Password Protected:8422
	Parameter Name：Busbar Voltage Calibration Coefficient(%)(ImmediatelyTake effect) Description：Busbar Voltage Calibration Coefficient (Normal Value: 100%)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.10 110 0x2001_AH	S16	PVT	RW	-	℃	-	0~3276.7	Not
	Parameter Name：Driver Temperature(℃) Description：Driver Temperature, Unit: 0.1°C.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.11 111 0x2001_BH	S16	PVT	RW	Reset	-	3	0~7	Password Protected：8421

Parameter Name：PWM Frequency Setting Register (Takes Effect upon Power-On, Password Protected)

Description：

Setpoint	Frequency magnitude
0	6K
1	2K
2	4K
3	8K
4	10K
5	16K
6	18K
7	20K

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P01.12 112 0x2001_CH	S16	PVT	RW	Reset	us	3	2~10	Password Protected：8421
	Parameter Name：Dead Time (μs, Takes Effect upon Power-On, Password Protected) Description：Dead Time (μs)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.13 113 0x2001_DH	U16	PVT	RO	-	-	-	0~65.535	Not
	Parameter Name：Driver Type Description：Driver Type.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.15 115 0x2001_FH	U16	PVT	RW	Immediately	-	2	0~32767	Password Protected:8422
	Parameter Name：Driver Rating Description：Driver Rating.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.16 116 0x2001_10H	S16	PVT	RW	Reset	-	0	0~3	Not

Parameter Name：Multiple of Speed Loop Execution Frequency to PWM Frequency (Takes Effect upon Power-On)

Description：

Setpoint	Multiple of Speed Loop Execution Frequency to PWM Frequency
0	2 times
1	1 times
2	2 times
3	4 times

Note: Only Nikon 24-bit encoders are permitted to be set to 4× magnification, and the switching frequency must not exceed 8 kHz.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.17	U16	PVT	RW	Reset	mohm	7.5	0.1~65.535	Password

117 0x2001_11H								Protected:8422
	Parameter Name：Resistance Value for Current Sampling (Takes Effect upon Power-On) Description：Resistance Value for Current Sampling.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.18 118 0x2001_12H	S16	PVT	RW	Reset	-	4	0~4	Not

Parameter Name：Multiple of Current Loop Execution Frequency to PWM Frequency (Takes Effect upon Power-On)

Description：

Setpoint	Multiple of Current Loop Execution Frequency to PWM Frequency
0	2 times
1	1 times
2	2 times
3	4 times
4	8 times

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.19 119 0x2001_13H	U16	PVT	RW	Reset	-	0	0~6	Not

Parameter Name：Current Sampling Decimation Rate (Takes Effect upon Power-On)

Description：

Setpoint	Current Sampling Decimation Rate
0	Decimation rate is 32 and avoids PWM spikes
1	The decimation rate is set to 32 without avoiding PWM spikes.
2	The decimation rate is set to 64 without avoiding PWM spikes.
3	The decimation rate is set to 128 without avoiding PWM spikes.
4	The decimation rate is set to 256 without avoiding PWM spikes.
5	The decimation rate is set to 16 without avoiding PWM spikes.
6	The decimation rate is set to 8 without avoiding PWM spikes.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.21 121 0x2001_15H	S16	PVT	RW	Reset	-	0	0~1	Not
	Parameter Name: Allow PWM Immediate Update (Takes Effect upon Power-On) Description: Setpoint: 0 — Current Sampling Decimation Rate: PWM Dual-Edge Update Setpoint: 1 — Current Sampling Decimation Rate: PWMImmediately Update							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.22 122 0x2001_16H	S16	PVT	RW	Reset	%	0	0~1000	Not
	Parameter Name: Dead-Time Compensation Percentage (Takes Effect upon Power-On) Description: Dead-Time Compensation Percentage %.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.23 123 0x2001_17H	S16	PVT	RW	Reset	25us	0	0~1000	Not
	Parameter Name: Voltage Output Filtering 25μs (Takes Effect upon Power-On) Description: Voltage Output Filtering 25μs.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.28 128 0x2001_1CH	S16	PVT	RW	Reset	25us	0	0~1000	Password Protected:8422
	Parameter Name: Phase A Current Sampling Offset Value (Password Protected) Description: Phase A Current Sampling Offset Value (Password Protected).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.29 129 0x2001_1DH	S16	PVT	RO	-	-	0	0~32767	Not
	Parameter Name: Phase A Current ADC Sampling Value Description: Phase A Current ADC Sampling Value.							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P01.30 130 0x2001_1EH	S16	PVT	RW	Reset	-	0	0~32767	Password Protected:8422
	Parameter Name：Phase C Current Sampling Offset Value (Password Protected) Description：Phase C Current Sampling Offset Value (Password Protected).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.31 131 0x2001_1FH	S16	PVT	RW	Reset	-	0	0~32767	Password Protected:8422
	Parameter Name：Phase B Current Sampling Offset Value (Password Protected) Description：Phase B Current Sampling Offset Value (Password Protected).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.32 132 0x2001_20H	S16	PVT	RO	-	-	-	0~32767	Not
	Parameter Name：Phase C Current ADC Sampling Value Description：Phase C Current ADC Sampling Value.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.33 133 0x2001_21H	S16	PVT	RO	-	-	-	0~32767	Not
	Parameter Name：Phase B Current ADC Sampling Value Description：Phase B Current ADC Sampling Value.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.34 134 0x2001_22H	S16	PVT	RO	-	-	-	0~32767	Not
	Parameter Name：Capacitor Voltage ADC Sampling Value Description：Capacitor Voltage ADC Sampling Value.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.36 136 0x2001_24H	S16	PVT	RO	-	-	-	0~32767	Not
	Parameter Name：Motor Temperature ADC Sampling Value Description：Motor Temperature ADC Sampling Value.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.37 137 0x2001_25H	U32	PVT	RO	-	ms	-	0~4294967296	Not
	Parameter Name：Driver Continuous Power-On Time (Milliseconds) Description：Driver Continuous Power-On Time (Milliseconds).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.39 139 0x2001_27H	U32	PVT	RO	-	-	-	0~4294967296	Not
	Parameter Name：Driver ID Description：Driver ID。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.41 141 0x2001_29H	U32	PVT	RW	Reset	-	-	0~4294967296	Not
	Parameter Name：res Description：res。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.44 144 0x2001_2CH	U32	PVT	RO	-	-	-	0~4294967296	Not
	Parameter Name：Driver ID2 Description：Driver ID2。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.46 146 0x2001_2EH	S16	PVT	RW	Immediately	-	8706	0~65535	Not
	Parameter Name：Multi-Function Parameters Description： BIT0: Enable AI Auto-Calibration							

	BIT1:Reserved for factory testing DO (Digital Output). Do not modify. BIT2-BIT5: Reserved Reserved for future functionality. Do not configure. BIT6: Reserved BIT7: Bus Servo as General-Purpose Mode When set to 1: Operates as general-purpose servo (ignores bus commands, accepts internal position/speed commands). When set to 0: Normal bus communication mode. BIT8: Reserved BIT9: General-Purpose Servo Homing Offset Bypass When set to 1 (General-Purpose Servo Mode): Skips offset movement during homing and directly sets origin at offset position. When set to 0: Normal homing procedure with offset movement. BIT10: Reserved BIT11: Undervoltage Relay Control When set to 1: Relay opens if voltage < 0.65×1.1414×rated voltage. When set to 0: Relay remains closed once activated and will not reopen. BIT12: Speed Sampling Rate Configuration When set to 1: High sampling rate (low precision, high responsiveness) for pulse-train speed control. When set to 0: Low sampling rate (high precision, low responsiveness) for pulse-train speed control. BIT13: Asynchronous Motor Parameter Learning When set to 0: Skips resistance/inductance learning during Fn004 auto-tuning. When set to 1: Enables resistance/inductance learning during Fn004 auto-tuning. BIT14: Probe Trigger DI Mapping When set to 1: Probe 1 triggers DI3, Probe 2 triggers DI4. When set to 0: Probe 1 triggers DI9, Probe 2 triggers DI10.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.49 149 0x2001_31H	U32	PVT	RO	-	min	-	0~4294967296	Not
	Parameter Name：Total System Runtime (min) Description：System Time Unit: minutes.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.51	S16	PVT	RW	Immed	-	2	0~65535	Not

151 0x2001_33H				iatel y				

Parameter Name：Multi-Function Parameter 2

Description：

BIT0: Torque Feedforward Calculation Mode

0: Calculate torque feedforward using new method based on position command

1: Calculate torque feedforward using legacy method based on speed command

BIT1: Torque Feedforward Enable for P720 States

0: Enable torque feedforward when P720=0/1

1: Disable torque feedforward when P720=0/1

BIT2: Power-On Initialization for Linear Motor Incremental Encoder Phase Search.Triggers incremental encoder phase alignment during power-up for linear motors

BIT3: Motor Encoder Parameter Learning Bypass (Fn004)

1: Disable motor encoder parameter learning during Fn004, operate in pure VVVF mode

0: Normal encoder parameter learning enabled during Fn004

BIT4: Resolver Frequency Selection 1 (FREQ SEL1)

Configures frequency selection for resolver interface

BIT5: Resolver Amplitude Modulation Control (AMCD)

Controls amplitude modulation parameters for resolver signal processing

BIT6: Low-Speed Bandwidth Correction

0: Enable low-speed bandwidth optimization

1: Disable low-speed bandwidth correction for backward compatibility

BIT7: Pulse Command Speed Selection

1: Select high-speed pulse command as position reference

0: Select low-speed pulse command as position reference

BIT8: PN Servo Fault Reset Enable

1: Enable simultaneous reset of PN servo and drive upon fault occurrence

0: Standard fault reset behavior

BIT9: Absolute Encoder Acceleration Filter Disable

1: Disable absolute encoder acceleration filtering

0: Enable absolute encoder acceleration filtering (default)

BIT10: Multi-Speed Segment 1 Source Forcing

When enabled, forces multi-speed segment 1 to source from AI1 analog input

BIT11: Speed Calculation Processor Assignment

Incremental Encoder:

0: FPGA-based speed calculation

1: ARM-based speed calculation

Absolute Encoder:

0: ARM-based speed calculation

1: FPGA-based speed calculation

BIT12: Bus Servo DI Enable Function

1: Enable digital input (DI) control functions for bus-connected servos

0: Standard DI functionality

	BIT13: Parameter P02.35 Persistence Enable 1: Allow saving of parameter P02.35 to non-volatile memory 0: Parameter remains volatile BIT14: Narrow Pulse Rejection Disable 1: Disable narrow pulse filtering for legacy servo compatibility (default=0) 0: Enable narrow pulse rejection (recommended for new systems)

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.52 152 0x2001_34H	S16	PVT	RW	Immediately	-	1024	0~65535	Not
	Parameter Name：Multi-Function Parameter 3 Description： BIT0: Numeric Overflow Handling 0: Enable ±32,767 numeric overflow detection Triggers overflow protection when command values exceed ±32,767 BIT1: Hardware Current Loop Enable 1: Enable hardware-based current loop control Requires dedicated FPGA firmware and system reset after modification BIT2: Jog Mode Operation Type 1: Force independent jog operation (non-superimposed) in velocity mode 0: Standard superimposed jog operation BIT3: Absolute Encoder Error Interpolation Disable 1: Disable automatic position error interpolation for absolute encoders BIT4: Position Error Unit Configuration 1: Set position error unit to 1/10,000,000 revolution 0: Default position error unit of 1/10,000 revolution BIT5: Electronic Gear Ratio Selection 1:Pulse command: Product of Gear1 × Gear2 Multi-segment position: Gear1 only Final unit conversion: Gear1-based BIT6: Single-Turn Encoder Power-Loss Retention Enable single-turn position retention during power failure (Homing Mode 35 only).Note: Software revolution counter unavailable for probe detection BIT7: Software Revolution Counter Forcing 1: Use software-based revolution counter exclusively (ignore encoder revolution data) BIT8: Position Mode Velocity Initialization 0: Initialize velocity with filtered value in position mode 1: Initialize velocity with raw (unfiltered) value							

	BIT9: Auto-Reset on ER103 Recovery 1: Enable automatic system reset when recovered from ER103 voltage fault BIT10: Feedforward Parameter Persistence 1: Maintain new torque/velocity feedforward values when disabled (NOT off) BIT11: Position Interpolation Enable Enable position interpolation for electronic gear ratios >2 in pulse-train position control BIT12: Position Error Retention on Mode Switch 1: Retain position error during control mode changes 0: Clear position error when switching control modes BIT13: E1 Servo Enable Behavior 1: Bypass speed verification during servo enable (direct charging) 0: Standard speed verification before servo enable BIT14: =1, the AI bias is added to the original voltage. When it equals 0, the AI processes it as follows: the AI inputs the voltage mV- bias mV- zero drift mV, then processes the dead zone, and after dividing by 10000, amplifies it. When the value is equal to 1, the AI processes it as follows: the AI inputs the voltage mV- zero drift mV, then processes the dead zone, adds the bias mV, and then divides it by 10,000 before amplifying.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.53 153 0x2001_35H	U16	PVT	RW	Immediately	-	256	0~65535	Not
	Parameter Name：Multi-Function Parameter 4 Description： BIT0: =1, block the 105 fault reported by the Z-point jump BIT1: =1The position error dead zone is enabled BIT2: =1, the asynchronous motor self-learns without learning the encoder resolution (applicable to encoders at NotZ point) BIT3: =1 and the 102 105 message is used, the speed command in torque Mode is used as the speed limit BIT4: =1, the Unit of M_ADD1 is compatible; otherwise, the Unit of M_ADD1 is 16384 corresponding to the maximum torque of the motor BIT5: Enable overload current limiting function BIT6: Enable the function of dynamically modifying multi-segment position and velocity commands BIT7: [BIT8-BIT7]==0 Not locked-rotor frequency reduction function BIT8-BIT7=1 Frequency reduction starts at 50% of the locked-rotor current BIT8-BIT7=2 Frequency reduction starts at 75% of the locked-rotor current BIT8-BIT7=3 Frequency reduction starts at 100% of the locked-rotor current							

	BIT8: [bit8-bit7]==0 Not blocking and frequency reduction function When BIT8-BIT7=1, the frequency starts to drop at 50% of the locked-rotor current When BIT8-BIT7=2, the frequency starts to drop at 75% of the locked-rotor current The frequency reduction begins at 100% of the locked-rotor current when BIT8-BIT7=3 BIT9: Reserved BIT10: Reserved BIT11: =0, the overcurrent protection uses an extraction rate of 16; otherwise, it uses an extraction rate of 8 BIT12: =1 All speed limits of modes are valid BIT13: Whether to reset controlword Default to 0 when reconnecting. controlword is set to 0 when reconnecting BIT14: =1 Torque limiting is based on the percentage of the motor's rated current, and it is also required that the motor's rated current be less than the driver's rated current.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.54 154 0x2001_36H	U16	PVT	RW	Immediately	-	64	0~65535	Not
	Parameter Name：Multi-Function Parameter 5 Description： BIT0: After being hooked, in torque Mode, once the speed limit is exceeded, the maximum torque will be used to slow down the speed BIT1: Reserved BIT2: Reserved BIT3: Reserved BIT4: Reserved BIT5: =1,After enabling,the faults reported during the initialization process of class 0 drives and encoder batteries will Reset the servo BIT6: The fault reported during the initialization process of the encoder battery after enabling has no effect. The customer is required to restart it BIT7: Set to 0 AI sampling current value parameter Unit: us BIT8: Reserved BIT9: Set to 1 to enable a speed of meters per minute BIT10: After enabling, if the battery fails, it can only be Reset through the FN000Reset function on the panel. Power-off and other methods are Not reset BIT11: INF38 is torque-limiting enable BIT12: Enable the parallel connection of dual IGBTs BIT13: Reserved BIT14: =1 Disables the electronic tag function.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.57 157 0x2001_39H	U16	PVT	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Multi-Function Parameter 8 Description： BIT0：Reserve BIT1：Reserve BIT2：Reserve BIT3：Reserve BIT4：Reserve BIT5：Reserve BIT6：Reserve BIT7：Reserve BIT8：Reserve BIT9：Reserve BIT10：Reserve BIT11：Reserve BIT12：Reserve BIT13：Reserve BIT14：Reserve							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.58 158 0x2001_3AH	U16	PVT	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Reserve Description：Reserve.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P01.63 163 0x2001_3FH	S32	PVT	RO	-	-	-	-2147483647~2147483647	Not
	Parameter Name：Black box flashAddress Description：Black box flashAddress.							

P02 Group Parameter - Basic Control Parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.01 201 0x2002_1H	S16	PVT	RW	Immediately	-	0	0~7	Not
	Parameter Name：Driver control Mode Description：Used to select the control Mode of the servo driver 0- Position Mode 1- Speed Mode 2- Torque Mode 3- Position torque Mode switching 4- Position/Speed Mode switch 5- Torque/Speed Mode switch 6- Position/Torque/Speed Mode switch 7- Specialized Control Mode							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.02 202 0x2002_2H	S16	PVT	RO	Immediately	-	0	0~8	Not
	Parameter Name：The Mode in which the current drive is running Description：Used to select the control Mode of the servo driver 0- Position Mode 1- Speed Mode 2- Torque Mode 3- Position torque Mode switching 4- Position/Speed Mode switch 5- Torque/Speed Mode switch 6- Position/Torque/Speed Mode switch 7- Specialized Control Mode 8- Bus control Mode							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.03 203 0x2002_3H	S16	PV	RW	Immediately	-	0	0~2	Not

Parameter Name：Reverse rotation is prohibited.

Description：

Setpoint	Forward and reverse rotation Settings
0	There is no limit on forward and reverse rotation
1	Forward rotation prohibited
2	No reversal allowed

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.04 204 0x2002_4H	S16	PVT	RO	Immediately	-	-	0~32767	Not

Parameter Name：Drive status

Description：

Setpoint	Drive status
0	Initialization
1	Self-check
2	Pre-charging
4	Ready
8	Ready
16	Run
32	Emergency stop
64	Response to failure
128	Fault(Er.xxx)

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.05 205 0x2002_5H	S16	PVT	RW	Immediately	-	0	0~11	Not

Parameter Name：The content displayed by the LED in the running or rdy state

Description：

Setpoint	Display content
0	Display state
1	Display speed
2	Display capacitor voltage
3	Display temperature

4	Display current
5	Display DI level value
6	Display DO level value
7	AI1 voltage value
8	AI2 voltage value
9	Reserve
10	Torque percentage

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.07 207 0x2002_7H	S16	PVT	RW	Immediately	-	1	0~1	Not

Parameter Name：Parameter write protection

Description：

Setpoint	Parameter write Settings
0	Prohibited from writing
1	Can be written

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.08 208 0x2002_8H	S16	PVT	RW	Immediately	-	0	0~2	Not

Parameter Name：The setting parameters are only saved in RAM

Description：

Setpoint	Parameter saving Settings
0	The parameters are saved in the EEPROM and will not be lost in case of power failure
1	Parameters are saved to RAM and lost in case of power failure
2	The parameters written by communication are saved to RAM and lost in case of power failure. The parameters written by the panel are saved to EEPROM and retained

			in case of power failure	

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.09 209 0x2002_9H	S16	PVT	RW	Immediately	-	0	0~32767	Not

Parameter Name：Startup options

Description：

a.bb format. When a=0, it starts normally. When a=1, all parameters are read to a USB drive at startup. The name of the USB drive is <PARA + 'bb'.csv>. For instance, if P02.09=1.05 is set, all parameters will be saved to a USB flash drive at the next startup, with the file name 'PARA05.csv'. When a=2, at startup, update all parameters in the USB drive with Parameter Name <PARA + 'bb'.csv> to the servo. For example, if P02.09=2.99, then when starting up next time, update all the parameters on the USB drive with the Parameter Name 'PARA99.csv' to the server. When a=3, at startup, update all non-motor drive parameters with Parameter Name <PARA + 'bb'.csv> on the USB flash drive to the servo. Non-motor drive parameters refer to all parameters except P00, P01 group, P05.13, P10.01, P1003, P10.04, and P10.06. When a=4, update all control parameters with the Parameter Name <PARA + 'bb'.csv> on the USB drive to the servo. The control parameters refer to all parameters except those in groups P00, P01, P05.13, P10.01, P1003, P10.04, P10.06, and P07. When a=5, record the curve in real time to a USB flash drive. When a=9, update the firmware of the FPGA in the USB drive with the name <fpga + 'bb'.sfc> to the server. When a=10, save the black box data to a USB flash drive.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.10 210 0x2002_AH	S16	PVT	RW	Immediately	-	0	0~5	Not

Parameter Name：Selection of servo Type II fault shutdown mode

Description：

Setpoint	Selection of servo Type II fault shutdown mode
0	Free to rotate
1	Rapid deceleration stop and disable driver
2	Slow deceleration stop and disable driver
3	Rapid deceleration stop and keep enable driver
4	Slow deceleration stop and keep enable driver
5	Braking according to the current set by P02.18

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.11 211 0x2002_BH	S16	PVT	RW	Immediately	-	0	0~5	Not

Parameter Name：Fault type 3 stop mode selection

Description：

Setpoint	Fault type 3 stop mode selection
0	Free to rotate
1	Rapid deceleration stop and disable driver
2	Slow deceleration stop and disable driver
3	Rapid deceleration stop and keep enable driver
4	Slow deceleration stop and keep enable driver
5	Braking according to the current set by P02.18

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.12 212 0x2002_CH	S16	PVT	RW	Immediately	-	0	0~5	Not

Parameter Name：Selection of over-travel shutdown mode

Description：

Setpoint	Selection of over-travel shutdown mode
0	Free to rotate
1	Rapid deceleration stop and disable driver
2	Slow deceleration stop and disable driver
3	Rapid deceleration stop and keep enable driver
4	Slow deceleration stop and keep enable driver
5	Braking according to the current set by P02.18

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.13	S16	PVT	RW	Immed	-	0	0~2	Not

213 0x2002_DH				iatel y				

Parameter Name：Selection of shutdown mode without enabling (There are only two valid shutdown modes, "0" and "2".)

Description：

Setpoint	Disable driver stop mode selection
0	Free to rotate
1	Rapid deceleration stop and disable driver
2	Slow deceleration stop and disable driver

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P02.14 214 0x2002_EH	S16	PVT	RW	Immed iatel y	-	0	0~4	Not

Parameter Name： The selection of emergency stop mode, the deceleration mode of the servo motor from rotation to stop when setting the servo emergency stop, and the state of the motor after stopping. (Note: Under the total line, modify this parameter and ResetTake effect)

Description：

Setpoint	Emergency stop selection
0	Free to rotate
1	Rapid deceleration stop and disable driver
2	Slow deceleration stop and disable driver
3	Rapid deceleration stop and keep enable driver
4	Slow deceleration stop and keep enable driver

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P02.16 216 0x2002_10H	U16	PVT	RW	Immed iatel y	ms	500	0~65535	Not

Parameter Name：Selection of emergency stop shutdown mode

Description：Fast parking time ms.

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P02.17 217 0x2002_11H	U16	PVT	RW	Immediately	ms	1000	0~65535	Not
	Parameter Name：Slow deceleration time Description：Slow deceleration time ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.18 218 0x2002_12H	U16	PVT	RW	Immediately	%	100	0~3276.7	Not
	Parameter Name：Percentage of dynamic braking current of the driver Description：Percentage of dynamic braking current of the driver.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.19 219 0x2002_13H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Enable dynamic braking of hardware Description：Enable dynamic braking of hardware.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.20 220 0x2002_14H	S16	PVT	RW	Immediately	-	2	0~3	Not

Parameter Name：Activate the energy consumption braking selection

Description：

Setpoint	Braking mode
0	Never start the brake
1	Braking is possible only when decelerating
2	Ready to brake at any time
3	Braking is only possible when the energy is fed back

For a 220V driver, when the DC bus voltage exceeds 380VDC, the energy consumption braking circuit is activated.

	For a 380V driver, when the DC bus voltage exceeds 680VDC, the energy consumption braking circuit is activated.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.21 221 0x2002_15H	S16	PVT	RW	Immediately	Ω	0	0~3276.7	Not
	Parameter Name：Braking resistor resistance value Description：The resistance value of the braking resistor is ohm.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.22 222 0x2002_16H	S16	PVT	RW	Immediately	Kw	0	0~3276.7	Not
	Parameter Name：The maximum power of the braking resistor Description：The maximum power of the braking resistor is Kw, set to 5 to 10 times the rated power.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.23 223 0x2002_17H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name：Heat dissipation coefficient of braking resistor Description：Heat dissipation coefficient of braking resistor %.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.30 230 0x2002_1EH	S16	PVT	RW	Immediately	ms	0	0~32767	Not
	Parameter Name：After the brake Not effect is applied, the command input is delayed Description：After the brake Not effect is applied, the command input is delayed ms.							

Address	Type	Mode	Visit	Take effe	Unit	Default	Range	Other

				ct				
P02.31 231 0x2002_1FH	S16	PVT	RW	Immediately	rpm	30	0~32767	Not
	Parameter Name：Zero-speed threshold of brake Description：Brake zero-speed threshold rpm							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.32 232 0x2002_20H	S16	PVT	RW	Immediately	ms	30	0~32767	Not
	Parameter Name：Power up hold time Description：Power up hold time ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.33 233 0x2002_21H	S16	PVT	RW	Immediately	ms	500	0~32767	Not
	Parameter Name：The maximum effective waiting time of the brake when the motor rotates after the enable is disconnected ms Description：The maximum effective waiting time of the brake when the motor rotates after the enable is disconnected ms							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.35 235 0x2002_23H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Drive password Description：Drive password.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.36 236 0x2002_24H	S16	PVT	RW	Immediately	%	60	0~100	Not

	Parameter Name：Self-learn the maximum current limit Description：Set it to around 60%.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.41 241 0x2002_29H	S16	PVT	RW	Immediately	%	100	0~1000	Not
	Parameter Name：Maximum voltage output of VVVF Description：Maximum voltage output of VVVF							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.43 243 0x2002_2BH	S16	PVT	RW	Immediately	-	0	-32767~32767	Not
	Parameter Name：The maximum stroke in the gain learning process Description：The Unit of a rotating motor is the number of turns, with an accuracy of 0.01. If it is set to 0, the internal structure will automatically change to 2.00 to be compatible with the previous fixed Settings.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.50 250 0x2002_32H	S16	PVT	RW	Immediately	-	0	0~7	Not
	Parameter Name：Command reverse (Note: It can also be used in bus Mode. For details, please refer to 5.1.4) Description：The command is reversed. When set to 1, the position command is reversed; when set to 2, the speed command is reversed; when set to 4, the torque command is reversed.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.54 254 0x2002_36H	S32	PVT	RO	-	-	0	-2147483647~2147483647	Not
	Parameter Name：The number of laps in a single lap simulated by the software Description：The number of laps in a single lap simulated by the software.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.56 256 0x2002_38H	S32	PVT	RO	-	Encoder PositionUnit	0	0~2147483647	Not
	Parameter Name：The original lap position Description：The original lap position.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.62 262 0x2002_3EH	S32	PVT	RO	-	User Position CommandUnit	0	0~2147483647	Not
	Parameter Name：Load location user Unit Description：Load location user Unit.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.64 264 0x2002_40H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Feedback the change in the user's Unit location Description：Feedback the change in the user's Unit location.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.67 267 0x2002_43H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：User location count Mode Description：Use BIT0 and BIT1 in combination to set the overflow Mode Use BIT1 and BIT0 in combination to set the overflow Mode. When BIT1_BIT0=00, it does not overflow. When BIT1_BIT0=01, retain. BIT1_BIT0=10. Single-turn overflow Mode, the overflow size is the denominator of the electronic gear ratio 1. BIT2 and BIT3 are used in combination to set the positioning Mode When BIT3 and BIT2 are used in combination, when BIT3_BIT2=00, nearby positioning is achieved. When BIT3_BIT2=01, only forward positioning is possible. When BIT1_BIT0=10, only reverse positioning is possible. When BIT1_BIT0=11, retain. BIT4：Reserved							

	BIT5：Reserved BIT6：Reserved BIT7：Reserved BIT8：Reserved BIT9：Reserved BIT10：Reserved BIT11：Reserved BIT12：Reserved BIT13：Reserved BIT14：Reserved

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.68 268 0x2002_44H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：PID source selection parameters Description：Aa.BB AA sets the given source, and BB sets the feedback source. When it is 0, it is derived from parameter P02.73. When it is 1, it originates from the polar AI1. When it is 2, it originates from the polar AI2. When it is 3, it originates from the polar AI3. When it is 4, it is derived from the percentage of the real-time speed of the motor relative to the rated speed. When it is 5, it comes from the percentage of the motor output current relative to the rated current. When it is 6, the percentage of the speed command derived from the pulse rate relative to the rated speed. When it is 7, it originates from the polar AI1. When it is 8, it originates from polar AI2. When it is 9, it originates from the polar AI3.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P02.69 269 0x2002_45H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：PID control parameters Description： When BIT0 is 1, the setting command is reversed When BIT1 is 1, the feedback instruction is reversed When BIT2 is 1, select unipolar PID output; otherwise, select bipolar PID output When BIT3 is 1, the output is reversed BIT4: When it is 1, PID is enabled, and this bit servo enables Take effect. Each time the servo is enabled, the PID output is reset to zero and the relevant parameters are initialized. Then, based on whether the PID enable bit is activated, select whether to perform the PID function operation BIT5: When it is 1, the integral remains, and this bit enables Take effect							

	When BIT6 is 1, the gain is automatically corrected BIT7: Reserved BIT8: Reserved BIT9: Reserved BIT10: Reserved BIT11: Reserved BIT12: Reserved BIT13: Reserved BIT14: Reserved

P03 Group Parameter - Position Mode Parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.01 301 0x2003_1H	S16	P	RW	Immediately	-	0	0~9	Not

Parameter Name: Location instruction source

Description:

Setpoint	Location instruction source
0	Reserve
1	Derived from internal multi-segment location planning
2	Reserve
3	Reserve
4	Reserve
5	Reserve
6	Sine wave
7	Reserve
8	The communication location is given

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.06 306 0x2003_6H	S16	P	RW	Immediately	ms	0	0~128	Not

Parameter Name: The position is given a median filtering time constant

Description: The position is given a median filtering time constant

Address	Type	Mode	Visit	Take	Unit	Default	Range	Other

				effect				
P03.07 307 0x2003_7H	S16	P	RW	Immediately	ms	5	0~32767	Not
	Parameter Name：The position is given a low-pass filter time constant Description：The position is given with the LPF time parameter.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.08 308 0x2003_8H	S32	PV	RW	Immediately	Numerical value	1000	0~2147483647	Not
	Parameter Name：The electronic gear ratio is 1 molecule Description：The electronic gear ratio is 1 molecule.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.10 310 0x2003_AH	S32	PV	RW	Immediately	Numerical value	1000	0~2147483647	Not
	Parameter Name：The electronic gear ratio is 1 denominator Description：The electronic gear ratio is 1 denominator.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.12 312 0x2003_CH	S32	PV	RW	Immediately	Numerical value	1000	0~2147483647	Not
	Parameter Name：The electronic gear ratio is 2 molecule Description：The electronic gear ratio is 2 molecule							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.14 314 0x2003_EH	S32	PV	RW	Immediately	Numerical value	1000	0~2147483647	Not
	Parameter Name：The electronic gear ratio is 2 denominator							

	Description：The electronic gear ratio is 2 denominator

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.16 316 0x2003_10H	S16	PV	RW	Immediately	ms	0	0~32767	Not
	Parameter Name：The electronic gear ratio switching filter time constant Description：The electronic gear ratio switching filter time constant.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.17 317 0x2003_11H	S16	PV	RO	Immediately	0.0001 week	0	-	Not
	Parameter Name：Position error monitoring Description：Position error monitoring, motor encoder Unit, linear motor Unitum.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.19 319 0x2003_13H	S32	P	RW	Immediately	0.0001 week	30000	0~2147483647	Not
	Parameter Name：Excessive position error value Description：When the position error is set to 0, no position error protection is provided. For rotary motor units, it is 0.0001 turns, and for linear motor units, it is um.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.86 386 0x2003_56H	U16	P	RW	Immediately	0.0001 week	0	0~65535	Not
	Parameter Name：Control the excessive value of position error Description：When the control position error is set to excessive value, no protection against excessive control position error will be carried out when it is set to 0. When it is set to 1, automatic protection will be implemented. For rotary motor units, it is 0.0001 turns, and for linear motor units, it is um. When it is set to greater than 1, a 247 fault will be reported when P03.94 is greater than P03.86 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.21 321 0x2003_15H	S16	P	RW	Immediately	-	0	0~3	Not

Parameter Name：Position deviation clearance signal pattern setting

Description：

Setpoint	Position deviation clearance signal pattern setting
0	Clear the deviation when ON
1	Reserve
2	Clear the deviation when OFF
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.22 322 0x2003_16H	S16	P	RW	Immediately	-	0	0~128	Not

Parameter Name：Position deviation clearance signal pattern setting

Description：

Setpoint	Position deviation clearance option
0	Eliminate positional errors and speed
1	Reserve
2	Reserve
3	Reserve
4	Reserve
5	Reserve
6	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.23 323 0x2003_17H	S16	P	RW	Immediately	ms	0	0~32767	Not

Parameter Name：The confirmation time of the output when the speed of the position instruction is 0

Description：The confirmation time of the output when the speed of the position instruction is 0

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.45 345 0x2003_2DH	S16	P	RW	Immediately	-	3	0~20	Not

Parameter Name：The positioning is completed and the output conditions are met

Description：

Setpoint	The positioning is completed and the output conditions are met
0	When the position error is less than the positioning completion threshold, output directly; otherwise, clear the output.
1	Output when the position error is less than the positioning completion threshold and the speed command P03.95 in position Mode is zero; otherwise, clear the output.
2	Output when the position error is less than the positioning completion threshold and the filtered speed command P03.96 in position Mode is zero; otherwise, clear the output.
3	Output when the position error is less than the positioning completion threshold and the speed command P03.95 in position Mode is zero. When the speed command P03.95 in position Mode is not zero, clear the output.
4	The multi-segment position instructions have been sent successfully and the position error is less than the positioning completion threshold
5	When the multi-segment position instructions are sent and the position error is less than the positioning completion threshold, and the retention time output is maintained, otherwise the output is cleared
6	Reserve
7	Reserve
8	Reserve
9	Reserve
10	After the instruction is issued and the position error converges within a certain Range and remains in place for a certain period of time, it is reset to zero when the instruction is triggered. If there is any load disturbance in the middle, the positioning will not change after completion
11	The load position (P02.62/P03.90) is close to the target position (P03.10) within a certain Range and remains in place for a certain period of time. When the command is triggered, it is reset to zero. If there is load disturbance in the middle, the positioning will not change after completion and is only applicable to the absolute positioning Mode

Address	Type	Mode	Visit	Take effe	Unit	Default	Range	Other

				ct				
P03.46 346 0x2003_2EH	S16	P	RW	Immediately	0.0001 week	50	0~32767	Not
	Parameter Name：Locate the completion threshold Description：Positioning completion threshold, motor encoder Unit.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.47 347 0x2003_2FH	S16	P	RW	Immediately	-	3	0~3	Not

Parameter Name：The positioning is close to the output condition

Description：

Setpoint	The positioning is close to the output condition
0	Output when the position error is less than the positioning proximity threshold, otherwise clear the output;
1	The output is when the position error is less than the positioning approach threshold and the speed command P03.95 in the position mode is zero, otherwise the output is cleared;
2	Output when the position error is less than the positioning approach threshold and the filtered speed command P03.96 in position mode is zero, otherwise clear the output
3	The output is when the position error is less than the positioning approach threshold and the speed command P03.95 in the position mode is zero, and the output is cleared when the speed command P03.95 in the position mode is not zero

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.48 348 0x2003_30H	S16	P	RW	Immediately	0.0001 week	500	0~32767	Not
	Parameter Name：Locate close to the threshold Description：Locate close to the threshold，Motor encoder Unit.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.49	S16	P	RW	Imme	ms	10	0~32767	Not

349 0x2003_31H				diat ely				
	Parameter Name：Positioning completion/approach time threshold Description：Positioning completion/approach time threshold ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.51 351 0x2003_33H	S16	P	RW	Imme diat ely	-	1	0~99	Not
	Parameter Name：Return to Zero Mode Description：Return to Zero Mode.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.52 352 0x2003_34H	U16	P	RW	Imme diat ely	ms	500	0~65535	Not
	Parameter Name：Zero return acceleration and deceleration time Description：Zero return acceleration and deceleration time ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.53 353 0x2003_35H	S16	P	RW	Imme diat ely	rpm	500	0~32767	Not
	Parameter Name：High zero return speed Description：High zero return speed (rpm).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.54 354 0x2003_36H	S16	P	RW	Imme diat ely	rpm	100	0~32767	Not
	Parameter Name：Low zero return speed Description：Low zero return speed (rpm).							

Address	Type	Mode	Visit	Take	Unit	Default	Range	Other

				effect				
P03.55 355 0x2003_37H	S16	P	RW	Immediately	UserUnit	0	-2147483647~2147483647	Not
	Parameter Name：Bias after returning to zero Description：Bias after returning to zero.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.57 357 0x2003_39H	S16	P	RW	Immediately	0.0001 week	5	0~32767	Not
	Parameter Name：Origin Range Description：Origin Range.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.73 373 0x2003_49H	S16	PV	RW	Immediately	-	2	0~32767	Not
	Parameter Name：Software and hardware limit Settings Description：When the lowest bit is set to 0, the limit of the disabled software and hardware is set. When the lowest bit is set to 1, Immediately enable the software and hardware limits upon power-on. When the least significant bit is set to 2, the software and hardware limit is enabled after the origin returns to zero. The over-limit distance of the high 4-digit set hardware switch is 0.01 turns for the rotary motor Unit and 0.1mm for the linear motor Unit. Take the linear motor as an example. If it is set to 501, the power-on enables the software and hardware limit switches. When the motor position exceeds the forward limit switch by 5mm, a hardware limit is reported. Or when the motor position exceeds the reverse limit switch by 5mm, a limit fault is reported. If the speed when encountering the limit switch exceeds half of the motor's rated speed, the over-limit distance Not effect can be applied.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.74 374 0x2003_4AH	S32	PV	RW	Immediately	0.01 week	-10000000	-2147483647~2147483647	Not
	Parameter Name：Lower limit value of the software limit							

	Description：The lower limit value of the software. If both the upper and lower limits of the software limit are set to 0, the software limit will be shielded.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.76 376 0x2003_4CH	S32	PV	RW	Immediately	0.01 week	10000000	-2147483647~2147483647	Not
	Parameter Name：Upper limit value of the software limit Description：The upper limit value of the software. If both the upper and lower limits of the software limit are set to 0, the software limit will be shielded.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.79 379 0x2003_4FH	U16	P	RW	Reset	Numerical value	0	0~65535	Not
	Parameter Name：Motor pulse output coefficient Description：Motor pulse output parameters. For an absolute value encoder, this parameter is set to the number of pulses output per revolution. For example, if it is set to 10,000, then when the motor rotates one revolution, the motor pulse output port outputs 10,000 pulses (after four times the frequency). If it is set to 5000, then when the motor rotates one revolution, the motor pulse output port outputs 5,000 pulses. If it is set to 0, This value is automatically set to 10,000 internally, meaning that for each revolution of the motor, the motor's pulse output port outputs 10,000 pulses. For incremental encoders, this parameter is set as the frequency division coefficient. For example, if it is set to 1 and the number of pulses per revolution of the incremental encoder is 10,000 (after 4 times the frequency), then for one revolution of the motor, the motor pulse output port outputs 10,000 pulses. If it is set to 4, then for one revolution of the motor, the motor pulse output port outputs 2,500 pulses. If set to 0, the internal system will automatically set to 1, meaning that for each revolution of the motor, the motor pulse output port will output 10,000 pulses.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.80 380 0x2003_50H	S16	P	RW	Reset	-	0	0~1	Not
	Parameter Name：The output of the frequency division pulse is out of phase Description：							

Setpoint	The output direction of the frequency division pulse
0	Positive output

	1 Positive output

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.81 381 0x2003_51H	S16	P	RW	Reset	-	0	0~1	Not

Parameter Name：Z-pulse polarity selection

Description：

Setpoint	Z-pulse polarity selection
0	Positive output
1	Reverse output

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.82 382 0x2003_52H	S16	P	RW	Enable	-	1	0~1	Not

Parameter Name：Enable the fourth power curve

Description：

Setpoint	Curve planning Settings
0	A trapezoidal velocity curve is adopted
1	Adopt a curve to the power of 4

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.83 383 0x2003_53H	S16	P	RO	Immediately	Numerical value	0	-32767~32767	Not

Parameter Name：Position curve planning error

Description：Curve planning failure register

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.84	S16	P	RW	enab	ms	1	0~32	Not

384 0x2003_54H				le				
	Parameter Name：Sampling interval for position instructions Description：Sampling interval for position instructions，Unit:ms。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.85 385 0x2003_55H	S16	P	RW	Immediately	%	0	0~300	Not
	Parameter Name：Static friction compensation Description：Static friction compensation，Unit:Driver current percentage.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.90 390 0x2003_5AH	S32	P	RO	Immediately	UserUnit	0	-2147483647~2147483647	Not
	Parameter Name：Mechanical position (User Position Unit) Description：Mechanical position (User Position Unit).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.92 392 0x2003_5CH	S32	PVT	RO	Immediately	Encoder Unit	0	-2147483647~2147483647	Not
	Parameter Name：Mechanical position（Encoder Unit） Description：Mechanical position（Encoder Unit）。							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.94 394 0x2003_5EH	S32	PVT	RO	Immediately	clk	0	-32767~32767	Not
	Parameter Name：After filtering the position error Description：After filtering the position error.							

Address	Type	Mode	Visit	Take effe	Unit	Default	Range	Other

				ct				
P03.95 395 0x2003_5FH	S16	PVT	RO	Immediately	rpm	0	-	Not
	Parameter Name：Speed command monitoring in position Mode Description：Unit is the rotational speed (rpm) converted to the motor.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P03.96 396 0x2003_60H	S16	PVT	RO	Immediately	rpm	0	-	Not
	Parameter Name：Monitoring of the filtered speed command in position Mode Description：Unit is the rotational speed (rpm) converted to the motor.							

P04 Group Parameters - Speed Mode Related Parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.01 401 0x2004_1H	S16	V	RW	Immediately	-	0	0~8	Not

Parameter Name：Speed source

Description：

Setpoint	Speed source
0	Main speed A
1	Auxiliary speed B
2	A/B switching through IO-INFn.12
3	A+B
4	Communication (P08.17)
5	Multi-speed
6	UP/DOWN pattern
7	Internal sine wave
8	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.02	S16	V	RW	Imme	-	0	0~4	Not

402 0x2004_2H				diat ely				

Parameter Name：Source of speed

Description：

Setpoint	The source of the principal velocity A
0	Sourced from P04.03
1	From AI1
2	From AI2
3	Reserve
4	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.03 403 0x2004_3H	S16	V	RW	Imme diat ely	rpm	500	-32767~327 67	Not

Parameter Name：Value of main speed A

Description：Value of main speed A.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.04 404 0x2004_4H	S16	V	RW	Imme diat ely	-	0	0~4	Not

Parameter Name：Auxiliary Speed B Source

Description：

Setpoint	Auxiliary Speed B Source
0	From P04.05
1	From AI1
2	From AI2
3	Reserve
4	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.05 405 0x2004_5H	S16	V	RW	Imme diat ely	rpm	500	-32767~327 67	Not

	Parameter Name：The value of the auxiliary speed B Description：The value of the auxiliary speed B.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.06 406 0x2004_6H	S16	V	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of speed positive clipping

Description：

Setpoint	Source of positive speed limit
0	Forward Limit A
1	Positive Limit B
2	A/B switching
3	A and B are restricted at the same time

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.07 407 0x2004_7H	S16	V	RW	Immediately	-	0	0~3	Not

Parameter Name：The source of the speed positive limit A

Description：

Setpoint	Source of positive speed limit A
0	From P04.08
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.08 408 0x2004_8H	S16	V	RW	Immediately	rpm	4400	0~32767	Not

Parameter Name：The value of the speed forward limit A

Description：The value of the forward limit A.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.09 409 0x2004_9H	S16	V	RW	Immediately	-	4400	0~3	Not

Parameter Name：The source of the speed forward limit B

Description：

Setpoint	The source of the positive velocity limit B
0	from P04.10
1	from AI1
2	from AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.10 410 0x2004_AH	S16	V	RW	Immediately	rpm	4400	0~32767	Not

Parameter Name：The value of the speed forward limit B

Description：The value of the forward limit B.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.11 411 0x2004_BH	S16	V	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of reverse speed limit

Description：

Setpoint	Source of reverse speed limit
0	Reverse limiter A
1	Reverse limiter B
2	A/B switch
3	Both A and B are restricted

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P04.12 412 0x2004_CH	S16	V	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of speed reverse limit A

Description：

Setpoint	Source of speed reverse limit A
0	from P04.13
1	from AI1
2	from AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.13 413 0x2004_DH	S16	V	RW	Immediately	rpm	4400	0~32767	Not

Parameter Name：The value of the speed reverse limit A

Description：The value of the speed reverse limit A.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.14 414 0x2004_EH	S16	V	RW	Immediately	-	0	0~3	Not

Parameter Name：Speed reverse limit B source

Description：

Setpoint	The source of the reverse speed limit B
0	from P04.15
1	from AI1
2	from AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.15 415 0x2004_FH	S16	V	RW	Immediately	rpm	4400	0~32767	Not

	Parameter Name：The value of the speed reverse limit B Description：The value of the speed reverse limit B.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.16 416 0x2004_10H	S16	PV	RW	Immediately	rpm	20	-32767~32767	Not
	Parameter Name：Point motion speed Description：Point motion speed.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.17 417 0x2004_11H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Acceleration time Description：Acceleration time.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.18 418 0x2004_12H	U16	PV	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Deceleration time Description：Deceleration time.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.19 419 0x2004_13H	S16	PV	RW	Immediately	rpm	100	0~32767	Not
	Parameter Name：Fast point movement speed Description：Fast point movement speed.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P04.20 420 0x2004_14H	S16	V	RW	Immediately	ms	20	0~32767	Not
	Parameter Name：The speed sets the filtering time Description：The speed sets the filtering time ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.21 421 0x2004_15H	S16	V	RO	Immediately	rpm	-	0~32767	Not
	Parameter Name：Display the value after speed filtering Description：Display the value after speed filtering.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.22 422 0x2004_16H	S16	V	RW	Immediately	ms	100	0~32767	Not
	Parameter Name：The speed shows the filtering time Description：The speed shows the filtering time ms.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.23 423 0x2004_17H	S16	V	RW	Immediately	ms	1000	0~32767	Not
	Parameter Name：The speed reaches the threshold Description：The speed reaches the threshold.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.24 424 0x2004_18H	S16	V	RW	Immediately	rpm	10	0~32767	Not
	Parameter Name：Speed consistency threshold Description：Speed consistency threshold.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.25 425 0x2004_19H	S16	V	RW	Immediately	rpm	10	0~32767	Not
	Parameter Name：Zero-speed threshold Description：Zero-speed threshold.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.26 426 0x2004_1AH	S16	V	RW	Immediately	rpm	5	0~32767	Not
	Parameter Name：Zero position fixed speed threshold Description：Zero position fixed speed threshold.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.27 427 0x2004_1BH	S16	V	RW	Immediately	rpm/s	375	0~32767	Not
	Parameter Name：Acceleration and deceleration threshold Description：Acceleration/deceleration threshold: When the acceleration/deceleration exceeds this threshold, output the acceleration/deceleration signal, Unitrpm per second.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.28 428 0x2004_1CH	S16	V	RW	Immediately	rpm	0	0~32767	Not
	Parameter Name：ECAT velocity sampling filtering Description：ECAT velocity sampling filtering.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P04.29 429	S16	PV	RO	Immediat	rpm	0	0~32767	Not

0x2004_1DH				ely				
	Parameter Name：Speed command monitoring Description：Speed loop command input.							

P05 Group Parameters - Torque Mode Related Parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.01 501 0x2005_1H	S16	T	RW	Immediately	-	0	0~5	Not

Parameter Name：Torque source

Description：

Setpoint	Torque source
0	main torque A
1	Auxiliary torque B
2	Perform A/B switchover through I/O
3	A+B
4	Communications (P08.16)
5	Internal sine wave

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.02 502 0x2005_2H	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name：The source of the main torque A

Description：

Setpoint	Source of main torque A
0	From P05.03
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.03 503	S16	T	RW	Immediat	%	0	-300.0~300.0	Not

0x2005_3H				ely				
	Parameter Name：The value of the main torque A Description：The value of the main torque A (-300.0% ~ 300.0%)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.04 504 0x2005_4H	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name：The source of assist torque B

Description：

Setpoint	The source of assist torque B
0	From P05.05
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.05 505 0x2005_5H	S16	T	RW	Immediately	%	0	-300.0~300.0	Not

Parameter Name：The value of the assist torque B

Description：The value of the auxiliary torque B (-300.0% ~ 300.0%).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.10 510 0x2005_AH	S16	T	RW	Immediately	%	0	0~1	Not

Parameter Name：Source of torque limitation

Description：

Setpoint	Source of torque limitation
0	Both positive and negative limits come from positive limiting
1	Positive and negative restrictions are restricted separately

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.11 511 0x2005_BH	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name: Source of torque positive limiting

Description:

Setpoint	Source of forward torque limiting
0	Forward limiter A
1	Forward limiter B
2	A/B switch
3	Both A and B are restricted

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.12 512 0x2005_CH	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name: Source of torque forward limiting A

Description:

Setpoint	The source of the positive torque limit A
0	From P05.13
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.13 513 0x2005_DH	S16	T	RW	Immediately	%	300	0~800.0	Not

Parameter Name: The value of torque positive limit A

Description: The value of torque positive limit A (0-300.0%).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P05.14 514 0x2005_EH	S16	T	RW	Immediately	-	300	0~3	Not

Parameter Name：Source of torque forward limiting B

Description：

Setpoint	Source of forward torque limiting B
0	From P05.15
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.15 515 0x2005_FH	S16	T	RW	Immediately	%	300	0~800.0	Not

Parameter Name：Torque positive limiting B value

Description：Torque positive limiting B value (0-300.0%).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.16 516 0x2005_10H	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of torque reverse limiting

Description：

Setpoint	Source of reverse torque limiting
0	Reverse limiter A
1	Reverse limiter B
2	A/B switch
3	Both A and B are restricted

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.17 517 0x2005_11H	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of torque reverse limiter A

Description：

Setpoint	Source of reverse torque limiting A
0	From P05.18
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.18 518 0x2005_12H	S16	T	RW	Immediately	%	300	0~800.0	Not

Parameter Name：Source of torque reverse limiter A

Description：Source of torque reverse limiter A (0-300.0%).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.19 519 0x2005_13H	S16	T	RW	Immediately	-	0	0~3	Not

Parameter Name：Source of torque reverse limiter B

Description：

Setpoint	Source of reverse torque limiting B
0	From P05.20
1	From AI1
2	From AI2
3	Reserve

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.20 520 0x2005_14H	S16	T	RW	Immediately	%	300	0~800.0	Not

Parameter Name：The value of torque reverse limiting B

Description：The value of torque reverse limiting B (0-300.0%).

Address	Type	Mode	Visit	Take	Unit	Default	Range	Other

				effect				
P05.24 524 0x2005_18H	S16	VT	RW	Immediately	rpm	1	0~32767	Not
	Parameter Name：The speed threshold of torque cutting speed limit (rpm) Description：The speed threshold of torque cutting speed limit (rpm).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.25 525 0x2005_19H	S16	VT	RW	Immediately	0.25ms	5	0~32767	Not
	Parameter Name：The time threshold for switching from torque Mode to speed Mode, unit 0.25ms, is generally set to 10 Description：The time threshold for switching from torque Mode to speed Mode, unit 0.25ms, is generally set to 10.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.26 526 0x2005_1AH	S16	VT	RW	Immediately	rpm	1	0~32767	Not
	Parameter Name：The speed threshold for limiting the shear torque(rpm) Description：The speed threshold for limiting the shear torque(rpm).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.27 527 0x2005_1BH	S16	VT	RW	Immediately	0.25ms	500	0~32767	Not
	Parameter Name：The time threshold for switching from speed Mode to torque Mode, unit 0.25ms, is generally set to 200 Description：The time threshold for switching from speed Mode to torque Mode, unit 0.25ms, is generally set to 200.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P05.28 528 0x2005_1CH	S16	V	RW	Immediately	ms	500	0~32767	Not
	Parameter Name：Speed limit low-pass filter time parameter ms, re-enable take effect Description：The speed limit low-pass filter time parameter ms, re-enabletake effect, is generally set to 500.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.29 529 0x2005_1DH	U16	T	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Torque command acceleration and deceleration time Description：Torque command acceleration and deceleration time.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.31 531 0x2005_1FH	S16	T	RW	Immediately	%	50	0~300.0	Not
	Parameter Name：The torque reaches the reference value Description：The value of the forward torque limit A (0-300.0%).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.32 532 0x2005_20H	S16	T	RW	Immediately	%	10	0~300.0	Not
	Parameter Name：The torque reaches the effective value Description：The value of the forward torque limit A (0-300.0%).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.33 533 0x2005_21H	S16	T	RW	Immediately	%	0	0~300.0	Not
	Parameter Name：The torque has reached an invalid value Description：The value of the forward torque limit A (0-300.0%).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.34 534 0x2005_22H	S16	T	RW	Immediately	ms	0	0~32767	Not
	Parameter Name：Torque sampling interval Description：Torque sampling interval.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.35 535 0x2005_23H	S16	T	RW	Immediately	%	0	0~10.0	Not
	Parameter Name：Torque suppression output limit Description：Torque suppression output limit.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.36 536 0x2005_24H	S16	T	RW	Immediately	%	300	0~300.0	Not
	Parameter Name：Buffeting gain Description：Anti-shake gain percentage %.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.37 537 0x2005_25H	S16	T	RW	Immediately	%	10	0~32767	Not
	Parameter Name：Jitter speed detection time constant Description：The jitter speed detection time constant ms is generally set to 10.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.38 538	S16	T	RO	Immediat	rpm	-	-	Not

0x2005_26H				ely				
	Parameter Name：The jitter speed detection value is rpm Description：The jitter speed detection value is rpm.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.39 539 0x2005_27H	S16	T	RO	Immediately	%	-	-	Not
	Parameter Name：Output value of anti-shake torque Description：Output value of anti-shake torque.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P05.40 540 0x2005_28H	S16	T	RO	Immediately	%	0	-	Not
	Parameter Name：Static torque compensation Description：Static torque compensation value.							

P06 Group Parameters - DIDO and AIAO Parameters.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.01 601 0x2006_1H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI1 Function control register Description： 0- none 1-enable drive 2-Reset the driver 3- Torque command AB switch 4- Torque command reverse switch 5- Forward torque limit switching 6- Negative torque limit selector switch 7- Positive speed limit selection 8- Negative speed limit selection 9- Forward point movement							

	10- Reverse dot movement 11- Reverse the speed command 12- Switch between the main speed command AB 13- Speed stops 14- Download the program to Reset the drive In speed Mode, the zero position is fixed 17- Multi-speed speed selection 0 18- Multi-speed speed selection 1 19- Multi-speed speed selection 2 20- Multi-speed speed selection 3 21- Position instructions are prohibited 22- Position command reverse 24- Electronic gear ratio switching 25- Eliminate positional errors 26- Return to zero 27- Trigger the execution of multiple segments of internal planning positions 28- Multi-segment position selection 0 29- Multi-segment position selection 1 30- Multi-segment position selection 2 31- Multi-segment position selection 3 32- Multi-segment position and direction selection 33- Quick forward point movement 65- Quick reverse dot movement 34- Return to zero origin switch input 36- Control Mode switch 0 37- Control Mode Switch 1 38-null 39-null 40- Switching between absolute and relative point positions is relative when activated 41- First set and second set gain switching switches 42-Reset fault 43- Forward travel limit switch 44- Reverse travel limit switch 46- Download the program Reset 56- Electronic Gear ratio Switching switch 2 57- Motor overheating 58- Emergency stop input 63- Speed ModeUPDOWNModeUP signal 64- Speed ModeUPDOWNModeDOWN signal 67-AI zero drift automatic correction 74- Back to origin 75-STO 76- Velocity loop integration is prohibited

	77- Local emergency stop 78- Local fault clearance

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.02 602 0x2006_2H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI2 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.03 603 0x2006_3H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI3 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.04 604 0x2006_4H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI4 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.05 605 0x2006_5H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI5 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P06.06 606 0x2006_6H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI6 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.07 607 0x2006_7H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI7 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.08 608 0x2006_8H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI8 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.09 609 0x2006_9H	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI9 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.10 610 0x2006_AH	S16	PVT	RW	Immediately	-	0	0~255	Not
	Parameter Name：DI10 Function control register Description：For the specific functions of the DI port, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.13 613 0x2006_DH	S16	PVT	RO	Immediately	Numerical value	0	0~1023	Not
	Parameter Name：The effective state of the DI terminal Description：Displayed in decimal format and converted to binary format, it contains 0 to 9 bits, with the lower to higher bits representing the states of the digital output terminals DI1 to DI10 in sequence. 0=OFF, 1=ON, and the 0th bit corresponds to DI1, etc. The 9th position corresponds to DI10.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.14 614 0x2006_EH	S16	PVT	RW	Immediately	Numerical value	0	0~1023	Not
	Parameter Name：DI forced input Description：Input in decimal (BCD) format and convert to Binary (Binary) to obtain the corresponding DIx input signal. For example, P06.14=42(BCD)=0000101010(Binary) indicates that terminals DI2, DI4, and DI6 are ON.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.15 615 0x2006_FH	S16	PVT	RO	Immediately	Numerical value	0	0~1023	Not
	Parameter Name：The actual level of the DI terminal Description：Displayed in decimal format and converted to binary format, it contains 0 to 9 bits, with the lower to higher bits representing the states of the digital output terminals DI1 to DI10 in sequence. 0=OFF, 1=ON, and the 0th bit corresponds to DI1, etc. The 9th position corresponds to DI10.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.16 616 0x2006_10H	S16	PVT	RW	Immediately	us	500	1~32767	Not
	Parameter Name：High-speed DI filter configuration (microsecond)							

	Description：High-speed DI filter configuration (microsecond).

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.17 617 0x2006_11H	S16	PVT	RW	Immediately	us	2100	1~32767	Not
	Parameter Name：Low-speed DI filter configuration (ms) Description：Low-speed DI filter configuration (ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.21 621 0x2006_15H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI1 effective level

Description：

Setpoint	Level type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.22 622 0x2006_16H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI2 effective level

Description：

Setpoint	Level type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.23 623	S16	PVT	RW	Immediat	-	0	0~1	Not

0x2006_17H				ely				

Parameter Name：DI3 effective level

Description：

Setpoint	Level type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.24 624 0x2006_18H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI4 effective level

Description：

Setpoint	Level type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.25 625 0x2006_19H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI5 effective level

Description：

Setpoint	Level type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.26 626 0x2006_1AH	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI6 effective level

Description：

Setpoint	Level Type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.27 627 0x2006_1BH	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI7 effective level

Description：

Setpoint	Level Type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.28 628 0x2006_1CH	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI8 effective level

Description：

Setpoint	Level Type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.29 629 0x2006_1DH	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI9 effective level

Description：

Setpoint	Level Type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.30 630 0x2006_1EH	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DI10 effective level

Description：

Setpoint	Level Type
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.40 640 0x2006_28H	S16	PVT	RW	Immediately	-	0	0~32767	Not

Parameter Name：DO1DO2 function control register

Description：When E=[BIT1-BIT0], set the functions of DO1-DO2. When E=0, DO1 and DO2 respectively output the functions configured at P06.41 and P06.42. When E=1, DO1 and DO2 respectively output A and B pulses. When E=2, DO1 outputs the Z-point signal, and DO2 outputs the functions configured at P06.42. Set the DI speed with D=[BIT3-BIT2]]. When D=0, the speed is automatically set according to the DI function bit. When D=1, fix DI9 and DI10 as high-speed DI, and the rest as low-speed DI. When D=2, fix DI3 and DI4 as high-speed DI, and the rest as low-speed DI.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.41 641 0x2006_29H	S16	PVT	RW	Immediately	-	0	0~99	Not

Parameter Name：DO1 Function control register

Description：

0-Not

1- Drive enable

2- The speed reaches the given value

3- Decelerating

4- Speeding up

	5 to zero speed 6- Speed exceeding the limit 7- Rotating forward 8- Reversing 9- Fault output In the forward speed limit under 10-torque Mode 11- In reverse speed limit in torque Mode 12- Speed limit in torque Mode 13- Positioning completed 14- Positioning proximity 15- Return to zero and complete 16- Output due to excessive position error 18- Software limit output 24- Brake output 25- The input command is valid 26- Always OFF 27- Always ON 28- Torque limiting output 29- Torque reached 32- Consistent speed 33- The pulse position command has a zero output

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.42 642 0x2006_2AH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO2 Function control register Description：For specific functions of the DO port, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.43 643 0x2006_2BH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO3 Function control register Description：For specific functions of the DO port, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P06.44 644 0x2006_2CH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO4 Function control register Description：For specific functions of the DO port, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.45 645 0x2006_2DH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：DO5 Function control register Description：For specific functions of the DO port, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.49 649 0x2006_31H	S16	PVT	RO	Immediately	Numerical value	-	-	Not
	Parameter Name：The DO terminal is in an effective state Description：The DO terminal is in an effective state.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.50 650 0x2006_32H	S16	PVT	RW	Immediately	Numerical value	0	0~63	Not
	Parameter Name：DO forced output Description：When the DO forced output is valid, set whether the DO function is valid through this parameter. Input in decimal (BCD) format and convert to Binary (Binary) to obtain the corresponding DOx input signal. For example: P06.50=5(BCD)=101(Binary) indicates that DO1 and DO3 output ON.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.51 651 0x2006_33H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO1 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.52 652 0x2006_34H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO2 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.53 653 0x2006_35H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO3 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.54 654 0x2006_36H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO4 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.55 655 0x2006_37H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO5 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.56 656 0x2006_38H	S16	PVT	RW	Immediately	-	0	0~1	Not

Parameter Name：DO5 effective level

Description：

Setpoint	Level validity
0	Low level effective
1	High level effective

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.61 661 0x2006_3DH	S16	PVT	RO	Immediately	mv	-	0~10000	Not

Parameter Name：AI1 input voltage mV

Description：AI1 input voltage mV.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P06.62 662 0x2006_3EH	S16	PVT	RO	Immediately	mv	-	0~10000	Not
	Parameter Name：AI2 input voltage mV Description：AI2 input voltage mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.63 663 0x2006_3FH	S16	PVT	RO	Immediately	mv	-	0~10000	Not
	Parameter Name：AI3 input voltage mV Description：AI1 input voltage mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.64 664 0x2006_40H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：AI1 bias mV Description：AI1 bias mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.65 665 0x2006_41H	S16	PVT	RW	Immediately	mv	0	0~5000	Not
	Parameter Name：AI1 Dead Zone mV Description：AI1 Dead Zone mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.66 666 0x2006_42H	S16	PVT	RW	Immediately	%	100	-3276.7~3276.7	Not
	Parameter Name：AI1 magnification % Description：AI1 magnification.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.67 667 0x2006_43H	S16	PVT	RW	Immediately	ms	2	0~32767	Not
	Parameter Name：Time constant of AI1 low-pass filter ms Description：Time constant of AI1 low-pass filter.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.68 668 0x2006_44H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：AI1 Zero Drift mV Description：AI1 Zero Drift mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.69 669 0x2006_45H	S16	PVT	RW	Immediately	mV	0	-10000~10000	Not
	Parameter Name：AI2 bias mV Description：AI2 bias mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.70 670 0x2006_46H	S16	PVT	RW	Immediately	mv	0	0~5000	Not
	Parameter Name：AI2 Dead Zone mV Description：AI2 Dead Zone mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.71 671 0x2006_47H	S16	PVT	RW	Immediately	%	100	-3276.7~3276.7	Not

	Parameter Name：AI2 magnification Description：AI2 magnification.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.72 672 0x2006_48H	S16	PVT	RW	Immediately	ms	2	0~32767	Not
	Parameter Name：Time constant of AI2 low-pass filter ms Description：Time constant of AI2 low-pass filter.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.73 673 0x2006_49H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：AI2 Zero Drift mV Description：AI2 Zero Drift mV.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.79 679 0x2006_4FH	S16	PVT	RW	Immediately	-	0	0~7	Not

Parameter Name：Automatic zero drift correction

Description：

Setpoint	AI automatically corrects the zero drift mode
0	Reserve
1	Automatically correct the zero drift of AI1 once
2	Automatically correct the zero drift of AI2 once
3	Automatically correct the zero drift of AI3 once (hardware not supported)
4	Automatically correct the zero drift of AI1, AI2 and AI3 once
5	Automatically correct the zero drift of the current sensor once
6	Clear the calibration current sensor

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.80 680 0x2006_50H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：Bias in AO1enable (mv) Description：Bias in AO1enable (mv).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.81 681 0x2006_51H	S16	PVT	RW	Immediately	%	100	-1000.0~1000.0	Not
	Parameter Name：AO1 magnification % Description：AO1 magnification %.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.82 682 0x2006_52H	S16	PVT	RW	Immediately	mv	0	-10000~10000	Not
	Parameter Name：Bias of AO1 off the enable (mv) Description：Bias of AO1 off the enable (mv).							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.84 684 0x2006_54H	S16	PVT	RW	Immediately	-	0	-30000~30000	Not

Parameter Name：The value of the AO1 configuration register

Description：

Setpoint	Output parameters Type
0	The actual rotational speed is 1mv corresponding to 1rpm
1	The speed loop speed command, 1mv corresponds to 1rpm
2	Torque command: 1mv corresponds to 0.1% of the rated torque
3	The position error before filtering, with 1mv corresponding to 1 motor encoder pulse
4	The position error after filtering, with 1mv corresponding to one

	motor encoder pulse
5	Feedforward speed, 1mv corresponds to 0.1% of the rated speed
6	Position command speed, 1mv corresponds to 1rpm
7	The speed of the position command after filtering, 1mv corresponds to 1rpm
8	The instantaneous value of phase A current, 1mV corresponds to 0.1A
9	The instantaneous value of phase B current, 1mV corresponds to 0.1A
10	Torque feedback: 1mv corresponds to 0.1% of the rated torque
11	The effective value of the current, 10V corresponds to the rated current of the driver
12	The effective value of the current, 10V corresponds to the rated current of the motor
13	The motor displays the absolute value of the rotational speed, with 10V corresponding to the rated speed
14	The absolute value of the motor's real-time rotational speed, with 1mV corresponding to 1rpm
15	The motor displays the absolute value of the rotational speed, with 10V corresponding to the maximum rotational speed. When setting 51 to 10000, it directly outputs 51 to 10000 mV. When setting 10001 to 30000, output -9999 to 10000mv

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.91 691 0x2006_5BH	S16	PVT	RO	Immediately	%	-	-3276.7~3276.7	Not
	Parameter Name：The final input value of AI1 % Description：The final AI1 input percentage.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.92 692 0x2006_5CH	S16	PVT	RO	Immediately	%	-	-3276.7~3276.7	Not
	Parameter Name：The final input value of AI2 % Description：The final AI2 input percentage.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.94 694 0x2006_5EH	S16	PVT	RW	Immediately	%	0	-2000~2000	Not
	Parameter Name：Minimum value of AI1 % Description：After being set to non-0, when P06.91 is less than this value, an AI1 input exception will be reported.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.95 695 0x2006_5FH	S16	PVT	RW	Immediately	%	0	-2000~2000	Not
	Parameter Name：The maximum value of AI1 % Description：After being set to non-0, when P06.91 is less than this value, an AI1 input exception will be reported.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P06.96 696 0x2006_60H	S16	PVT	RO	Immediately	mv	-	-10000~10000	Not
	Parameter Name：AO1 output voltage mv Description：AO1 output voltage mv。							

P07 Group Parameters - Loop control parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.01 701 0x2007_1H	S16	PVT	RW	Immediately	-	29	0~32767	Not
	Parameter Name：Current loop proportional gain							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P07.02 702 0x2007_2H	S16	PVT	RW	Immediately	-	28	0~32767	Not
	Parameter Name： Current loop integral gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.03 703 0x2007_3H	S16	PV	RW	Immediately	-	188	0~32767	Not
	Parameter Name： Proportional gain in the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.04 704 0x2007_4H	S16	PV	RW	Immediately	-	18	0~32767	Not
	Parameter Name： Velocity loop integral gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.40 740 0x2007_28H	S16	PV	RW	Immediately	-	0	0~32767	Not
	Parameter Name： Differential gain of the velocity loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.41 741 0x2007_29H	S16	PV	RW	Immediately	%	0	0~500	Not
	Parameter Name： Torque feedforward percentage							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.82 782 0x2007_52H	S16	PV	RW	Immediately	%	0	0~100	Not
	Parameter Name： Integral limit percentage of speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.83 783 0x2007_53H	S16	P	RW	enable	-	0	0~100	Not
	Parameter Name： Position error filtering							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.42 742 0x2007_2AH	S16	PV	RW	Immediately	%	0	0~500	Not
	Parameter Name： Percentage of proportional gain in the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.05 705 0x2007_5H	S16	PV	RW	Immediately	-	0	0~32767	Not
	Parameter Name： Position-loop proportional gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.79 779	S16	P	RW	Immediatel	-	0	0~32767	Not

0x2007_4FH				y				
	Parameter Name： Positional loop integral gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.80 780 0x2007_50H	S16	P	RW	Immediately	-	0	0~32767	Not
	Parameter Name： Position loop advance compensation gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.06 706 0x2007_6H	S16	P	RW	Immediately	%	100	0~800	Not
	Parameter Name： The percentage of the maximum output speed of the position loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.08 708 0x2007_8H	S16	PV	RW	Immediately	ms	10	0~63	Not
	Parameter Name： Torque feedforward filtering time constant 0.01us							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.09 709 0x2007_9H	S16	P	RW	Immediately	-	10	0~32767	Not
	Parameter Name： Time constant of velocity feedforward filtering ms							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P07.10 710 0x2007_AH	S16	PV	RW	Immediately	-	108	0~32767	Not
	Parameter Name： Torque feedforward coefficient							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.11 711 0x2007_BH	S16	P	RW	Immediately	%	100	0~300	Not
	Parameter Name： Velocity feedforward coefficient							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.12 712 0x2007_CH	S16	PVT	RW	Immediately	-	0	0~8	Not
	Parameter Name： Torque filter Type Description： Select the Type of the torque filter 0-low-pass filtering 1- Notch filter 2-Not filtering 3- Low-pass filter and notch filter combined 4- Automatically calculate filter parameters 5- Automatically calculate the parameters of two notch filters 6- Automatically calculate a notch filter parameter 7- Only automatically calculate the parameters of the two notch filters once 8- Only automatically calculate one notch filter parameter once							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.13 713 0x2007_DH	S16	T	RW	Immediately	ms	0.8	0~327.67	Not
	Parameter Name： Torque low-pass filtering time constant ms							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.14 714 0x2007_EH	S16	PVT	RW	Immediately	HZ	0	0~4000	Not
	Parameter Name： Notch filter 1 frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.15 715 0x2007_FH	S16	PVT	RW	Immediately	%	10	0~100	Not
	Parameter Name： Notch 1 depth Description： The smaller it is, the more severe the notch is 0.0 -100.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.16 716 0x2007_10H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name： Notch filter 1 width Description： Notch width, as a percentage relative to the center frequency .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.17 717 0x2007_11H	S16	PVT	RW	Immediately	HZ	0	0~4000	Not
	Parameter Name： Notch filter 2 frequency Description： The center frequency of the notch filter .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.18 718 0x2007_12H	S16	PVT	RW	Immediately	%	10	0~100	Not

	Parameter Name：Depth of notch 2 Description：The smaller it is, the more severe the notch is.0 -100.0 .

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.19 719 0x2007_13H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name：The width of the notch absorber 2 Description：Notch width, as a percentage relative to the center frequency.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.20 720 0x2007_14H	S16	PVT	RW	Immediately	-	4	0~6	Not
	Parameter Name：Gain adjustment Mode Description：Select the gain adjustment Mode 0- Fixed first set gain P07.03-P07.05 1- Gain switching between the first and second sets 2- Automatically calculate a set of gains based on rigidity grade and load inertia (normal Mode) 3- Automatically calculate a set of gains based on the rigidity grade and load inertia (positioning Mode) The Unit for fixing the first set of gain and proportional gain is the bandwidth multiplied by 6.28 5- No adjustment required. Control according to parameter P07.78 6- Switch the parameters of the first set of bandwidth and the second set of bandwidth according to the switching conditions							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.21 721 0x2007_15H	S16	PVT	RW	Immediately	-	800	0~32767	Not
	Parameter Name：The second set of speed loop proportional gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P07.22 722 0x2007_16H	S16	PVT	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The second set of velocity loop integral gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.23 723 0x2007_17H	S16	PVT	RW	Immediately	-	200	0~32767	Not
	Parameter Name： The second set of position loop proportional gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.24 724 0x2007_18H	S16	PVT	RW	Immediately	-	0	0~8	Not
	Parameter Name：Gain switching condition Description：Select the gain switching condition 0-IO switching Switch to INFn.41 and use the second set of gain when effective 1-When the torque command is large, switch to the second gain set. 2-When the speed setting command is large, switch to the second gain set. 3-When the acceleration command is large, switch to the second gain set. 4-When the speed error is large, switch to the second gain set. 5-When the position error is large after filtering, switch to the second gain set. 6-When positioning is completed, switch to the second gain set; if not, switch to the first gain set. 7- Retained When the 8-DO output switching bandwidth is 725=0 and the DO1 output switching bandwidth is effective, use the first set of 725=1 and the DO2 output switching bandwidth							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.25 725 0x2007_19H	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Gain switching level							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.26 726 0x2007_1AH	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Gain switching delay							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.27 727 0x2007_1BH	S16	PVT	RW	Immediately	ms	10	0~32767	Not
	Parameter Name：Gain switching time Description：The two gain switches are smooth switches, and this parameter is the smooth time parameter.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.28 728 0x2007_1CH	S16	PVT	RW	Immediately	-	10	0~31	Not
	Parameter Name：Rigidity grade 0 to 31							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.29 729 0x2007_1DH	S16	PVT	RW	Immediately	-	2	0~32767	Not
	Parameter Name：Load inertia ratio							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.30 730	S16	V	RW	Immediate	%	100	0~3276.7	Not

0x2007_1EH				y				
	Parameter Name： Zero-speed speed gain attenuation/amplification							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.31 731 0x2007_1FH	S16	P	RW	Immediately	%	100	0~3276.7	Not
	Parameter Name： Zero-speed position gain attenuation/amplification							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.32 732 0x2007_20H	S16	PVT	RW	Immediately	rpm	10	0~32767	Not
	Parameter Name： Zero-speed attenuation threshold Description： When the rotational speed rpm is less than this value, perform attenuation/amplification at P07.30 and P07.31.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.33 733 0x2007_21H	S16	PVT	RW	Immediately	ms	500	0~32767	Not
	Parameter Name： The acceleration and deceleration times during inertia learning							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.34 734 0x2007_22H	S16	PVT	RW	Immediately	%	0	0~3276.7	Not
	Parameter Name： Zero-speed current gain attenuation/amplification %							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P07.35 735 0x2007_23H	S16	PVT	RW	Immediately	-	0	0~3	Not
	Parameter Name：Inertia learning option Description：Select the option of inertia self-learning 1、After the 0-inertia learning is completed, the speed and position loop gain are not automatically matched 2、After the inertia learning is completed, a set of gains is matched according to the rigidity grade P07.28							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.38 738 0x2007_26H	S16	PVT	RW	Immediately	%	100	0~3000	Not
	Parameter Name：Percentage of vibration detection threshold							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.39 739 0x2007_27H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：Vibration detection value							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.44 744 0x2007_2CH	S16	PVT	RW	Immediately	HZ	0	0~4000	Not
	Parameter Name：Notch filter 3 frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P07.45 745 0x2007_2DH	S16	PVT	RW	Immediately	%	10	0~100	Not
	Parameter Name： Notch 3 depth Description： The smaller it is, the more severe the notch is.0 -100.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.46 746 0x2007_2EH	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name： The width of the notch filter 3 Description： Notch width, as a percentage relative to the center frequency.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.47 747 0x2007_2FH	S16	PVT	RW	Immediately	HZ	0	0~4000	Not
	Parameter Name： Notch filter 4 frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.48 748 0x2007_30H	S16	PVT	RW	Immediately	%	10	0~100	Not
	Parameter Name： Notch 4 depth Description： The smaller it is, the more severe the notch is.0 -100.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.49 749 0x2007_31H	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name： The width of the notch filter is 4 Description： Notch width, as a percentage relative to the center frequency.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.50 750 0x2007_32H	S16	PVT	RW	Immediately	-	0	0~5	Not
	Parameter Name：Torque compensation Mode Description：Select the torque compensation Mode 0- Compensate for a fixed value P07.53 1- Automatic compensation (Emphasizing stability, adjusting P07.43, P07.54, P07.51, P07.52) 2- Automatic Compensation (Emphasizing response, adjusting P07.43 to P07.54) 3- Retained 4- Retained 5- Automatic Recognition 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.43 743 0x2007_2BH	S16	PVT	RW	Immediately	-	100	10~1000	Not
	Parameter Name：Torque compensation gain 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.51 751 0x2007_33H	S16	PVT	RW	Immediately	ms	0	-1000~1000	Not
	Parameter Name：Torque compensation and frequency compensation Description：The higher the frequency, the smaller the filtering.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.52 752 0x2007_34H	S16	PVT	RW	Immediately	HZ	100	1~1000	Not
	Parameter Name：Torque compensation and inertia compensation							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.53 753 0x2007_35H	S16	PVT	RW	Immediately	HZ	100	-32767~32767	Not
	Parameter Name： Torque compensation fixed value							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.54 754 0x2007_36H	S16	PVT	RW	Immediately	%	100	0~300	Not
	Parameter Name： Torque compensation percentage							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.55 755 0x2007_37H	S16	PVT	RW	Immediately	HZ	0	0~1000	Not
	Parameter Name： Low-frequency suppression of notch filter frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.56 756 0x2007_38H	S16	PVT	RW	Immediately	%	0	0~100	Not
	Parameter Name： Low-frequency suppression notch depth Description： The smaller it is, the more severe the notch is.0 -100.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.57 757 0x2007_39H	S16	PVT	RW	Immediately	%	50	0~100	Not

	Parameter Name：The width of the low-frequency suppression notch filter Description：Notch width, as a percentage relative to the center frequency.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.58 758 0x2007_3AH	S16	PVT	RW	Immediately	HZ	0	0~1000	Not
	Parameter Name：Position command notch filter frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.59 759 0x2007_3BH	S16	PVT	RW	Immediately	%	0	0~100	Not
	Parameter Name：Position command notch depth Description：The smaller it is, the more severe the notch is.0 -100.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.60 760 0x2007_3CH	S16	PVT	RW	Immediately	%	50	0~100	Not
	Parameter Name：Position command notch width Description：Notch width, as a percentage relative to the center frequency.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.61 761 0x2007_3DH	S16	PVT	RW	enable	-	0	0~9999	Not
	Parameter Name：Advanced control function selection Description：AAA.B format. Ordinary feedforward control when AAA=0; Single-inertia model prediction when AAA=1; Dual-inertia model prediction when AAA=2 When AAA=3, the single-inertia model prediction (Not model prediction position filtering), when AAA=4, the dual-inertia model prediction (Not model prediction position filtering), when B=0, the continuous vibration suppression function is Not effective, and when B=1, the continuous vibration suppression function is effective.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.62 762 0x2007_3EH	S16	PVT	RW	Immediately	-	50	1~2000	Not
	Parameter Name： The model prediction gain ranges from 1.0 to 2000.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.63 763 0x2007_3FH	S16	PVT	RW	Immediately	-	100	50~200	Not
	Parameter Name： Model prediction compensation: 50.0-200.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.64 764 0x2007_40H	S16	PVT	RW	Immediately	-	100	0~1000	Not
	Parameter Name： The model predicts positive gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.65 765 0x2007_41H	S16	PVT	RW	Immediately	-	100	0~1000	Password Protected-Disability /Not
	Parameter Name： The model predicts reverse gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.66 766	S16	PVT	RW	Immediatel	HZ	50	1~250	Not

0x2007_42H				y				
	Parameter Name： The model predicts the suppression frequency to be 1.10 -250.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.67 767 0x2007_43H	S16	PVT	RW	Immediately	HZ	70	1~250	Not
	Parameter Name： The model predicts the suppression frequency to be 2.10 -250.0 .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.68 768 0x2007_44H	S16	PVT	RW	Immediately	rpm	100	0~1000	Not
	Parameter Name： The model predicts the feedforward velocity							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.69 769 0x2007_45H	S16	PVT	RW	Immediately	-	50	0~2000	Not
	Parameter Name： The model predicts 2 gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.70 770 0x2007_46H	S16	PVT	RW	Immediately	-	100	50~200	Not
	Parameter Name： Model prediction 2 compensation							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P07.71 771 0x2007_47H	S16	PVT	RW	Immediatel y	HZ	100	1~200	Not
	Parameter Name： Continuous vibration suppression frequency							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P07.72 772 0x2007_48H	S16	PVT	RW	Immediatel y	-	100	1~1000	Not
	Parameter Name： Continuous vibration suppression inertia compensation							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P07.73 773 0x2007_49H	S16	PVT	RW	Immediatel y	%	0	0~300	Not
	Parameter Name： Continuous vibration suppression velocity feedback compensation percentage							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P07.74 774 0x2007_4AH	S16	PVT	RW	Immediatel y	-	0	-100~100	Not
	Parameter Name： Continuous vibration suppression, low-pass filtering, time constant compensation							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P07.75 775 0x2007_4BH	S16	PVT	RW	Immediatel y	-	0	-100~100	Not
	Parameter Name： Continuous vibration suppression high-pass filter time constant compensation							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.76 776 0x2007_4CH	S16	PVT	RW	Immediately	%	0	0~1000	Not
	Parameter Name：Continuous vibration suppression velocity feedback compensation percentage 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.77 777 0x2007_4DH	U16	PVT	RW	Immediately	HZ	2000	1~5000	Not
	Parameter Name：Continuous vibration suppresses high-order vibration frequencies							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.78 778 0x2007_4EH	S16	PVT	RW	Immediately	-	2.1	0~99	Not
	Parameter Name：No adjustment of parameters Description：A.B format. A refers to the rigidity grade, which is set within the range of 0 to 7, usually below 4. B refers to the inertia class, set to Range0 to 7, usually around 4.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.81 781 0x2007_51H	S16	PVT	RW	Immediately	0.2pu	0	0~32767	Not
	Parameter Name：CSPMode acceleration compensation Description：CSPMode acceleration compensation compensates 0.2pu at 50rpm/ms.							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P07.90 790 0x2007_5AH	S16	PVT	R	Immediately	-	306	-	Not
	Parameter Name： The actual proportional gain of the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.91 791 0x2007_5BH	S16	PVT	R	Immediately	-	26	-	Not
	Parameter Name： The actual speed loop integral gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.92 792 0x2007_5CH	S16	PVT	R	Immediately	-	149	-	Not
	Parameter Name： The actual position loop proportional gain							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.93 793 0x2007_5DH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The final calculated value of torque compensation							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P07.97 797 0x2007_61H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The final calculated value of torque feedforward							

P08 Group Parameters - Communication parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.16 816 0x2008_10H	S16	T	RW	Immediately	-	0	-3276.7~3276.7	Not
	Parameter Name： Torque communication is given							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.17 817 0x2008_11H	S16	V	RW	Immediately	-	0	-32767~32767	Not
	Parameter Name： Speed communication given							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.18 818 0x2008_12H	S32	P	RW	Immediately	-	0	-2147483647~2147483647	Not
	Parameter Name： Location communication given							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.26 826 0x2008_1AH	S16	PVT	RW	Immediately	-	2	0~2	Not
	Parameter Name： Monitor the baud rate of the monitoring port Description： 0- 9600 1-38400 2- 115200							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P08.29 829 0x2008_1DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Does the RS232 monitoring port send curves or text Description： 0-The sending curve can be monitored by VECOBSERVER 1- Send the text							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.34 834 0x2008_22H	U16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Multifunctional parameters Description：BIT0 Position instruction filtering P0306 and P0307 in enableCSPMode. BIT1 enableCSV acceleration and deceleration time.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.41 841 0x2008_29H	S16	PVT	RW	Reset	-	0	1~127	Not
	Parameter Name：Slave node number Description：For EtherCAT bus servo, if the value X of the slave node number is greater than 0 and less than 255, the servo will automatically change its device name to vc1pnX when it starts up, where X is the set value of this parameter, and set the IPAddress to 192.168.0.X. Set the subnet mask to 255.255.0.0 and the gateway to 192.168.0.X .							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.42 842 0x2008_2AH	S16	PVT	RW	Immediately	-	0	0~32767	Not
	Parameter Name：Custom protocol Settings Description：For the ECAT servo, when P08.42=0, the BIT9-BIT0 of the 0x60fd object is directly mapped to the valid state of the DI10-DI1 terminal. When P08.42=2, BIT0 is the effective state of the negative limit switch. BIT1 is the effective state of the forward limit switch; BIT2 is the valid state of the origin switch; BIT3-BIT12 is mapped to the valid states of DI1 to DI10. The valid state of the 16-bit Z-point; BIT17 is the effective state of probe 0. The effective status of BIT 18-bit probe 1. For the PN bus servo, this parameter consists of 5 bits a, B, c, D, and E.							

	When DE=01, the custom IO variable setting value in the 111 message is mapped to P13.95. When DE=03, the custom IO variable setting value in the 111 message is mapped to MOMRED. When BC=01, The response value of the custom IO variable in the 111 message is mapped to the percentage of the motor's rated current. When DE=02, the response value of the custom IO variable in the 111 message is mapped to the percentage of the motor's rated torque.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.44 844 0x2008_2CH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：SDO byte order Description： 0- Standard SDO byte order 1- Standard SDO byte order reverse							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.55 855 0x2008_37H	S32	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name：External insertion speed							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.57 857 0x2008_39H	S32	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name：Interpolation speed							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.59 859 0x2008_3BH	S32	PVT	R	Immediately	rpm	0	-	Not

	Parameter Name：Speed after filtering

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.61 861 0x2008_3DH	S32	PVT	R	Immediately	-	0	-	Not
	Parameter Name：External insertion position							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.63 863 0x2008_3FH	S32	PVT	R	Immediately	-	0	-	Not
	Parameter Name：Interpolation position							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.65 865 0x2008_41H	S32	PVT	R	Immediately	-	0	-	Not
	Parameter Name：External insertion error							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.67 867 0x2008_43H	S32	PVT	R	Immediately	-	0	-	Not
	Parameter Name：Interpolation error							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P08.69 869 0x2008_45H	S32	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： Control error							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.71 871 0x2008_47H	S32	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： True error							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.73 873 0x2008_49H	S16	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： Predicted position error							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.74 874 0x2008_4AH	U16	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： The status word of the CIA402 protocol							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.75 875 0x2008_4BH	U16	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： ECAT PDI JITTER 3.5us							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.76 876 0x2008_4CH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：ECAT BIT STATE							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.77 877 0x2008_4DH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：CANopen control word monitoring							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.79 879 0x2008_4FH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：ECAT DEBUG OR PN STW2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.81 881 0x2008_51H	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：Bus output event count							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.82	U16	PVT	R	Immed	-	0	-	Not

882 0x2008_52H				iatel y				
	Parameter Name： PORT0 physical layer error count							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.83 883 0x2008_53H	U16	PVT	R	Immed iatel y	-	0	-	Not
	Parameter Name： Synchronous event counting							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P08.84 884 0x2008_54H	U16	PVT	R	Immed iatel y	3.555us	0	-	Not
	Parameter Name： The time output to synchronization Unit:3.555us							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P08.85 885 0x2008_55H	U16	PVT	R	Immed iatel y	-	0	-	Not
	Parameter Name： PORT1 physical layer error count							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P08.86 886 0x2008_56H	U16	PVT	R	Immed iatel y	3.555us	0	-	Not
	Parameter Name： The time of synchronization to synchronization Unit:3.555us							

Address	Type	Mode	Visit	Take	Unit	Default	Range	Other

				effect				
P08.87 887 0x2008_57H	U16	PVT	R	Immediately	3.555us	0	-	Not
	Parameter Name： The time from output to output Unit:3.555us							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.88 888 0x2008_58H	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PORT0 forwarding error							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.89 889 0x2008_59H	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： A position difference of 0 counts							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.90 890 0x2008_5AH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： Frame processing error							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.91 891 0x2008_5BH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PORT0 lost connection error							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.92 892 0x2008_5CH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PORT1 forwarding error count							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.93 893 0x2008_5DH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PDI error							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P08.94 894 0x2008_5EH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PORT1 lost connection error							

P09 Group Parameters - Advanced Debugging parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.01 901 0x2009_1H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 1							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P09.02 902 0x2009_2H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.03 903 0x2009_3H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.04 904 0x2009_4H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.05 905 0x2009_5H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 5							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.06 906 0x2009_6H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 6							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.07	S16	PVT	RW	Immed	Custo	0	-32768~327	Not

907 0x2009_7H				iatel y	m		67	
	Parameter Name： Debugging parameters 7							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.08 908 0x2009_8H	S16	PVT	RW	Immediately	Custom	0	-32768~32767	Not
	Parameter Name： Debugging parameters 8							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.09 909 0x2009_9H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： Real-time speed monitoring Description： The rotational speed value for speed feedback, Unit:rpm							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.10 910 0x2009_AH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： UD output monitoring							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.11 911 0x2009_BH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： UQ output monitoring							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.12 912	S16	PVT	R	Immediatel	-	0	-	Not

0x2009_CH				y				
	Parameter Name： A compares the value of the register							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.13 913 0x2009_DH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： B compares the value of the register							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.14 914 0x2009_EH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： C compares the value of the register							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.16 916 0x2009_10H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： Z-point count							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.19 919 0x2009_13H	S16	PVT	R	Immediately	-	685	-	Not
	Parameter Name： The electrical Angle value Q10							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.20 920 0x2009_14H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Given velocity loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.21 921 0x2009_15H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Speed loop feedback							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.22 922 0x2009_16H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Forward limiting of the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.23 923 0x2009_17H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Reverse limiting of the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.24 924 0x2009_18H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The output value of the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.25 925 0x2009_19H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The D-axis current loop is given							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P09.26 926 0x2009_1AH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： D-axis current loop feedback							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.27 927 0x2009_1BH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Forward limiting of the D-axis current loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.28 928 0x2009_1CH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Reverse limiting of the D-axis current loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.29 929 0x2009_1DH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： D-axis current loop output							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.30 930 0x2009_1EH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Torque current given (Q-axis)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P09.31 931 0x2009_1FH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Torque-current feedback (Q-axis)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.32 932 0x2009_20H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Forward limiting of the Q-axis current loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.33 933 0x2009_21H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Reverse limiting of the Q-axis current loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.34 934 0x2009_22H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Q-axis current loop output							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.39 939 0x2009_27H	S32	PVT	R	Immediately	-	96180	-	Not
	Parameter Name： Original phase							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.41 941	S16	PVT	R	Immediately	%	0	-	Not

0x2009_29H				y				
	Parameter Name： Brake resistor PWM duty cycle							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.45 945 0x2009_2DH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： 0.1% before Q-axis current filtering							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.47 947 0x2009_2FH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： Hardware self-check fault code							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.48 948 0x2009_30H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The current loop control start time/the current sampling error value when the ECAT servo is statically enabled							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.49 949 0x2009_31H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The speed loop controls the start time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.59 959 0x2009_3BH	S16	PVT	RW	Immediately	-	0	1~32767	Not

	Parameter Name：Amplitude of the sine wave generator

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.60 960 0x2009_3CH	S16	PVT	RW	Immediately	HZ	0	1~32767	Not
	Parameter Name：Sine wave generator frequency							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.62 962 0x2009_3EH	S16	PVT	RW	Immediately	-	0	-32767~32767	Not
	Parameter Name：Bits that need to be monitored							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.63 963 0x2009_3FH	U16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：The value of the bit that needs to be monitored							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.64 964 0x2009_40H	S16	PVT	RW	Immediately	-	0	0~1024	Not
	Parameter Name：Compensation for the Z-point bias constant							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.75 975 0x2009_4BH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：The number of interruptions in the speed loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.76 976 0x2009_4CH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The number of interrupts of the current loop							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.77 977 0x2009_4DH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： PWMCNT							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.85 985 0x2009_55H	S16	PVT	R	Immediately	us	0	-	Not
	Parameter Name： Execution period of the speed loop (us)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.86 986 0x2009_56H	S16	PVT	R	Immediately	us	0	-	Not
	Parameter Name： Execution time of the speed loop(us)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.87 987 0x2009_57H	S16	PVT	R	Immediately	us	0	-	Not
	Parameter Name： Current loop execution cycle(us)							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P09.88 988 0x2009_58H	S16	PVT	R	Immediately	us	0	-	Not
	Parameter Name： Current loop execution time(us)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.89 989 0x2009_59H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： The speed is given in position mode							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.90 990 0x2009_5AH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： Position error in position mode							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.91 991 0x2009_5BH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Percentage of heat from brake resistance							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.93 993 0x2009_5DH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： 1ms Task execution cycle							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P09.94	S16	PVT	R	Immed	-	0	-	Not

994 0x2009_5EH				iatel y				
	Parameter Name： UD Feedforward voltage							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P09.95 995 0x2009_5FH	S16	PVT	R	Immed iatel y	-	0	-	Not
	Parameter Name： UQ Feedforward voltage							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P09.96 996 0x2009_60H	S16	PVT	R	Immed iatel y	-	0	-	Not
	Parameter Name： Absolute value encoder communication error							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P09.97 997 0x2009_61H	S16	PVT	RW	Immed iatel y	-	0	-32767~ 32767	Not
	Parameter Name： Enable current loop speed loop bandwidth test							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P09.98 998 0x2009_62H	S16	PVT	R	Immed iatel y	-	0	-	Not
	Parameter Name： Absolute value encoder communication error 2							

P10 Group parameters - Fault protection parameters

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P10.01	S16	PVT	RW	Reset	%	350	0~350	Not

1001 0x2010_1H	Parameter Name：Overcurrent threshold Description：If the percentage of the driver torque current is greater than the overcurrent threshold or the percentage of the single-phase current is greater than the overcurrent threshold, report software overcurrent,ResetTake effect.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.02 1002 0x2010_2H	S16	PVT	RW	Immediately	%	83.3	0~200	Not
	Parameter Name：Overload value Description：Normally, this value is set as the percentage of the motor's rated current P00.01 divided by the driver's rated current P01.03. The larger this value is, the more difficult it is to report overload, and the higher the requirement for the overload capacity of the motor. ImmediatelyTake effect. When the BIT4 of P10.07 is 1, P10.39 is used for overload protection; otherwise, P10.02 is used for overload protection.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.39 1039 0x2010_27H	S16	PVT	RW	Reset	%	100	1~300	Not
	Parameter Name：Motor overload coefficient Description：It is generally set to 100%, and the overload value is automatically set internally as the percentage of the motor overload factor P10.39 multiplied by the motor rated current P00.01 divided by the driver rated current P01.03. The larger this value is, the more difficult it is to report overload, and the higher the requirement for the overload capacity of the motor. Power on Take effect. When the BIT4 of P10.07 is 1, P10.39 is used for overload protection; otherwise, P10.02 is used for overload protection.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.03 1003 0x2010_3H	S16	PVT	RW	Immediately	%	200	0~800	Not
	Parameter Name：Locked-rotor protection current threshold Description：When the driver current percentage exceeds this value and persists for P10.04 for a period of time, and the rotational speed is less than 5rpm, a locked rotor fault is reported.							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P10.04 1004 0x2010_4H	U16	PVT	RW	Immediatel y	ms	2000	0~65535	Not
	Parameter Name： The threshold of locked rotor protection time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.05 1005 0x2010_5H	S16	PVT	RW	Immediatel y	%	240	0~3276.7	Not
	Parameter Name： Percentage of passing speed Description： When the percentage of the actual motor speed (rpm) divided by the rated motor speed (rpm) is greater than the overspeed percentage, an overspeed fault of the motor is reported.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.06 1006 0x2010_6H	S16	PVT	RW	Immediatel y	℃	80	0~3276.7	Not
	Parameter Name： Driver overheating threshold							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.07 1007 0x2010_7H	S16	PVT	RW	Immediatel y	-	16	0~32767	Not
	Parameter Name： Protection-related Settings Description： Select the phase loss protection setting BIT0 reserved BIT1 =1 enables RST phase loss protection BIT2 enable single-axis incoming line drop protection BIT3 enable master site disconnection protection When BIT4 =0enable, the old overload mode and the motor rated current setting Not turn off =1, use 1039 motor overload coefficient BIT5 =1 enables the disconnection brake function When BIT6 =1, the torque command is based on the motor's rated value							

	BIT7 =1 software disables STO protection. If an STO unit is installed, the STO server must be hardware-disabled for it to function BIT8 reserved When BIT9 =0, the absolute point position is prohibited before returning to zero; otherwise, a fault will be reported. When BIT9 =1, the absolute point position before returning to zero is allowed BIT10 =0enablePWM WATCHDOC BIT11 reserved BIT12 reserved BIT13 reserved BIT14 reserved

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.08 1008 0x2010_8H	S16	PVT	RW	Immediately	s	0	0~32767	Not
	Parameter Name：The timeout time for returning to the origin Description：Set to 0 and do not perform return-to-zero timeout protection.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.10 1010 0x2010_AH	S16	PVT	RW	Immediately	mv	500	0~32767	Not
	Parameter Name：AI zero-drift threshold Description：When the zero drift value of AIx is greater than the zero drift threshold of AI, it reports that the AI zero drift is too large.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.11 1011 0x2010_BH	S16	PVT	RW	Reset	-	0	0~5	Not
	Parameter Name：Overload curve selection Description：Overload curve selection: From 0 to 4, select the internal overload curve. When set to 5, select the Custom overload curve.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P10.12 1012 0x2010_CH	S16	PVT	RW	Immediately	-	0	0~100	Not
	Parameter Name：The zero-speed command automatically reduces the torque limit value Description：The zero-speed command automatically reduces the torque limit value (%)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.13 1013 0x2010_DH	S16	PVT	RW	Reset	s	0	0~3276.7	Not
	Parameter Name：Custom 1.1 times overload curve time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.14 1014 0x2010_EH	S16	PVT	RW	Reset	s	0	0~3276.7	Not
	Parameter Name：Custom 1.5 times overload curve time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.15 1015 0x2010_FH	S16	PVT	RW	Reset	s	0	0~3276.7	Not
	Parameter Name：Custom 2.0 times overload curve time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.16 1016 0x2010_10H	S16	PVT	RW	Reset	s	0	0~3276.7	Not
	Parameter Name：Custom 2.5 times overload curve time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.17 1017 0x2010_11H	S16	PVT	RW	Reset	s	0	0~3276.7	Not
	Parameter Name：Custom 3.0 times overload curve time							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P10.18 1018 0x2010_12H	S16	PVT	RW	Reset	-	0	0~32767	Not
	Parameter Name：Flying car monitoring threshold Description：When set to non-zero, enable runaway protection. The smaller the value, the more sensitive it is; the larger the value, the less sensitive it is. The setting range is from 0 to 10,000, and it is generally set to 100.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.20 1020 0x2010_14H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：The current fault code							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.21 1021 0x2010_15H	S16	PVT	RW	Immediately	-	0	1~5	Not
	Parameter Name：The number of selected fault codes Description：The number of selected fault codes, choose P10.22-P10.31 to display the fault information of the most recent fault, which can only be set to 1 to 5. ImmediatelyTake effect.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.22 1022 0x2010_16H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name：Selected number of fault codes							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.23 1023 0x2010_17H	U16	PVT	R	Immediately	min	0	-	Not

	Parameter Name：The selected fault time point

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.24 1024 0x2010_18H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name：Motor speed at selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.25 1025 0x2010_19H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name：The effective value of the motor current at the selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.26 1026 0x2010_1AH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name：The V-phase current of the motor at the selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.27 1027 0x2010_1BH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name：The W phase current of the motor at the selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P10.28 1028 0x2010_1CH	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The bus voltage at the time of the selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.29 1029 0x2010_1DH	S16	PVT	R	Immediately	℃	0	-	Not
	Parameter Name： The temperature of the electric driver at the selected fault time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.30 1030 0x2010_1EH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DI status of the entity at the time of the selected fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.31 1031 0x2010_1FH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The selected entity is in the DO state at the time of the fault							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.33 1033 0x2010_21H	U16	PVT	RW	Immediately	-	44	0~65535	Not
	Parameter Name： Fault shielding Description： BIT0 shield overload Er206							

	BIT1 blocks software overcurrent Er100 BIT2 reserved BIT3 reserved BIT4 reserved BIT5 shielded continuous vibration fault Er234 BIT6 blocks the instability of point Z Er216 BIT7 block SYNC lost BIT8 shielded current sensor fault Er104 BIT9 shields under-voltage Er103 BIT10 shielded encoder fault Er105 BIT11 shielded PN bus disconnection fault Er702 BIT12 shielding blockage fault Er209 BIT13 shielding HALL cannot locate the fault Er118 The BIT14 shielded motor parameters cannot be found for fault Er610 and the driver parameters cannot be found for fault Er609

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.34 1034 0x2010_22H	U16	PVT	RW	Reset	20ns	150	0~65535	Not
	Parameter Name：Hardware failure time threshold Description：The threshold for the number of hardware failures, Unit, is 20ns. When the duration of a single hardware failure exceeds this value, Er.101 is reported. When the overcurrent protection for the inverter unit is set, the extraction rate is 8 when set to 100, 16 when set to 200, 32 when set to 300, and 64 when set to 400.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.35 1035 0x2010_23H	S16	PVT	RW	Immediately	s	60	3~32767	Not
	Parameter Name：The Reset fault will be responded to only after the minimum duration of the fault Description：The Reset fault will only be responded to after the minimum duration of the fault, Unit seconds. When reporting software overcurrent, hardware overcurrent, driver overheating, motor overload, locked rotor, or overload of the braking resistor, the Reset fault must wait for P10.35 seconds.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P10.36 1036 0x2010_24H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The accompanying fault code of the current fault code is 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.37 1037 0x2010_25H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The accompanying fault code of the current fault code is 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.38 1038 0x2010_26H	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The accompanying fault code of the current fault code is 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.44 1044 0x2010_2CH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The speed loop is given at the most recent valid failure							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.45 1045 0x2010_2DH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Speed loop feedback during the most recent valid failure							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.46 1046 0x2010_2EH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： The torque setting at the most recent valid failure							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.47 1047 0x2010_2FH	S16	PVT	R	Immediately	%	0	-	Not
	Parameter Name： Torque feedback during the most recent effective failure							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.48 1048 0x2010_30H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The position error after filtering during the most recent valid failure							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.49 1049 0x2010_31H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： Current record index Description： For the current record index, each time a valid fault is reported, the record index increases once. When it reaches 5, it is reset to zero, and a fault record is made simultaneously.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.50 1050	S16	PVT	R	Immediatel	-	0	-	Not

0x2010_32H				y				
	Parameter Name： The fault code of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.51 1051 0x2010_33H	U16	PVT	R	Immediately	s	0	-	Not
	Parameter Name： The fault time of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.52 1052 0x2010_34H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： The rotational speed of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.53 1053 0x2010_35H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The effective value of the fault current with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.54 1054 0x2010_36H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the V-phase current of the fault with index 0							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P10.55 1055 0x2010_37H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the W-phase current of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.56 1056 0x2010_38H	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The voltage of the faulty capacitor with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.57 1057 0x2010_39H	S16	PVT	R	Immediately	℃	0	-	Not
	Parameter Name： The temperature of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.58 1058 0x2010_3AH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DI status of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.59 1059 0x2010_3BH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DO status of the fault with index 0							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.60 1060 0x2010_3CH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The fault code of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.61 1061 0x2010_3DH	U16	PVT	R	Immediately	s	0	-	Not
	Parameter Name： The fault time of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.62 1062 0x2010_3EH	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： The rotational speed of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.63 1063 0x2010_3FH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The effective current value of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.64 1064	S16	PVT	R	Immediatel	A	0	-	Not

0x2010_40H				y				
	Parameter Name： The instantaneous value of the V-phase current of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.65 1065 0x2010_41H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the W-phase current of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.66 1066 0x2010_42H	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The capacitor voltage of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.67 1067 0x2010_43H	S16	PVT	R	Immediately	℃	0	-	Not
	Parameter Name： The temperature of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.68 1068 0x2010_44H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DI status of the fault with index 1							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P10.69 1069 0x2010_45H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DO status of the fault with index 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.70 1070 0x2010_46H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The fault code of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.71 1071 0x2010_47H	U16	PVT	R	Immediately	s	0	-	Not
	Parameter Name： The fault time of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.72 1072 0x2010_48H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： The rotational speed of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.73 1073 0x2010_49H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The effective current value of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.74 1074 0x2010_4AH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the V-phase current of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.75 1075 0x2010_4BH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the W-phase current of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.76 1076 0x2010_4CH	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The voltage of the faulty capacitor with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.77 1077 0x2010_4DH	S16	PVT	R	Immediately	℃	0	-	Not
	Parameter Name： The temperature of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.78 1078	S16	PVT	R	Immediatel	-	0	-	Not

0x2010_4EH				y				
	Parameter Name： The DI status of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.79 1079 0x2010_4FH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DO status of the fault with index 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.80 1080 0x2010_50H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The fault code of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.81 1081 0x2010_51H	U16	PVT	R	Immediately	s	0	-	Not
	Parameter Name： The fault time of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.82 1082 0x2010_52H	S16	PVT	R	Immediately	rpm	0	-	Not
	Parameter Name： The rotational speed of the fault with index 3							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P10.83 1083 0x2010_53H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The effective current value of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.84 1084 0x2010_54H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the V-phase current of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.85 1085 0x2010_55H	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the W-phase current of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.86 1086 0x2010_56H	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The capacitor voltage of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.87 1087 0x2010_57H	S16	PVT	R	Immediately	℃	0	-	Not
	Parameter Name： The temperature of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.88 1088 0x2010_58H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DI status of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.89 1089 0x2010_59H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The DO status of the fault with index 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.90 1090 0x2010_5AH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The fault code of the fault with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.91 1091 0x2010_5BH	U16	PVT	R	Immediately	s	0	-	Not
	Parameter Name： The fault time of the fault with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.92 1092	S16	PVT	R	Immediatel	rpm	0	-	Not

0x2010_5CH				y				
	Parameter Name： The rotational speed of the fault with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.93 1093 0x2010_5DH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The effective value of the fault current with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.94 1094 0x2010_5EH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the V-phase current of the fault with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.95 1095 0x2010_5FH	S16	PVT	R	Immediately	A	0	-	Not
	Parameter Name： The instantaneous value of the W-phase current of the fault with index 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P10.96 1096 0x2010_60H	S16	PVT	R	Immediately	V	0	-	Not
	Parameter Name： The voltage of the faulty capacitor with index 4							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P10.97 1097 0x2010_61H	S16	PVT	R	Immediatel y	℃	0	-	Not
	Parameter Name： The temperature of the fault with index 4							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P10.98 1098 0x2010_62H	S16	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： The DI status of the fault with index 4							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P10.99 1099 0x2010_63H	S16	PVT	R	Immediatel y	-	0	-	Not
	Parameter Name： The DO status of the fault with index 4							

P11 Group Parameters - Multi-Speed Parameters

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P11.01 1101 0x2011_1H	S16	V	RW	enabl e	-	0	0~2	Not
	Parameter Name： Multi-speed operation Mode Description： 0- Single operation shutdown 1- Loop operation 2-IO switching operation							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P11.02	S16	V	RW	Immed	-	16	1~16	Not

1102 0x2011_2H				iatel y				
	Parameter Name： Total number of segments							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.03 1103 0x2011_3H	S16	V	RW	Immediately	-	1	0~1	Not
	Parameter Name： Running time Unit Description： 0- ms 1- s							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.04 1104 0x2011_4H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Acceleration time 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.05 1105 0x2011_5H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Deceleration time 1							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.06 1106 0x2011_6H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Acceleration time 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.07 1107 0x2011_7H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Deceleration time 2							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.08 1108 0x2011_8H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Acceleration time 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.09 1109 0x2011_9H	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Deceleration time 3							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.10 1110 0x2011_AH	U16	V	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Acceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.11 1111	U16	V	RW	Immediatel	ms	500	0~65535	Not

0x2011_BH				y				
	Parameter Name： Deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.12 1112 0x2011_CH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 1 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.13 1113 0x2011_DH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 1 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.14 1114 0x2011_EH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 1: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.15 1115 0x2011_FH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not

	Parameter Name：The size of the speed command in the 2 section

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.16 1116 0x2011_10H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 2 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.17 1117 0x2011_11H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 2: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.18 1118 0x2011_12H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：The size of the speed command in the 3 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.19 1119 0x2011_13H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 3 speed running time							

	Description：The Unit of this parameter is set on P11.03.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.20 1120 0x2011_14H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 3: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.21 1121 0x2011_15H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：The size of the speed command in the 4 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.22 1122 0x2011_16H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 4 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.23 1123 0x2011_17H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 4: Selection of acceleration and deceleration times for speed Description：							

	0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.24 1124 0x2011_18H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 5 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.25 1125 0x2011_19H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 5 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.26 1126 0x2011_1AH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 5: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.27	S16	V	RW	Immed	rpm	0	-32767~327	Not

1127 0x2011_1BH				iatel y			67	
	Parameter Name： The size of the speed command in the 6 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.28 1128 0x2011_1CH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 6 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.29 1129 0x2011_1DH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 6: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.30 1130 0x2011_1EH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 7 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.31 1131	S16	V	RW	Immediatel	-	10	0~32767	Not

0x2011_1FH				y				
	Parameter Name： The 7 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.32 1132 0x2011_20H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 7: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.33 1133 0x2011_21H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：The size of the speed command in the 8 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.34 1134 0x2011_22H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 8 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.35 1135 0x2011_23H	S16	V	RW	Immediately	-	0	0~4	Not

	Parameter Name：Section 8: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.36 1136 0x2011_24H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name：The size of the speed command in the 9 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.37 1137 0x2011_25H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 9 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.38 1138 0x2011_26H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 9: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P11.39 1139 0x2011_27H	S16	V	RW	Immediatel y	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 10 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.40 1140 0x2011_28H	S16	V	RW	Immediatel y	-	10	0~32767	Not
	Parameter Name： The 10 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.41 1141 0x2011_29H	S16	V	RW	Immediatel y	-	0	0~4	Not
	Parameter Name：Section 10: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.42 1142 0x2011_2AH	S16	V	RW	Immediatel y	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 11 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P11.43 1143 0x2011_2BH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 11 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.44 1144 0x2011_2CH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 11: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.45 1145 0x2011_2DH	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 12 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.46 1146 0x2011_2EH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 12 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.47	S16	V	RW	Immed	-	0	0~4	Not

1147 0x2011_2FH				iatel y				
	Parameter Name：Section 12: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P11.48 1148 0x2011_30H	S16	V	RW	Immed iatel y	rpm	0	-32767~327 67	Not
	Parameter Name：The size of the speed command in the 13 section							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P11.49 1149 0x2011_31H	S16	V	RW	Immed iatel y	-	10	0~32767	Not
	Parameter Name： The 13 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P11.50 1150 0x2011_32H	S16	V	RW	Immed iatel y	-	0	0~4	Not
	Parameter Name：Section 13: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.51 1151 0x2011_33H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 14 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.52 1152 0x2011_34H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 14 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.53 1153 0x2011_35H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 14: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.54 1154 0x2011_36H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 15 section							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P11.55 1155 0x2011_37H	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 15 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.56 1156 0x2011_38H	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 15: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.57 1157 0x2011_39H	S16	V	RW	Immediately	rpm	0	-32767~32767	Not
	Parameter Name： The size of the speed command in the 16 section							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P11.58 1158 0x2011_3AH	S16	V	RW	Immediately	-	10	0~32767	Not
	Parameter Name： The 16 speed running time Description：The Unit of this parameter is set on P11.03.							

Address	Type	Mode	Visit	Take effec	Unit	Defau lt	Range	Other

				t				
P11.59 1159 0x2011_3BH	S16	V	RW	Immediately	-	0	0~4	Not
	Parameter Name：Section 16: Selection of acceleration and deceleration times for speed Description： 0- Use the universal speed Mode for acceleration and deceleration time 1- Use acceleration and deceleration time 1 2- Use acceleration and deceleration time 2 3- Use acceleration and deceleration time 3 4- Use acceleration and deceleration time 4							

P12 Group parameters - Virtual DI DO parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.01 1201 0x2012_1H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI1 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.02 1202 0x2012_2H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI2 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.03 1203 0x2012_3H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI3 function configuration							

	Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.04 1204 0x2012_4H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI4 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.05 1205 0x2012_5H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI5 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.06 1206 0x2012_6H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI6 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.07 1207 0x2012_7H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI7 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.08 1208 0x2012_8H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI8 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.09 1209 0x2012_9H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI9 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.10 1210 0x2012_AH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI10 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.11 1211 0x2012_BH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI11 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P12.12 1212 0x2012_CH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI12 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.13 1213 0x2012_DH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI13 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.14 1214 0x2012_EH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI14 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.15 1215 0x2012_FH	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name：Virtual DI15 function configuration Description：The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P12.16 1216 0x2012_10H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name： Virtual DI16 function configuration Description： The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.17 1217 0x2012_11H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name： Virtual DI20 function configuration Description： The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.18 1218 0x2012_12H	S16	PVT	RW	Immediately	-	0	0~599	Not
	Parameter Name： Virtual DI21 function configuration Description： The specific functions of the VDI port are the same as those of the DI port. For details, please refer to P06.01.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.19 1219 0x2012_13H	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The monitoring values of virtual DI20 and virtual DI21							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.20 1220 0x2012_14H	U16	PVT	RW	Immediately	-	0	0~65535	Not
	Parameter Name： Virtual DI1-DI16 input value setting registers							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.21 1221 0x2012_15H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI1 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.22 1222 0x2012_16H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI2 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.23 1223 0x2012_17H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI3 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.24 1224 0x2012_18H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI4 level Type Description：							

	0-Write to 1 is always valid 1-The rising edge is valid

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.25 1225 0x2012_19H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI5 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.26 1226 0x2012_1AH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI6 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.27 1227 0x2012_1BH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI7 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.28 1228 0x2012_1CH	S16	PVT	RW	Immediately	-	0	0~1	Not

	Parameter Name：Virtual DI8 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.29 1229 0x2012_1DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI9 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.30 1230 0x2012_1EH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI10 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.31 1231 0x2012_1FH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI11 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.32	S16	PVT	RW	Immed	-	0	0~1	Not

1232 0x2012_20H				iatel y				
	Parameter Name：Virtual DI12 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P12.33 1233 0x2012_21H	S16	PVT	RW	Immed iatel y	-	0	0~1	Not
	Parameter Name：Virtual DI13 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P12.34 1234 0x2012_22H	S16	PVT	RW	Immed iatel y	-	0	0~1	Not
	Parameter Name：Virtual DI14 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P12.35 1235 0x2012_23H	S16	PVT	RW	Immed iatel y	-	0	0~1	Not
	Parameter Name：Virtual DI15 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effec	Unit	Defau lt	Range	Other

				t				
P12.36 1236 0x2012_24H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI16 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.37 1237 0x2012_25H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI20 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.38 1238 0x2012_26H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：Virtual DI21 level Type Description： 0-Write to 1 is always valid 1-The rising edge is valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.41 1241 0x2012_29H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO1 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P12.42 1242 0x2012_2AH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO2 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.43 1243 0x2012_2BH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO3 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.44 1244 0x2012_2CH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO4 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.45 1245 0x2012_2DH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO5 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P12.46 1246 0x2012_2EH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO6 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.47 1247 0x2012_2FH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO7 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.48 1248 0x2012_30H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO8 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.49 1249 0x2012_31H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO9 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.50 1250	S16	PVT	RW	Immediately	-	0	0~99	Not

0x2012_32H				y				
	Parameter Name：Virtual DO10 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.51 1251 0x2012_33H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO11 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.52 1252 0x2012_34H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO12 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.53 1253 0x2012_35H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO13 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.54 1254 0x2012_36H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO14 configuration register							

	Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.55 1255 0x2012_37H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO15 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.56 1256 0x2012_38H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO16 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.57 1257 0x2012_39H	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO20 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.58 1258 0x2012_3AH	S16	PVT	RW	Immediately	-	0	0~99	Not
	Parameter Name：Virtual DO21 configuration register Description：The function of the VDO port is the same as that of the DO port. For specific functions, please refer to P06.41.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.59 1259 0x2012_3BH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The output levels of virtual DO20 and DO21							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.60 1260 0x2012_3CH	S16	PVT	R	Immediately	-	0	-	Not
	Parameter Name： The output levels of virtual DO1-DO16							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.61 1261 0x2012_3DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name： The effective level of virtual DO1 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.62 1262 0x2012_3EH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name： The effective level of virtual DO2 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P12.63 1263 0x2012_3FH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO3 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.64 1264 0x2012_40H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO4 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.65 1265 0x2012_41H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO5 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.66 1266 0x2012_42H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO6 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.67 1267 0x2012_43H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO7 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.68 1268 0x2012_44H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO8 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.69 1269 0x2012_45H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO9 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.70 1270 0x2012_46H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO10 Description： 0-Output 1 when valid							

	1-Output 0 when valid

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.71 1271 0x2012_47H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO11 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.72 1272 0x2012_48H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO12 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.73 1273 0x2012_49H	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO13 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.74 1274 0x2012_4AH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name：The effective level of virtual DO14							

	Description: 0-Output 1 when valid 1-Output 0 when valid

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.75 1275 0x2012_4BH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO15 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.76 1276 0x2012_4CH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO16 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.77 1277 0x2012_4DH	S16	PVT	RW	Immediately	-	0	0~1	Not
	Parameter Name: The effective level of virtual DO20 Description: 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.78 1278	S16	PVT	RW	Immediatel	-	0	0~1	Not

0x2012_4EH				y				
	Parameter Name： The effective level of virtual DO21 Description： 0-Output 1 when valid 1-Output 0 when valid							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P12.79 1279 0x2012_4FH	S16	PVT	RW	Reset	-	1	0~1	Not
	Parameter Name： Whether the virtual DI1-DI16 input value register P12.20 is reset to zero upon power-on Description： The virtual DI input value P12.20 is not reset to zero upon power-on The virtual DI input value P12.20 is reset to zero upon power-on							

P13 Group Parameters - Multi-segment position parameters

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.01 1301 0x2013_1H	S16	P	RW	enable	-	0	0~2	Not
	Parameter Name： Multi-segment position Mode Description：When DI switching is running, the values of (INFn.31, INFn.30, INFn.29, INFn.28) are read and run as segment numbers. 0- Single operation shutdown 1- Loop operation 2-DI switching operation							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.02 1302 0x2013_2H	S16	P	RW	Immediately	-	16	1~16	Not
	Parameter Name： Total number of segments							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.03	S16	P	RW	Immed	-	1	0~1	Not

1303 0x2013_3H				iatel y				
	Parameter Name：Idle waiting time Unit Description： 0- ms 1- s							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.04 1304 0x2013_4H	S16	P	RW	Immediately	-	0	0~1	Not
	Parameter Name：Margin handling method Description： 0- Start over 1- Start from the part where it stopped last time							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.05 1305 0x2013_5H	S16	P	RW	Immediately	-	1	0~3	Not
	Parameter Name：Absolute or relative position Mode Description： 0- Absolute position command 1- Relative position instruction 2- Depends on INFn40 3- Depends on P1396							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.10 1310 0x2013_AH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name：The 1-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other

P13.12 1312 0x2013_CH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 1 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.13 1313 0x2013_DH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： The first acceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.90 1390 0x2013_5AH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： The first section of deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.14 1314 0x2013_EH	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 1 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.15 1315 0x2013_FH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 2-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.17	S16	P	RW	Immed	rpm	500	0~32767	Not

1317 0x2013_11H				iatel y				
	Parameter Name：Section 2 Running speed(rpm)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.18 1318 0x2013_12H	U16	P	RW	Immed iatel y	ms	500	0~65535	Not
	Parameter Name： The second acceleration time(ms)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.91 1391 0x2013_5BH	U16	P	RW	Immed iatel y	ms	500	0~65535	Not
	Parameter Name： The second section of deceleration time							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.19 1319 0x2013_13H	S16	P	RW	Immed iatel y	-	1	0~32767	Not
	Parameter Name： 2 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P13.20 1320 0x2013_14H	S32	P	RW	Immed iatel y	UserU nit	10000	-214748364 7~21474836 47	Not
	Parameter Name： The 3-segment position instruction							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.22 1322	S16	P	RW	Immed iatel	rpm	500	0~32767	Not

0x2013_16H				y				
	Parameter Name： Section 3 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.23 1323 0x2013_17H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 3: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.24 1324 0x2013_18H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 3 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.25 1325 0x2013_19H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 4-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.27 1327 0x2013_1BH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 4 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.28 1328 0x2013_1CH	U16	P	RW	Immediately	ms	500	0~65535	Not

	Parameter Name：Paragraph 4: Acceleration and deceleration time(ms)

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.29 1329 0x2013_1DH	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name：4 paragraph's idle time Description：The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.30 1330 0x2013_1EH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name：The 5-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.32 1332 0x2013_20H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：Section 5 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.33 1333 0x2013_21H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Paragraph 5: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.34 1334 0x2013_22H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name：5 paragraph's idle time							

	Description：The Unit of this parameter is set on P13.03.

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.35 1335 0x2013_23H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 6-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.37 1337 0x2013_25H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 6 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.38 1338 0x2013_26H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 6: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.39 1339 0x2013_27H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 6 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.40 1340 0x2013_28H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 7-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.42 1342 0x2013_2AH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 7 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.43 1343 0x2013_2BH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 7: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.44 1344 0x2013_2CH	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 7 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.45 1345 0x2013_2DH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 8-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.47 1347 0x2013_2FH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 8 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.48 1348 0x2013_30H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 8: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.49 1349 0x2013_31H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 8 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.50 1350 0x2013_32H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 9-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.52 1352 0x2013_34H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 9 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.53 1353 0x2013_35H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 9: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take	Unit	Defau	Range	Other

				effect		lt		
P13.54 1354 0x2013_36H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name：9 paragraph's idle time Description：The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.55 1355 0x2013_37H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name：The 10-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.57 1357 0x2013_39H	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name：Section 10 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.58 1358 0x2013_3AH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name：Paragraph 10: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.59 1359 0x2013_3BH	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name：10 paragraph's idle time Description：The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take	Unit	Default	Range	Other

				effect				
P13.60 1360 0x2013_3CH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 11-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.62 1362 0x2013_3EH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 11 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.63 1363 0x2013_3FH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 11: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.64 1364 0x2013_40H	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 11 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.65 1365 0x2013_41H	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 12-segment position instruction							

Address	Type	Mode	Visit	Take effec	Unit	Default	Range	Other

				t				
P13.67 1367 0x2013_43H	S16	P	RW	Immediatel y	rpm	500	0~32767	Not
	Parameter Name： Section 12 Running speed(rpm)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.68 1368 0x2013_44H	U16	P	RW	Immediatel y	ms	500	0~65535	Not
	Parameter Name： Paragraph 12: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.69 1369 0x2013_45H	S16	P	RW	Immediatel y	-	1	0~32767	Not
	Parameter Name： 12 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P13.70 1370 0x2013_46H	S32	P	RW	Immediatel y	UserU nit	10000	-2147483647~2147483647	Not
	Parameter Name： The 13-segment position instruction							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.72 1372 0x2013_48H	S16	P	RW	Immediatel y	rpm	500	0~32767	Not
	Parameter Name： Section 13 Running speed(rpm)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other

P13.73 1373 0x2013_49H	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 13: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.74 1374 0x2013_4AH	S16	P	RW	Immediately	-	1	0~32767	Not
	Parameter Name： 13 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.75 1375 0x2013_4BH	S32	P	RW	Immediately	UserUnit	10000	-2147483647~2147483647	Not
	Parameter Name： The 14-segment position instruction							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.77 1377 0x2013_4DH	S16	P	RW	Immediately	rpm	500	0~32767	Not
	Parameter Name： Section 14 Running speed(rpm)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.78 1378 0x2013_4EH	U16	P	RW	Immediately	ms	500	0~65535	Not
	Parameter Name： Paragraph 14: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.79	S16	P	RW	Immed	-	1	0~32767	Not

1379 0x2013_4FH				iatel y				
	Parameter Name： 14 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P13.80 1380 0x2013_50H	S32	P	RW	Immed iatel y	UserU nit	10000	-214748364 7~21474836 47	Not
	Parameter Name： The 15-segment position instruction							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.82 1382 0x2013_52H	S16	P	RW	Immed iatel y	rpm	500	0~32767	Not
	Parameter Name： Section 15 Running speed(rpm)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.83 1383 0x2013_53H	U16	P	RW	Immed iatel y	ms	500	0~65535	Not
	Parameter Name： Paragraph 15: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.84 1384 0x2013_54H	S16	P	RW	Immed iatel y	-	1	0~32767	Not
	Parameter Name： 15 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Default	Range	Other
P13.85	S32	P	RW	Immed	UserU	10000	-214748364	Not

1385 0x2013_55H				iatel y	nit		7~21474836 47	
	Parameter Name： The 16-segment position instruction							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.87 1387 0x2013_57H	S16	P	RW	Immed iatel y	rpm	500	0~32767	Not
	Parameter Name： Section 16 Running speed(rpm)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.88 1388 0x2013_58H	U16	P	RW	Immed iatel y	ms	500	0~65535	Not
	Parameter Name： Paragraph 16: Acceleration and deceleration time(ms)							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.89 1389 0x2013_59H	S16	P	RW	Immed iatel y	-	1	0~32767	Not
	Parameter Name： 16 paragraph's idle time Description： The Unit of this parameter is set on P13.03.							

Address	Type	Mode	Visit	Take effec t	Unit	Defau lt	Range	Other
P13.92 1392 0x2013_5CH	S16	P	RW	Immed iatel y	-	3	0~32767	Not
	Parameter Name： Multi-segment position trigger signal Type Description： When BIT0= 0, the rising edge of INFn27 triggers the multi-segment position, and the falling edge stops executing the multi-segment position. When BIT0=1, the rising edge triggers and does not stop. When BIT1 =0 and multiple positions come from DI, a change in DI automatically triggers multiple positions. When BIT1=1, if multiple positions come from DI, changes in DI do not							

	automatically trigger multiple positions. Only when INFn27 is re-triggered will position execution be triggered. BIT2 reserved BIT3 reserved BIT4 automatically triggers after a delay of P13.89ms following the completion of position instruction 1 BIT5 enables tension-controlled speed feedforward and simultaneously enables tension-controlled variable feedforward. P07.11 is the feedforward for the maximum roll diameter (generally smaller), and P1385 is the feedforward for the small roll diameter (generally larger). Versions V142 and above are effective BIT6 reserved BIT7 reserved BIT8 reserved BIT9 reserved BIT10 reserved BIT11 reserved BIT12 reserved BIT13 reserved BIT14 reserved

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.93 1393 0x2013_5DH	S16	P	RW	Immediately	-	1	0~1	Not
	Parameter Name：The condition for sending the latter instruction Description： 0- The next position instruction will only be sent after the previous positioning is completed and output, and the idle time will be delayed. 1-After the previous position instruction is sent, wait for the idle time to directly send the second position instruction.							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.94 1394 0x2013_5EH	S16	P	RW	Immediately	-	0	0~4	Not
	Parameter Name：The speed source of the first position instruction Description： 0- from P13.12 1- Derived from AI1							

	2- Derived from AI2 3- Derived from AI3 4- Derived from the pulse rate

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.95 1395 0x2013_5FH	S16	P	RW	Immediately	-	0	0~3000	Not
	Parameter Name：Dynamic attenuation coefficient of multi-segment position velocity command							

Address	Type	Mode	Visit	Take effect	Unit	Default	Range	Other
P13.96 1396 0x2013_60H	U16	P	RW	Immediately	-	0	0~65535	Not
	Parameter Name：Multi-segment position Mode refers to the relative or absolute position of each segment Description：BIT0-BIT15 controls the absolute or relative Mode from segment 1 to segment 16. 0 is absolute and 1 is relative.							