



RS Series Servo User Manual

Preface

Thank you for purchasing the RS series V4.0 servo drive!

RS series V4.0 servo drive is the fourth generation of general-purpose AC servo drive developed by SIMTACH. The power range of this series products is 0.05~3KW, and it supports RS485-based MODBUS communication protocol. It can be used for network operation of multiple drives. The drive also contains an internal PLC mode to facilitate customer customization

The RS series servo system is equipped with a standard 17~23-bit single-turn/multi-turn absolute encoder motor, and the frame below 80 adopts a full series of ultra-short high-density servo motors. It can achieve ultra-small installation dimension and high speed precise positioning.

The RS series servo system has the characteristics of fast positioning and good adaptability. The drive has three basic control modes (position control, speed control, torque control). In addition, more flexible application functions can be realized by using the drive "internal PLC programming" or "485 communication".

This manual is a comprehensive user manual for the RS series V4.0 servo drive. Please read this manual carefully to confirm the relevant information before the formal power-on connection. If you have any doubts about the functions and performance of the product, please consult our technical support.

As we are committed to the continuous improvement of servo drives, the information provided by the company is subject to change without prior notice.

Revision History

Date	Version	Description
2017.07	V1.0	Version 1 release
2018.05	V2.0	Version 2 release
2019.09	V2.1	Version 2 product updates
2020.10	V3.0	Version 3 product updates
2021.12	V3.1	<ol style="list-style-type: none">1、 Modify the parameter address error in the description of the control mode2、 New parameter function description3、 Modify other errors
2022.10	V3.2	<ol style="list-style-type: none">1、 Modify the technical specifications of the servo drive and motor2、 Modify the drive dimension error3、 Modify the wrong description of the accessory model4、 Modify the description of the braking resistor5、 Rearrange the chapters6、 Modify other errors
2023.08	V4.0	Version 4 release

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1. Safety Instructions

1.1. Safety Precautions

- ◆ Please disconnect the power supply for more than 5 minutes before removing or disassembling the drive, otherwise it may cause electric shock due to residual voltage.
- ◆ Please never touch the inside of the servo drive, otherwise it may cause electric shock.
- ◆ Please insulate the connection part of the power supply terminal, otherwise it may cause electric shock.
- ◆ The ground terminal of the servo drive must be grounded, otherwise it may cause electric shock.
- ◆ Please do not damage or pull on the cable, subject the cable to excessive force, put it under heavy objects or clamp it. Doing so may result in electric shock, which may cause the product to stop or burn out.
- ◆ Unless designated personnel, please do not set up, disassemble or repair, otherwise it may cause electric shock or injury.
- ◆ Please do not remove the cover, cables, connectors and optional accessories while the power is on, otherwise it may cause electric shock and damage the drive.
- ◆ Please follow the steps required by this manual for trial operation.
- ◆ If an operation error occurs while the servo motor is connected to the machine, it will not only cause damage to the machine, but also sometimes cause personal accidents.
- ◆ Please do not change the maximum speed value, except for special purposes. Inadvertent change may damage the machine or cause injury.
- ◆ 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, and the servo motor may become hot. Please do not touch it, otherwise it may cause burns. To prevent accidental contact with hands or parts (cables, etc.), please take safety precautions such as installing an enclosure.
- ◆ Please do not touch the rotating part of the servo motor while it is running, as this may result in injury.
- ◆ If the servo motor is installed on the supporting machine and starts to run, make sure that the servo motor can be stopped at any time, otherwise you may get injured.
- ◆ Please install a stop device on the machine side to ensure safety.
- ◆ The brake of the servo motor with brake is not a stopping device to ensure safety. If a stop device is not provided, it may cause injury.
- ◆ If power is restored after a momentary power failure occurs during operation, the machine may restart suddenly, so please do not approach the machine.
- ◆ Please take measures to ensure that personal safety will not be endangered when restarting, otherwise it may cause injury.
- ◆ Please do not modify the product in any way, otherwise it may cause injury or mechanical damage.

- ◆ Please install the servo drive, servo motor, and external braking resistor on non-combustible materials, otherwise it may cause a fire.
- ◆ Between the power supply and the main circuit power supply of the servo drive (single-phase L1, L2, three-phase L1, L2, L3), be sure to connect an electromagnetic contactor and a non-fuse circuit breaker. Otherwise, when the servo drive fails, the large current cannot be cut off, which may cause a fire.
- ◆ In the servo drive and servo motor, please do not mix oil, grease and other flammable foreign objects and screws, metal pieces and other conductive foreign objects, otherwise it may cause fire and other accidents.

1.2. Unpacking Inspection

Items	Description
Check whether the delivered products comply with you ordered.	The packaging box contains the products you ordered. Please confirm it by the nameplate model of the servo motor and servo drive.
Check whether the products are intact.	Please check the product surface to see if the product is damaged during transportation. If any omission or damage is found, please contact our company or your supplier as soon as possible.
Check whether the motor is rotating smoothly	It is normal to be able to turn gently by hand. Except for servo motors with brakes.

1.3. Packing list

No.	Products
1	RS servo drive * 1 (including one DB44 terminal kit + one main circuit terminal)
2	Servo motor * 1
3	Motor supporting power extension cable*1
4	Motor supporting encoder extension cable*1
5	Brake extension cable for brake motor * 1 (special for motor with brake)
6	Drive debugging software communication cable * 1 (optional)

2. Product Information

2.1. Drive Introduction

2.1.1. Drive Naming

RS 400 C

Symbol	Description
RS	AC servo drive
400	Drive output power: 100: 100W 200: 200W 400: 400W 750: 750W 1000: 1000W 1500: 1500W 3000: 3000W
C	Function code: None: Pulse + RS485 communication, standard E: EtherCAT communication C: Pulse

◆ Note: Model naming rules are only used to resolve model meanings.

2.1.2. Drive Specifications

1. Basic specifications

Model	RS100	RS200	RS400	RS750	RS1000	RS1500	RS3000
Rated power	100W	200W	400W	750W	1KW	1.5KW	3KW
Continuous current	3.0A	3.0A	3.0A	5.0A	7.0A	9.0A	12.0A
Maximum current	9.0A	9.0A	9.0A	15.0A	21.0A	27.0A	36.0A
Power supply	Single-phase 220VAC			Single-phase 220VAC			Single-phase/Three-phase 220VAC
Size code	Type A			Type B			Type C
Size	175*156*40			175*156*51			196*176*72

2. Electrical specifications

Item	Description
Control mode	IPM PWM control, SVPWM drive mode
Encoder type	Match 17~23Bit optical or magnetic encoder, support absolute encoder control
Pulse input specifications	5V differential pulse/2MHz; 24V single-ended pulse/200KHz
Analog input specifications	2 channels, -10V ~ +10V analog input channel Note: Only RS standard servo has analog interface
Universal input	9 channels, support 24V common anode or common cathode
Universal output	4 single-ended + 2 differential outputs, Single-ended: 50mA Differential: 200mA
Encoder output	ABZ 3 differential outputs (5V) + ABZ 3 single-ended outputs (5-24V) Note: Only RS standard servo has encoder frequency division output interface

2.2. Motor Introduction

2.2.1. Motor Naming

RSNA M 06 J 13 30 A - Z

①
②
③
④
⑤
⑥
⑦
⑧

① Serial name
A: Five pairs of poles, ultra-thin, silver

② Motor inertia code
S: Small inertia M: Medium inertia
H: Large inertia

③ Motor flange size
06:60mm 13:130mm

④ Encoder code
J : 17bit magnetic unicyclic absolute encoder
H : 23bit optical unicyclic absolute encoder
G : 17bit magnetic multiturn absolute encoder
L : 23bit optical multiturn absolute encoder

⑤ Motor rated torque
13:1.3 Nm 150: 15 Nm

⑥ Motor rated speed
30: 3000 rpm 15: 1500 rpm

⑦ Is there an oil seal
A: With oil seal inside
None: No oil seal inside

⑧ Brake code
Z: With brake

- ◆ Note: Model naming rules are only used for model meaning analysis. For specific optional models, please refer to the details page.

2.2.2.Motor Specifications

1. Basic specifications

Frame (mm)	Model	Power	Motor length (mm)	Motor length with brake (mm)
40	RSNA-M04J0130A	50W	61.5	93.5
	RSNA-M04J0330A	100W	81.5	110
60	RSNA-M06J0630A	200W	80	109
	RSNA-M06J1330A	400W	98	127
80	RSNA-M08J2430A	750W	107	144
	RSNA-M08J3230A	1000W	127	163
110	RS□-M11J4030A	1.2KW	189	294
	RS□-M11J5030A	1.5KW	204	264
	RS□-M11J6030A	1.8KW	219	294
130	RS□-M13J4025A	1.0KW	166	223
	RS□-M13J6025A	1.5KW	179	236
	RS□-M13J7725A	2.0KW	192	249
	RS□-M13J10025A	2.5KW	209	290
	RS□-M13J15015A	2.3KW	241	322
	RS□-M13J15025A	3.8KW	231	312

- ◆ Note: The encoder comes standard with 17-bit magnetic encoding, 23-bit optical encoding is optional, and multi-turn absolute value specifications are optional.

2. Electrical specifications

Item	Description
Rated voltage	220V
Encoder type	17bit magnetic encoder / 23bit optical encoder optional

2.2.3.Encoder Type

1. Encoder specifications

Encoder code	Description
J	17-bit single-turn magnetic absolute encoder
H	23-bit single-turn optical absolute encoder
G	17-bit multi-turn magnetic absolute encoder
L	23-bit multi-turn optical absolute encoder

2. Encoder performance instructions

- ◆ The encoder is the position counting device of the servo motor, and the feedback of the motor position and speed information provides the most important basis for the control of the drive. It is obvious that a high-resolution encoder can "cut" the movement of the motor in one revolution into smaller units, so a high-resolution encoder can provide higher precision information.
- ◆ The absolute encoder can feedback the absolute number of turns of the encoder, and can be connected to an external battery to keep the position information of the motor even after the drive is powered off. It is generally used in some occasions with high precision and precise positioning.
- ◆ Restricted by the encoder manufacturing process and servo drive acquisition capabilities, our company provides up to 23-bit photoelectric encoders with the highest resolution of 8388608. In actual use, because of the working conditions, we can choose a slightly lower resolution encoder to reduce the cost of the motor while ensuring a certain accuracy. Therefore, please choose the encoder specification of the servo motor reasonably according to your actual situation.

2.3. Braking Resistor Introduction

When the output torque of the motor and the rotation speed are in the opposite direction, it represents the energy transferred from the load end to the drive. This energy is fed back to the capacitor in the DC bus so that its voltage value rises. When it rises to a certain value, the capacitor cannot fully absorb the feedback energy, and a braking resistor is needed to dissipate it.

The braking resistor is connected to the P+ and Br ports. The drive has a braking resistor with a certain power. When the built-in resistor of the drive is not enough to absorb the braking energy consumption, the user can also connect an external braking resistor with a larger power. In this case, it is only necessary to replace the braking resistor built in the drive with a high-power braking resistor.

1. Regenerative resistor specifications

Drive model	RS100	RS400	RS750	RS1000	RS1500	RS3000
Rated power	100W	400W	750W	1KW	1.5KW	3KW
Continuous current	3.0A	3.0A	5.0A	7.0A	9.0A	12.0A
Maximum current	9.0A	9.0A	15.0A	21.0A	27.0A	36.0A
Built-in braking resistor resistance and power	-	-	50 Ω		50 Ω	
	-	-	75W		100W	
Allowable braking power	-	-	38W		50W	
Minimum resistance of external braking resistor	-	-	30 Ω		20 Ω	

2. Configuration reference of braking resistor

As mentioned in the above table, the braking energy of the drive returns to the DC bus first. When the feedback superimposed voltage exceeds the reference value set by the drive (that is, the maximum absorption capacity of the DC bus capacitor), the braking energy enters the braking resistor.

When the built-in braking resistor of the drive cannot meet the discharge requirements, it is necessary to replace the braking resistor with a larger specification. The power of the braking resistor needs to be greater than the power of the built-in braking resistor of the drive. The resistance of the braking resistor needs to meet certain requirements, and the minimum resistance should not be lower than the lower limit listed in the above table.

Generally speaking, the greater the load inertia and the shorter the acceleration and deceleration time, the greater the braking energy and the greater the braking resistor power required.

2.4. Accessories

2.4.1. Motor & Encoder Cables

1. Wiring matching table

(1) AMP plug type motor (Frame 40/60/80mm)

Cable type	Cable length		
	3 meters	5 meters	8 meters
Motor cable	SMS4-030A	SMS4-050A	SMS4-080A
Single-turn absolute encoder cable	SES4-030	SES4-050	SES4-080
Multi-turn absolute encoder cable	SES6-030	SES6-050	SES6-080
Brake cable	SBS2-030	SBS2-050	SBS2-080

(2) Aviation plug type motor (Frame 110/130mm)

Cable type	Cable length		
	3 meters	5 meters	8 meters
Motor cable	SMH4-030	SMH4-050	SMH4-080
Single-turn absolute encoder cable	SEH4-030	SEH4-050	SEH4-080
Multi-turn absolute encoder cable	SEH6-030	SEH6-050	SEH6-080

◆ Note: The standard length of the extension cable is 3 meters, if you need other sizes, please specify when ordering.

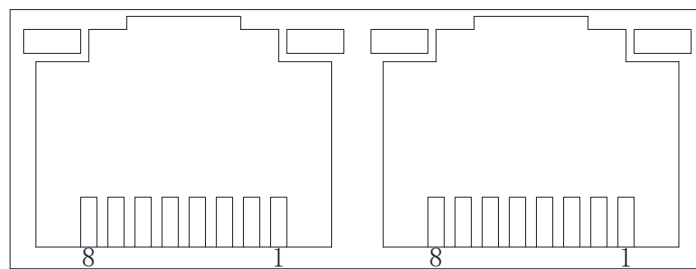
2. Motor wiring requirements

- ◆ The motor power cable needs to meet certain current carrying requirements, The motor with frame 40/60/80mm shall use the wire diameter specification of 0.5mm^2 or above, and the motor with frame 110/130mm shall use the wire diameter specification of 0.75mm^2 or above.
- ◆ The encoder cable of motor needs to meet the requirements of shielding isolation, standard configuration 0.14mm^2 wire diameter, twisted pair, shielded cable.
- ◆ For drag chains or similar use environments, please be sure to use flexible cables that meet the requirements to ensure the normal operation of the servo system.
- ◆ The cable installed in the drag chain needs to maintain a certain amount of space, and do not artificially increase the bending angle of the cable.

2.4.2. Mini-USB Debugging Cable

Please use Mini-USB cable with magnetic ring, please contact after-sales service or official website to download the driver.

2.4.3. RS485 Communication Cable



Signal		Pin	Function
Communication signal	RS485+	1	RS485 communication port
	RS485-	2	
	-	3	-
	-	4	-
	-	5	-
	-	6	-
	DGND	7	GND signal
	-	8	-

3. Installation

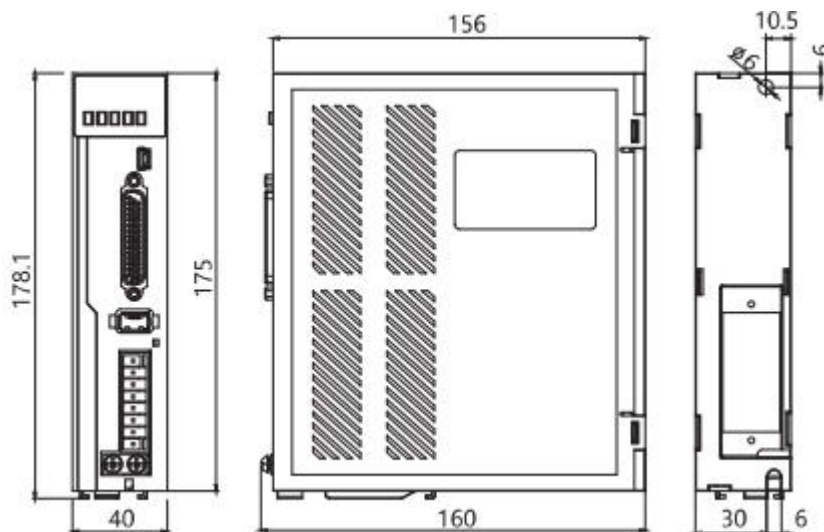
3.1. Servo Drive Installation

3.1.1. Drive Environment

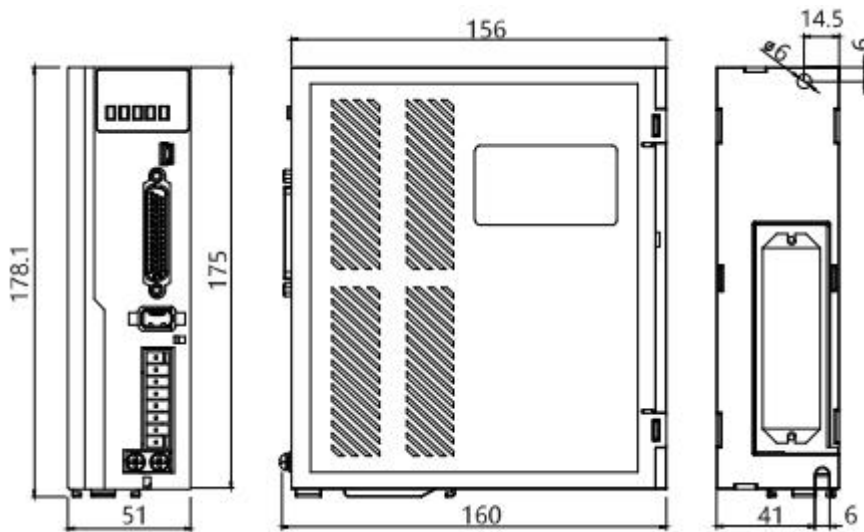
Item	Requirement
Ambient temperature	0~55° C (The average load rate should not exceed 80% when the ambient temperature is above 45° C)
Storage temperature	-20~85°C
Ambient/storage humidity	Below 90%RH (free from condensation)
Vibration	4.9m/s ²
Impact	19.6m/s ²
Protection class	IP10
Altitude	Less than 1000m

3.1.2. Dimension

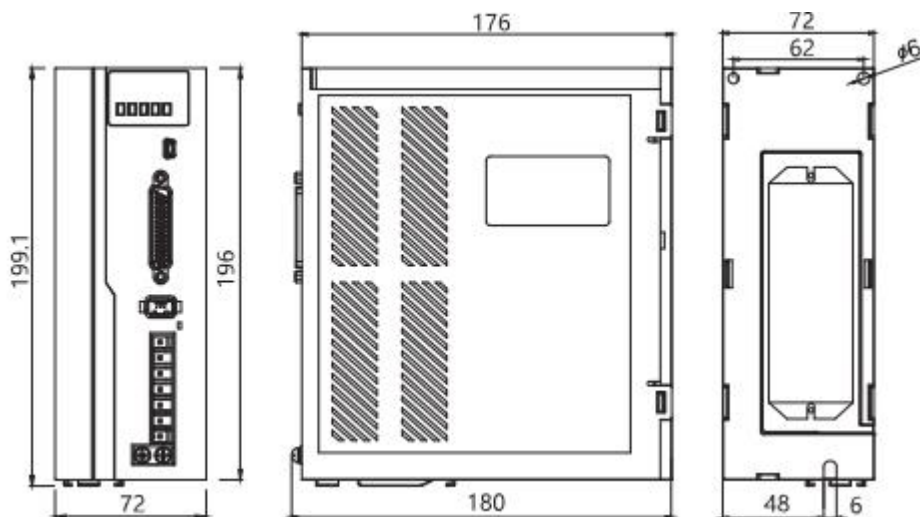
1. Size A: Below 400W



2. Size B: Below 2000W



3. Size C: Below 3000W



3.1.3. Installation Precaution

- ◆ Please install the drive in an electrical cabinet free from sunlight and rain.
- ◆ Do not place the drive in a corrosive or other harmful environment.
- ◆ Please ensure that the installation direction is perpendicular to the wall, and use natural air convection or a fan to cool the servo drive. Fix the servo drive firmly on the mounting surface through 2~4 mounting holes (the number of mounting holes varies according to the capacity). When installing, please face the front of the drive to the operator and make it perpendicular to the wall. Please pay attention to avoid drilling chips and other foreign matter from falling into the driver during installation, otherwise it may cause drive failure.
- ◆ When multiple drives are installed in the control cabinet, please note that sufficient space must be reserved for the placement position to achieve sufficient heat dissipation.

- ◆ Be sure to connect the ground terminal to the ground, otherwise there may be a risk of electric shock or interference resulting in malfunction.
- ◆ When there is a vibration source (punch) near the drive installation, if it is unavoidable, please use a vibration absorber or install an anti-vibration rubber gasket.
- ◆ When there are noise interference sources such as large magnetic switches and fusion splicers near the drive, it is easy to cause the drive to be interfered by the outside and cause malfunction. At this time, a noise filter needs to be installed, but the noise filter will increase the leakage current, therefore, it is necessary to install an insulating transformer on the input end of the drive.

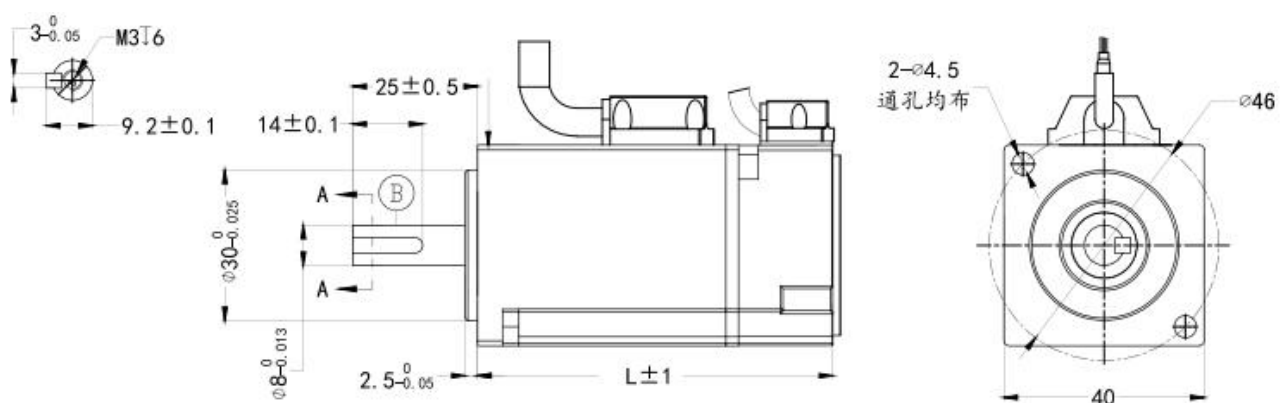
3.2. Servo Motor Installation

3.2.1. Motor Environment

Item	Requirement
Ambient temperature	0~40°C
Storage temperature	-20~60°C
Ambient/storage humidity	Below 90%RH (free from condensation)
Vibration	49m/s ²
Impact	196m/s ²
Protection class	IP65
Altitude	Below 1000m

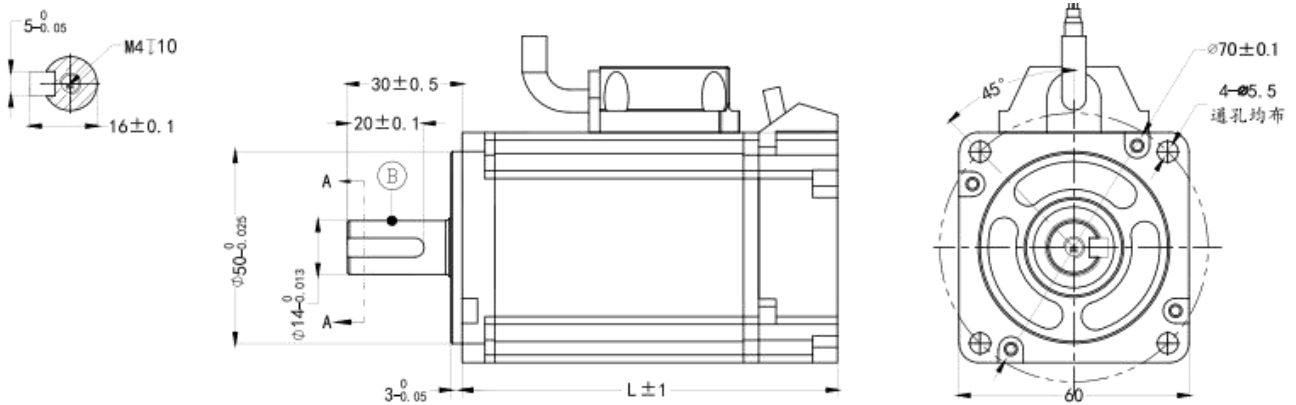
3.2.2. Dimension

1. Frame 40mm (AMP plug outlet*)



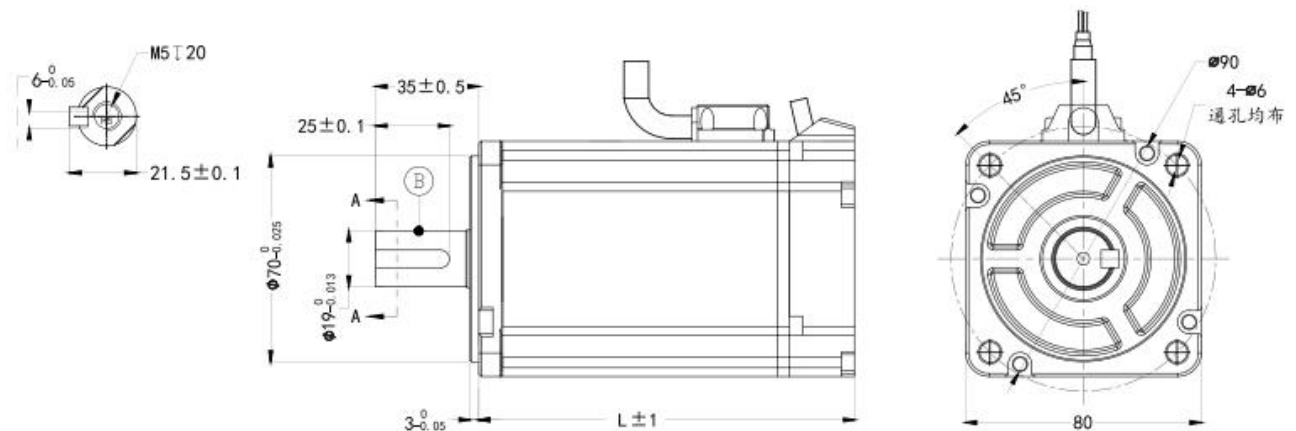
Description	Model	Length (mm)	Weight (Kg)
50W	RSNA-M04J0130A	61.5	0.35
100W	RSNA-M04J0330A	81.5	0.46
100W with brake	RSNA-M04J0330A-Z	110	0.66

2. Frame 60mm (AMP plug outlet*)



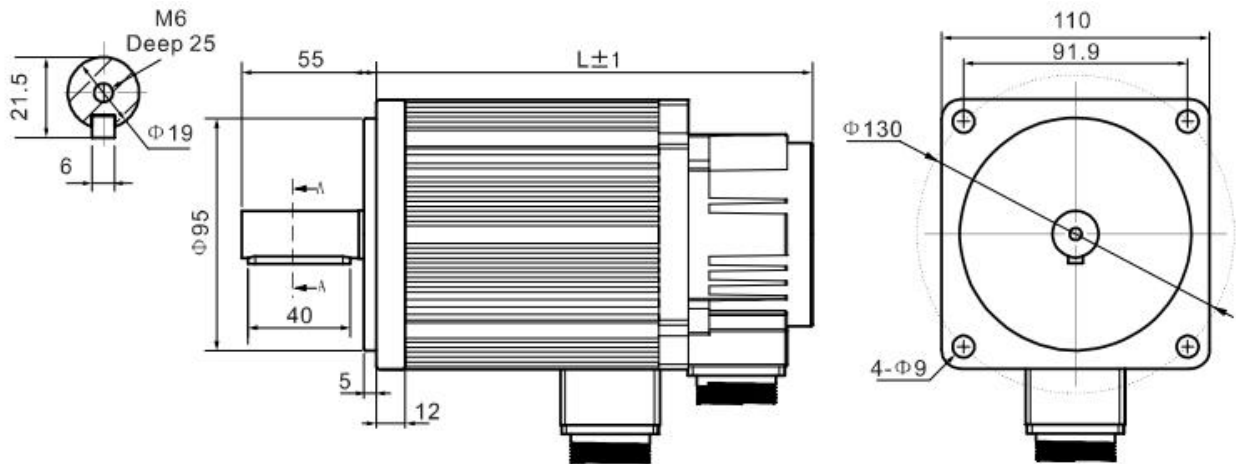
Description	Model	Length (mm)	Weight (Kg)
200W	RSNA-M06J0630A	80	0.84
400W	RSNA-M06J1330A	98	1.19
200W with brake	RSNA-M06J0630A-Z	109	1.21
400W with brake	RSNA-M06J1330A-Z	127	1.56

3. Frame 80mm (AMP plug outlet*)



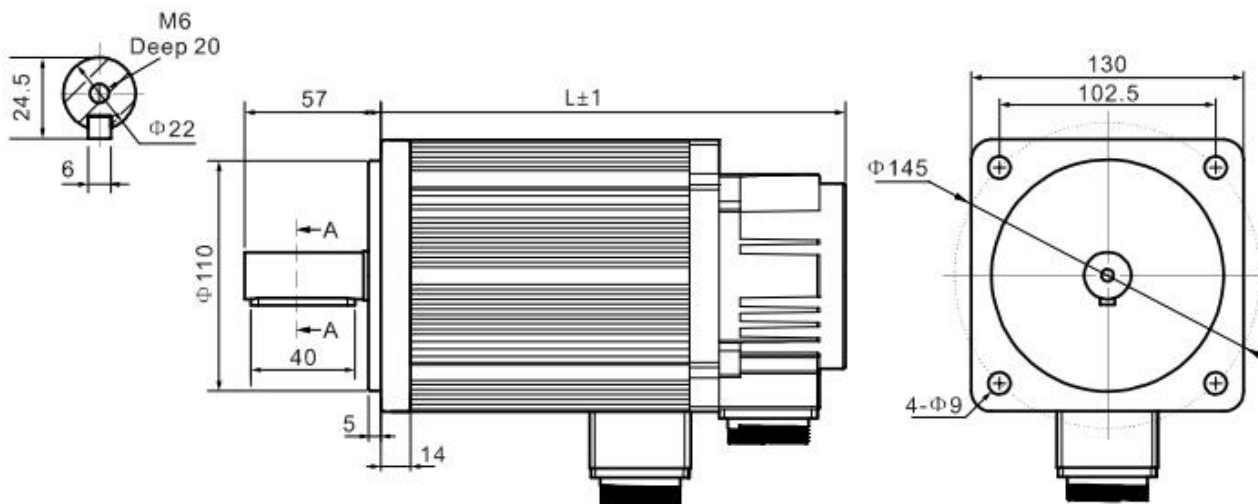
Description	Model	Length (mm)	Weight (Kg)
750W	RSNA-M08J2430A	107	2.27
1000W	RSNA-M08J3230A	127	2.95
750W with brake	RSNA-M08J2330A-Z	144	3.05
1000W with brake	RSNA-M08J3230A-Z	163	3.73

4. Frame 110mm (Aviation plug outlet*)



Description	Model	Length (mm)	Weight (Kg)
1.2KW	RS□-M11J4030A	189	6.0
1.5KW	RS□-M11J5030A	204	6.8
1.2KW	RS□-M11J6020A	219	7.9
1.8KW	RS□-M11J6030A	219	7.9
1.2KW with brake	RS□-M11J4030A-Z	294	6.5
1.5KW with brake	RS□-M11J5030A-Z	264	7.3
1.2KW with brake	RS□-M11J6020A-Z	279	8.4
1.8KW with brake	RS□-M11J6030A-Z	294	8.4

5. Frame 130mm (Aviation plug outlet*)



Description	Model	Length (mm)	Weight (Kg)
1.0KW	RS□-M13J4025A	166	6.2
1.5KW	RS□-M13J6025A	179	7.4
2.0KW	RS□-M13J7725A	192	8.3
2.6KW	RS□-M13J10025A	209	9.8
2.3KW	RS□-M13J15015A	241	12.6
3.8KW	RS□-M13J15025A	231	11.7
1.0KW with brake	RS□-M13J4025A-Z	223	7.8
1.5KW with brake	RS□-M13J6025A-Z	236	9.0
2.0KW with brake	RS□-M13J7725A-Z	249	9.9
2.6KW with brake	RS□-M13J10025A-Z	290	11.4
2.3KW with brake	RS□-M13J15015A-Z	322	14.2
3.8KW with brake	RS□-M13J15025A-Z	312	13.3

Remark:

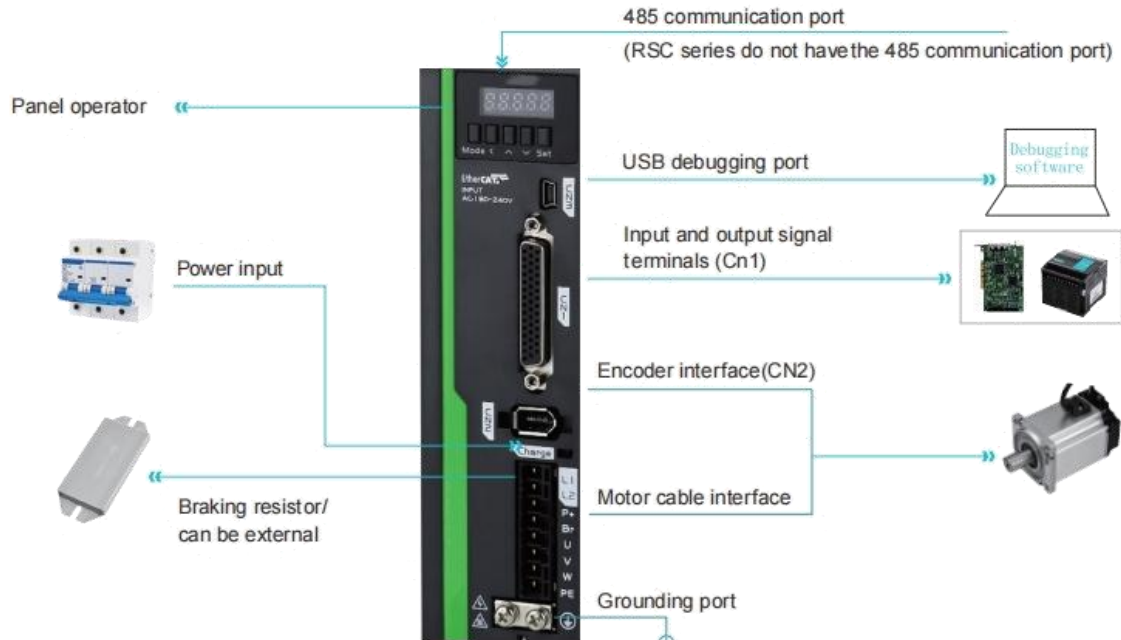
- ◆ The AMP plug outlet specification is "4 holes motor wire + 9 holes encoder wire + 2 holes brake wire".
- ◆ The aviation plug outlet specification is "4 holes motor wire + 7 holes encoder wire + 2 holes brake wire"

3.2.3.Installation Precaution

- ◆ Please ensure that the installation direction is perpendicular to the wall, and use natural air convection or a fan to cool the servo drive. By 2 ~ 4 mounting holes (the number of mounting holes varies according to the capacity), and the servo drive is firmly fixed on the mounting surface. When installing, please face the front of the drive to the operator and make it perpendicular to the wall. Please pay attention to avoid drilling chips and other foreign matter from falling into the drive during installation, otherwise it may cause drive failure.
- ◆ When multiple drivers are installed in the control cabinet, please note that sufficient space must be reserved for the placement position to achieve sufficient heat dissipation.
- ◆ Be sure to connect the ground terminal to the ground, otherwise there may be a risk of electric shock or interference resulting in malfunction.
- ◆ When there is a vibration source (punch) near the drive installation, if it is unavoidable, please use a vibration absorber or install an anti-vibration rubber gasket.
- ◆ When there are noise interference sources such as large magnetic switches and fusion splicers near the drive, it is easy to cause the drive to be interfered by the outside and cause malfunction. At this time, a noise filter needs to be installed, but the noise filter will increase the leakage current, therefore, it is necessary to install an insulating transformer on the input end of the drive.

4. Wiring

4.1. Drive Interface & Connection



4.2. Power Port

Pin	Definition	Detail
L1、L2、L3	Power supply input terminal	Servo driver power supply input terminal, single-phase 220VAC or three-phase 220VAC
P+、Br	Braking resistor terminal	Connect to energy consumption braking resistor
U、V、W、PE	Servo Motor connection terminal	Servo motor connection terminals, must be connected to the U, V, W, and PE terminals of the motor

Circuit wiring Precautions:

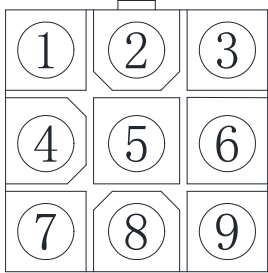
- ◆ Do not connect the input power cable to the output terminals U, V, W, otherwise the servo drive will be damaged.
- ◆ Do not pass the power cable and signal cable through the same pipe or bundle them together. To avoid interference, the distance between them should be more than 30cm.
- ◆ Do not turn on/off the power frequently. When you need 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 drive has a capacitor, when the power is turned on, a relatively large charging current will flow (charging time 0.2s). Frequent ON/OFF of the power supply will cause the performance of the main circuit components inside the servo drive to degrade.

- ◆ Please connect the servo drive to the ground reliably, and the PE wire should be as thick as possible to ensure that the grounding resistance is less than 100Ω.
- ◆ It is recommended that the power supply be supplied through a noise filter to improve the anti-interference ability.
- ◆ Please install a non-fuse type (NFB) circuit breaker so that the external power supply can be cut off in time when the drive error occurs.
- ◆ Do not power on and use the servo drive when the terminal screws or cables are loose, otherwise it may cause a fire.

4.3. Encoder Signal-CN2

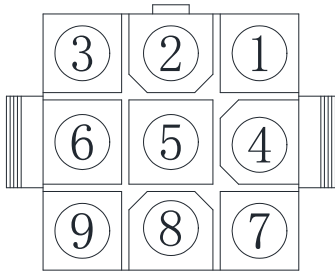
1. Servo motor encoder output terminal signal definition

In the face of the motor encoder outlet terminal, the terminal definition is shown in the following diagram:

Servo motor encoder outlet terminal diagram			
	Signal	Pin	Definition
	FG	1	Shield ground
	+5V	2	Power input: +5V
	GND	3	Power input: 0V
	SD+	4	Encoder bus signal
	SD-	5	
	E+	6	Encoder battery
E-	7		

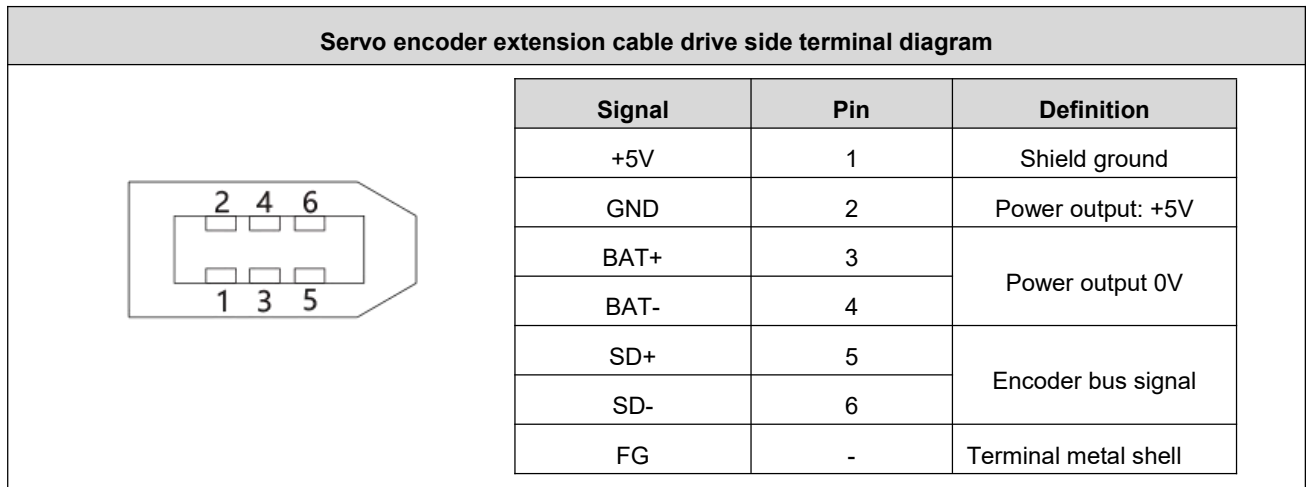
2. Servo encoder extension cable motor side terminal

In the face of the servo encoder extension cable motor side terminal, the terminal definition is shown in the following diagram:

Servo encoder extension cable motor side terminal diagram			
	Signal	Pin	Definition
	FG	1	Shield ground
	+5V	2	Power output: +5V
	GND	3	Power output 0V
	SD+	4	Encoder bus signal
	SD-	5	
	E+	6	Encoder battery
E-	7		

3. Servo encoder extension cable drive side terminal

The servo encoder extension cable drive side terminal is a welding pin, which is marked with a pin serial number, and the definition serial number of its terminal is shown in the following diagram:



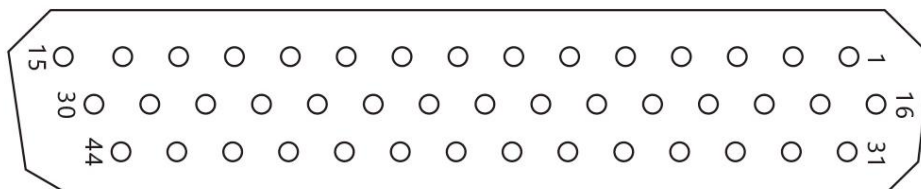
Remark:

- ◆ Please purchase the SE series cables or cables with the same specifications and above.
- ◆ The encoder cable should be as far away as possible from other high-current loops of the equipment to prevent interference.
- ◆ Do not place the encoder connector in the drag chain to prevent poor connection at the connector. The multi-turn absolute encoder wiring comes with two battery connectors. Please pay attention to the battery protection when purchasing.
- When cables are placed in the drag chain, attention should be paid to the distribution space to avoid excessive bending angles and the resulting reduction in cable life.

4.4. Control Signal-CN1

4.4.1. Pin Definition

CN1 is a 44-pin three-row DB connector, which is included with the drive when shipped. Please carefully confirm the pin definition and electrical specifications. The drive control signal terminal CN1 pin diagram is as follows:



Function	Signal	Pin	Definition	Default function	Description
External pulse interface	PUL+	3	Differential pulse positive	-	Differential input, 5V
	PUL-	4	Differential pulse negative		
	DIR+	5	Differential direction positive		
	DIR-	6	Differential direction negative		
	24VPUL+	16	24V pulse positive		24V+
	24VDIR+	17	24V direction positive		
Universal input interface	IN1(SV-ON)	2	Input 1	Servo enable	Below 24V, support common anode or common cathode. Note: Does not support the mixed use of NPN and PNP.
	IN2(POT)	7	Input 2	Positive limit	
	IN3(NOT)	8	Input 3	Negative limit	
	IN4(ALMRST)	9	Input 4	Alarm clear	
	IN5(PULStop)	10	Input 5	Pulse prohibited	
	IN6(Home)	11	Input 6	Origin input	
	IN7(ZEROStart)	12	Input 7	Start homing	
	IN8(EMESop)	13	Input 8	Emergency stop	
	IN9(GAIN)	14	Input 9	Gain switching	
INCOM	1	Input common	-		
Universal common cathode output interface	OUT1(SV-RDY)	32	Output 1	Servo ready	Below 24V, common cathode output, current does not exceed 50mA.
	OUT2(INP)	33	Output 2	Positioning completed	
	OUT3(ALM)	34	Output 3	Alarm output	
	OUT4(ZERODONE)	35	Output 4	Homing completed	
	OUTCOM-	31	Output common	-	
Universal differential output interface	DFOUT5+(BRK+)	18	Output 5 positive	Brake	Below 24V, differential output, current does not exceed 200mA
	DFOUT5-(BRK-)	19	Output 5 negative		
	DFOUT6+(PULO+)	20	Output 6 positive	Internal command stop	
	DFOUT6-(PULO-)	21	Output 6 negative		
Encoder output interface	DFEA+	23	Encoder A+	-	5V differential output
	DFEA-	24	Encoder A-		
	DFEB+	25	Encoder B+		
	DFEB-	26	Encoder B-		
	DFEZ+	27	Encoder Z+		
	DFEZ-	28	Encoder Z-		

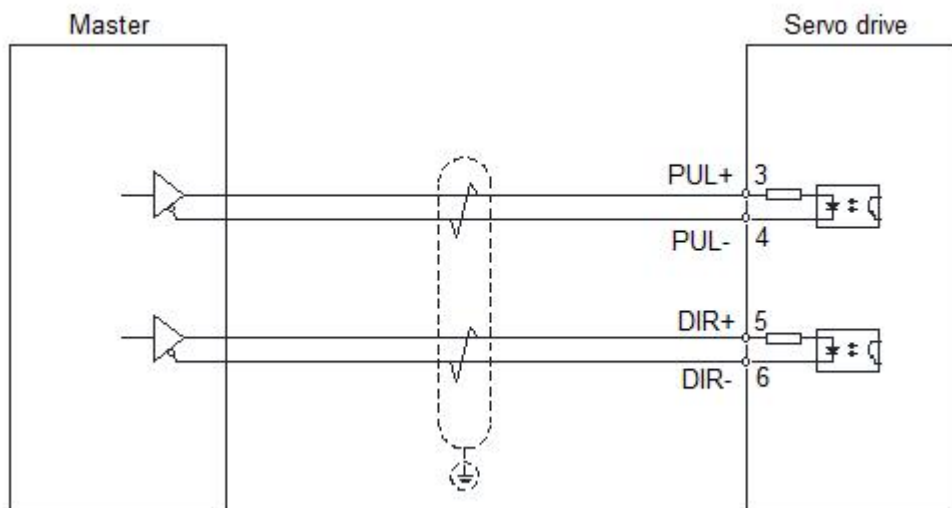
	EA	36	Single-ended EA	-	Collector output
	EB	37	Single-ended EB		
	EZ	29	Single-ended EZ		
	GND	30	Single-ended GND		
Analog input interface	AN1+	39	Analog channel 1+	-	-10V ~ +10V analog input
	AN1-	40	Analog channel 1-		
	AN2+	43	Analog channel 2+		
	AN2-	44	Analog channel 2-		
	AIGND	41	Analog channel GND		

4.4.2. Position Command Input Signal

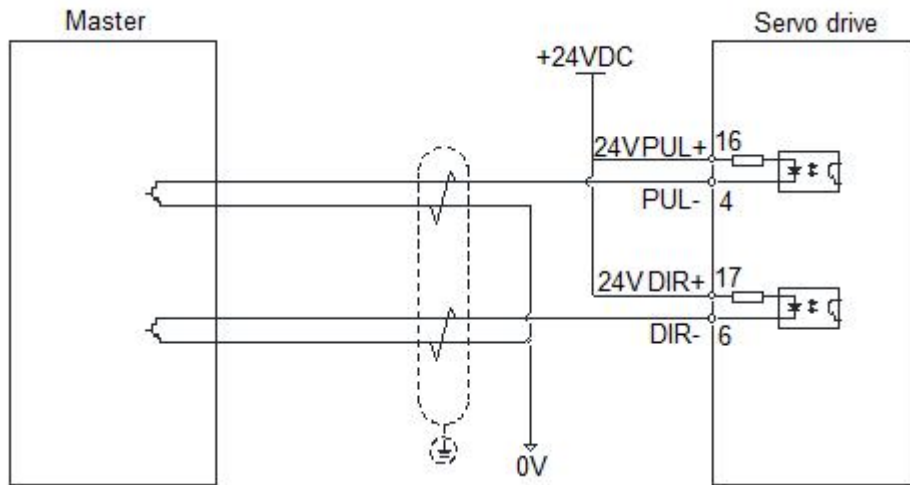
◆ Note: Only RS pulse type/RS485 type drive can be connected with pulse input signal.

Signal	Pin	Definition	Description
PUL+	3	Differential pulse positive	Differential input 5V
PUL-	4	Differential pulse negative	
DIR+	5	Differential direction positive	
DIR-	6	Differential direction negative	
24VPUL+	16	24V pulse positive	Single-ended input 24V+
24VDIR+	17	24V direction positive	

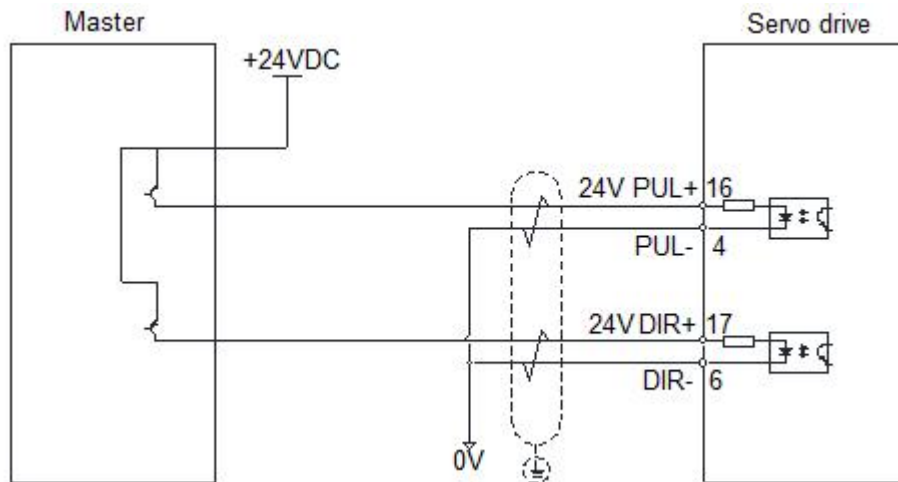
1. Differential pulse signal



2. Single-ended common anode signal



3. Single-ended common cathode signal

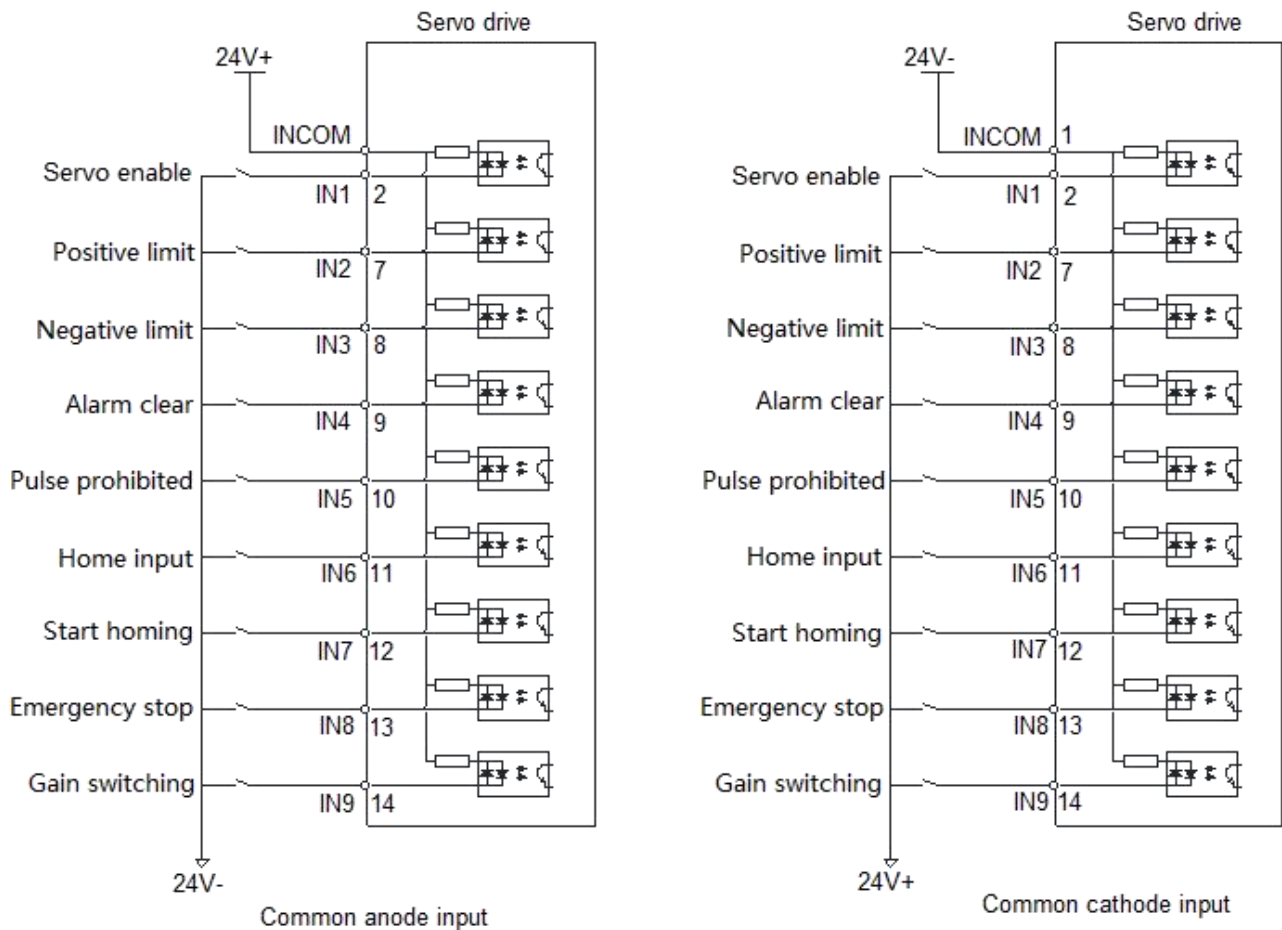


4.4.3. Digital Input Signal

Signal	Pin	Definition	Default function	Description
IN1(SV-ON)	2	Input 1	Servo enable	Below 24V, support common anode or common cathode. Note: Does not support the mixed use of NPN and PNP.
IN2(POT)	7	Input 2	Positive limit	
IN3(NOT)	8	Input 3	Negative limit	
IN4(ALMRST)	9	Input 4	Alarm clear	
IN5(PULStop)	10	Input 5	Pulse prohibited	
IN6(Home)	11	Input 6	Origin input	
IN7(ZEROStart)	12	Input 7	Start homing	
IN8(EMESStop)	13	Input 8	Emergency stop	
IN9(GAIN)	14	Input 9	Gain switching	
INCOM	1	Input common	-	

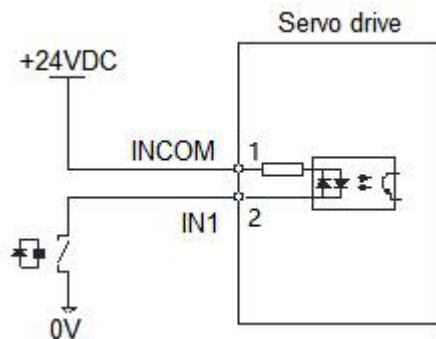
The drive has a total of 9 input ports. As shown in the figure above, the input uses a bidirectional optocoupler, which can support NPN and PNP switch signals.

The interface circuits of IN1~IN9 are the same, and the function can be selected and set according to P02.00~P02.17.

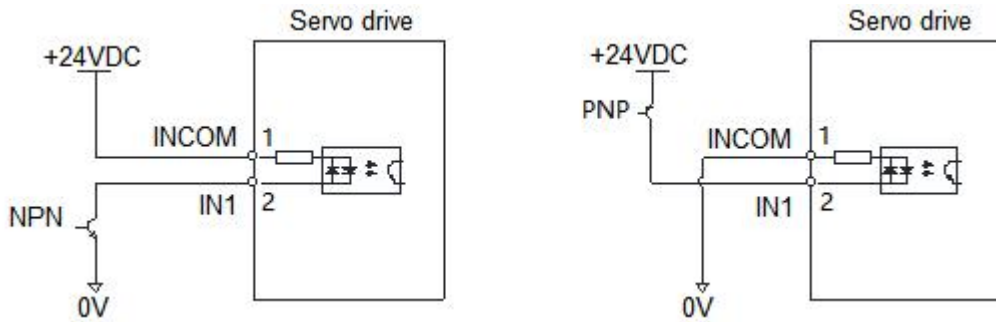


Take IN1 as an example, the wiring example is as follows:

1. When the upper computer device is a relay output:



2. When the upper computer device is open-collector output:



◆ Note: Mixing of NPN and PNP is not supported

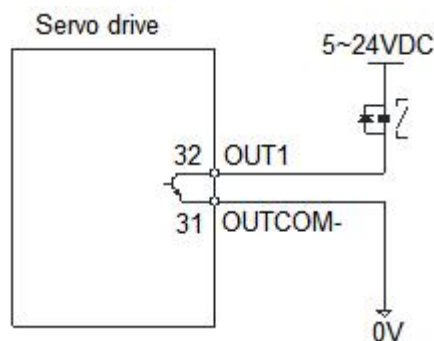
4.4.4. Digital Output Signal

Signal	Pin	Definition	Default function	Description
OUT1 (SV-RDY)	32	Output 1	Servo ready	Below 24V, common cathode output, current does not exceed 50mA.
OUT2 (INP)	33	Output 2	Positioning completed	
OUT3 (ALM)	34	Output 3	Alarm output	
OUT4 (ZERODONE)	35	Output 4	Homing completed	
OUTCOM-	31	Output common	-	Below 24V, differential output, current does not exceed 200mA
DFOUT5+ (BRK+)	18	Output 5 positive	Brake	
DFOUT5- (BRK-)	19	Output 5 negative		
DFOUT6+ (PULO+)	20	Output 6 positive	Internal command stop	
DFOUT6- (PULO-)	21	Output 6 negative		

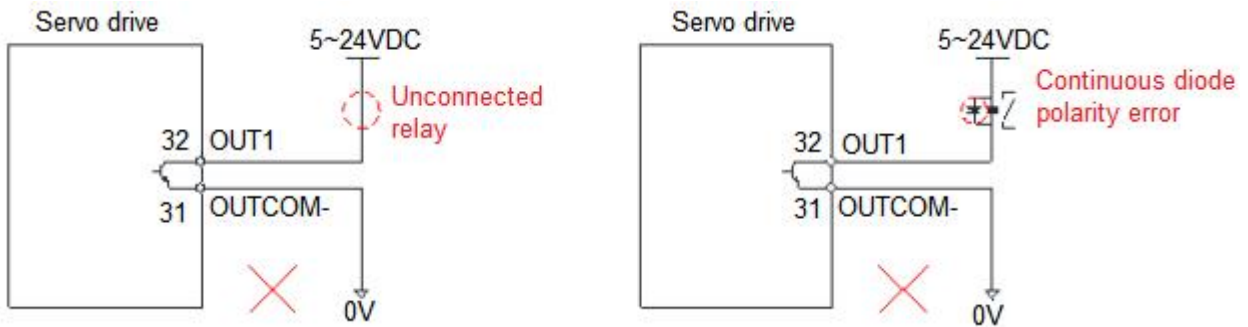
The drive has a total of six output ports, the common cathode output terminal drive current is 50mA, which can be used for small current output; the maximum drive current of the differential output terminal is 200mA, which can be used to drive the relay type output.

1. The OUT1~OUT4 interface circuits are the same. Take OUT1 as an example.

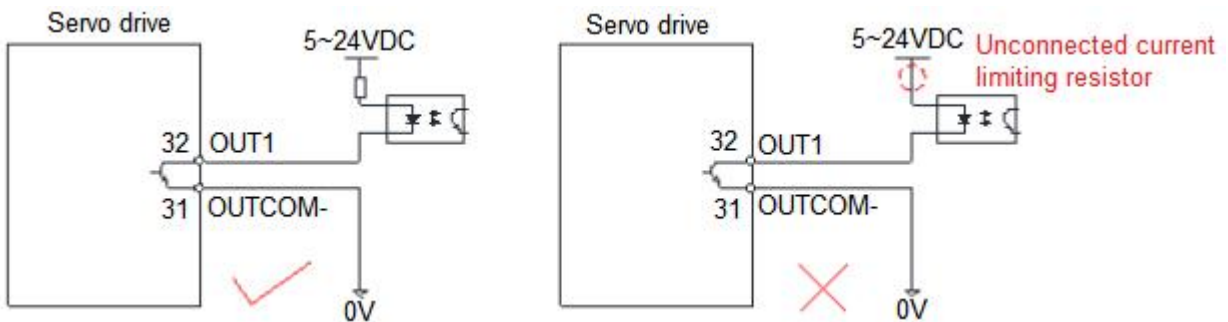
(1) When the upper computer device is a relay output



The following is the wrong wiring method

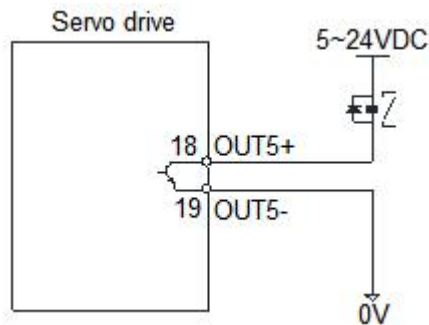


(2) When the upper device is optocoupler input

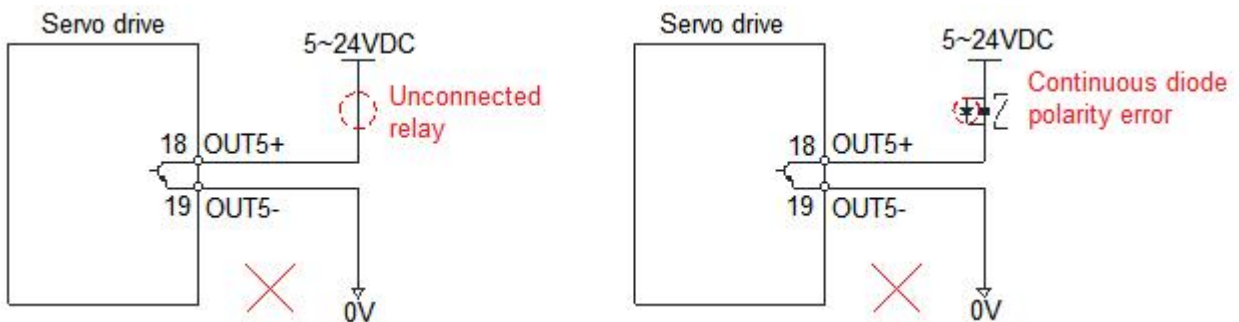


2. The OUT5~OUT6 interface circuits are the same. Take OUT5 as an example.

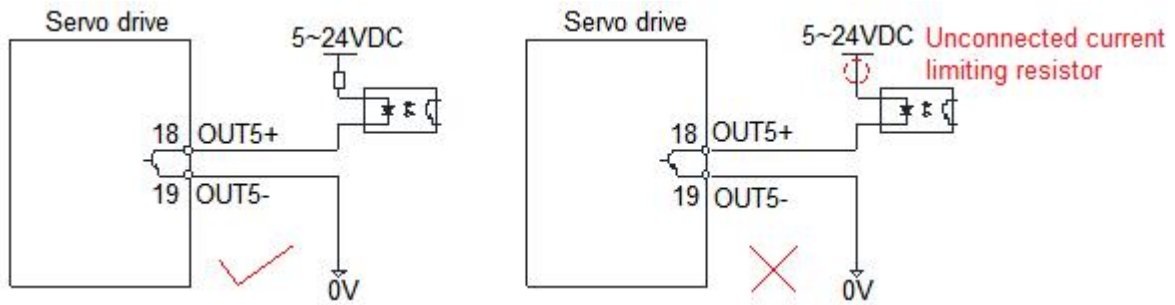
(1) When the upper device is a relay input



The following is the wrong wiring method

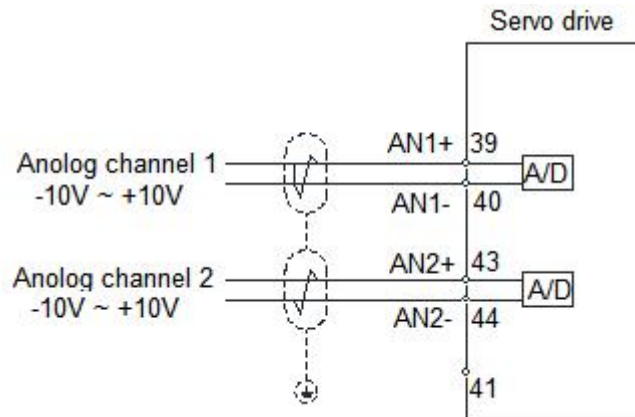


(2) When the upper device is optocoupler input



4.4.5. Analog Input Signal

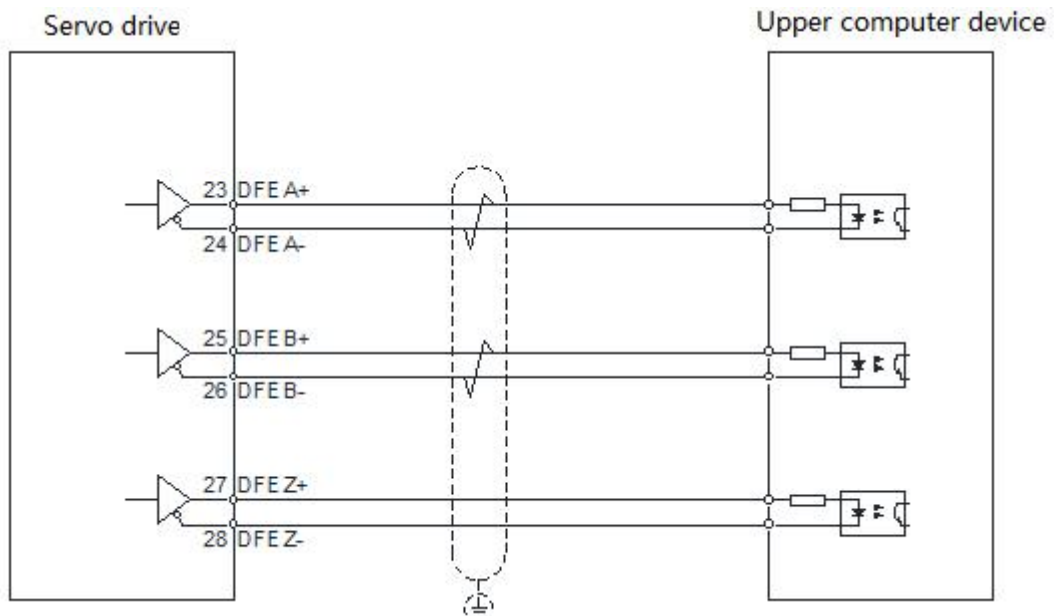
Signal	Pin	Definition	Default function	Description
AN1+	39	Analog channel 1 +	-	-10V ~ +10V analog input
AN1-	40	Analog channel 1 -		
AN2+	43	Analog channel 2 +		
AN2-	44	Analog channel 2 -		
AIGND	41	Analog GND	-	



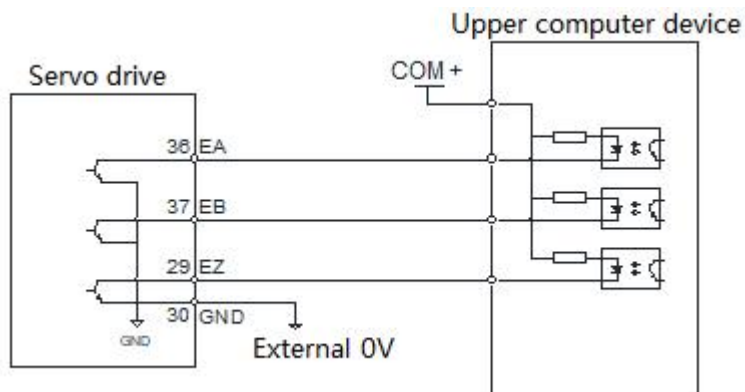
4.4.6. Encoder Output Signal

Signal	Pin	Definition	Default function	Description
DFEA+	23	Encoder A+	-	5V differential output
DFEA-	24	Encoder A-		
DFEB+	25	Encoder B+		
DFEB-	26	Encoder B-		
DFEZ+	27	Encoder Z+		
DFEZ-	28	Encoder Z-		
EA	36	Single-ended EA	-	Collector output
EB	37	Single-ended EB		
EZ	29	Single-ended EZ		
GND	30	Single-ended GND		

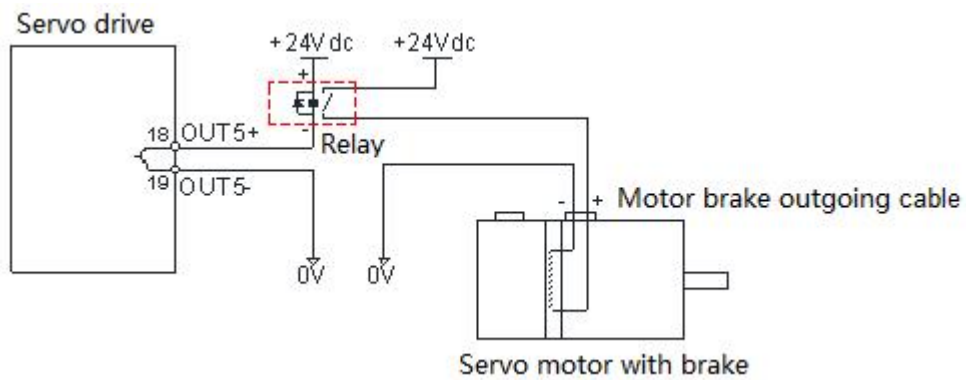
1. Encoder differential output



2. Encoder collector output



4.4.7. Motor Brake Wiring



4.5. Anti-interference Countermeasures for Electrical Wiring

1. To suppress interference, please take the following measures

- ◆ The length of the command input cable should be less than 3m, and the encoder cable should be less than 20m.
- ◆ Use thick wires as much as possible for the grounding wiring. (Above 2.0mm²)
- ◆ Please use a noise filter to prevent radio frequency interference. When using in a civil environment where the power supply interference noise is strong, please install a noise filter on the input side of the power cord.

2. In order to prevent the malfunction caused by electromagnetic interference, the following treatment methods can be used


- ◆ Install the host computer device and noise filter near the servo drive as much as possible.
- ◆ Install surge suppressors on the coils of relays, screw tubes, and electromagnetic contactors.
- ◆ When wiring, please lay the strong current cables separately from the weak current cables, and keep an interval of more than 30cm. Do not put them in the same pipe or bundle them together.
- ◆ Do not share power supply with electric welders, electrical discharge processing equipment, etc. When there is a high-frequency generator nearby, install a noise filter on the input side of the power cord.

5. Control Panel

5.1. Panel Overview

5.1.1. Panel Composition Introduction

The display panel of the servo drive is composed of 5 keys and a 5-digit LED digital tube display, which is used to realize various status information display, trial operation, parameter management and other functions. The 5 keys are identified as follows:

Function	Symbol	Description	Icon
Mode/return	MODE	Mode switch	
Shift key	◀	Shift left	
Increase	▲	Switch up selection/increase value	
Decrease	▼	Switch down selection/decrease value	
Confirm	SET	Confirm operation	

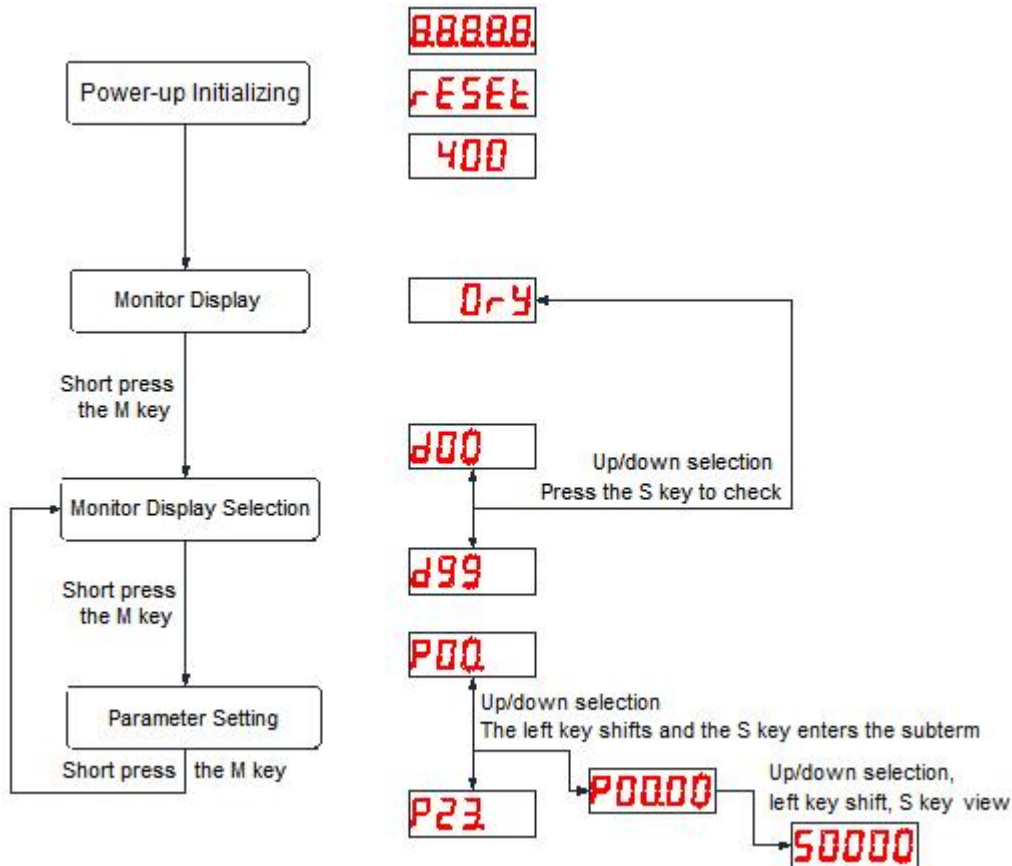
5.1.2. Panel Display Content

When the servo drive is running, the LED display can be used for servo monitoring display, parameter display, function display, parameter management, encoder adjustment, and open loop operation.

- ◆ Monitoring display: display the current running status of the servo
- ◆ Parameter display: display the set value of servo control parameters
- ◆ Function display: internal test run operation
- ◆ Parameter management: used to manage servo control parameters
- ◆ Encoder adjustment, open loop operation: the manufacturer reserves this function

5.1.3. Panel Operation

The operation of the control panel of the servo drive is shown in the figure below:



Remark:

- ◆ After the power is turned on and the initialization of the servo drive is completed, the panel display immediately enters the monitor display mode. The target parameter of pre-monitoring can be selected through parameter P01.35.
- ◆ Short press the "MODE" key to switch between different display modes.
- ◆ Once a fault occurs, the servo drive automatically displays the fault monitoring code.

5.1.4. Data Display

Different data length and negative number display description:

1. 4 or less digits signed number or 5 or less digits unsigned number

A single-page digital tube (5 digits) is used for display. For signed numbers, the highest digit of the data "-" indicates a negative sign.

(1) Display example: -6666 is displayed as follows:

-6666

(2) Display example: 65535 is displayed as follows:

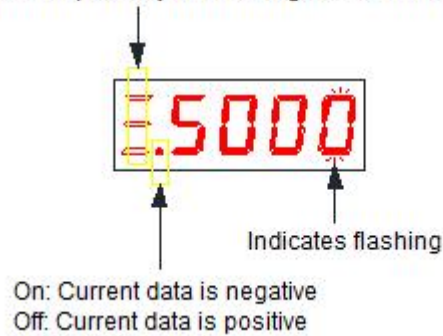
65535

2. 4 or more digits signed number or 5 or more digits unsigned number

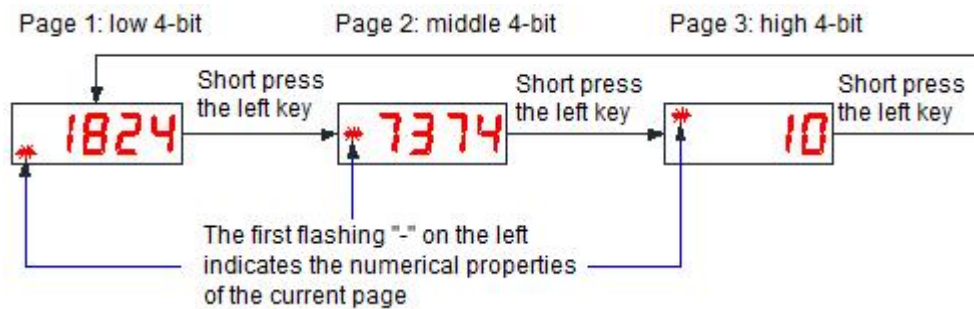
Display in pages from low to high by digits, each 4 digits is a page, display method: current page + current page value, switch the current page by long pressing the M key.

Note: The drive displays a maximum of 12 digits. Three pages are required to represent the "high 4 bits", "middle 4 bits" and "low 4 bits" of the 12 digits.

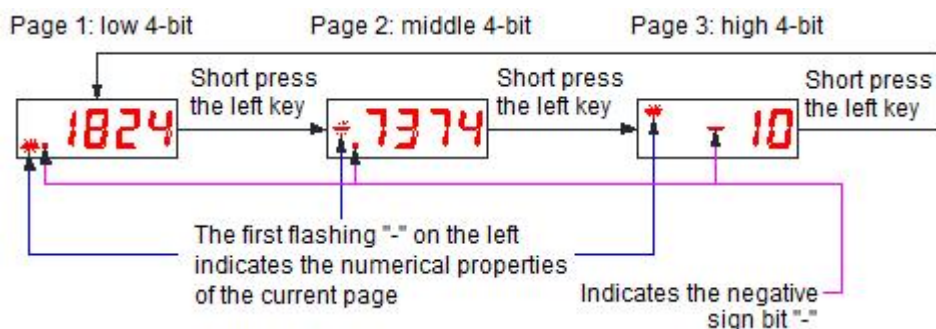
Indicates the numerical properties of the current page: "upper, middle and lower respectively indicate "high 4-bit", "middle 4-bit" and "low 4-bit".



(1) Display example: 1073741824 is displayed as follows:

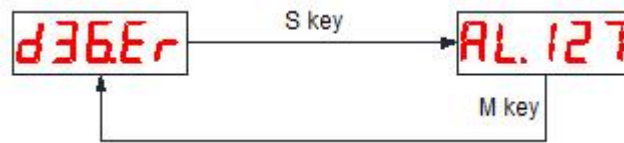


(2) Display example: -1073741824 is displayed as follows:



5.1.5.Fault Display

When the drive is in an error state, the LED panel can display related failure information. If the drive generates multiple fault alarms at the same time, the drive panel will jump to display each alarm in turn.

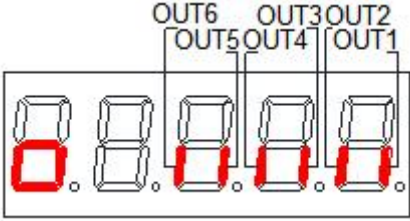
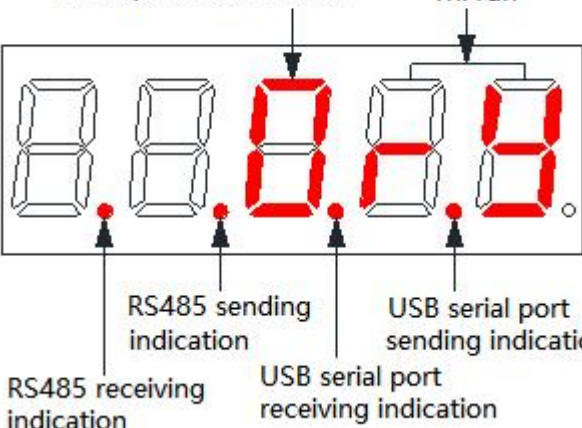


◆ For specific troubleshooting, please refer to the relevant content in [chapter 9](#).

5.1.6.Monitor Display

The monitor display is used to monitor the operation status of the servo drive. By setting the parameter code P01.35 (the panel default monitoring object), when the servo drive is powered on and initialized, the display will show the monitoring value of the object. The detailed description of the monitoring display is as follows:

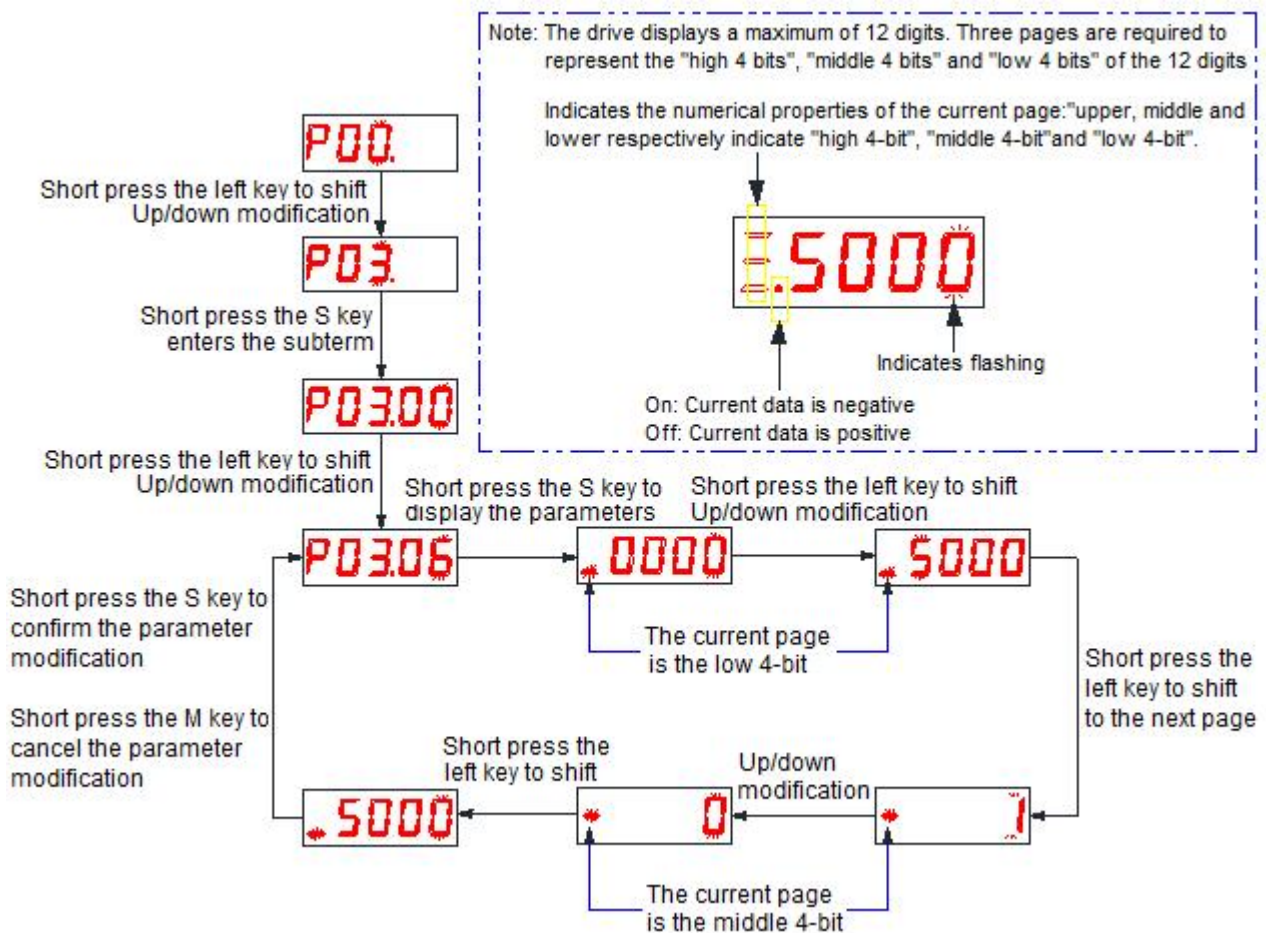
Display status	Description	Unit
d00.rS	Operation status	-
d01.SF	Motor speed	rpm
d02.SC	Speed command	rpm
d03.tF	Motor torque	%
d04.tC	Torque command	%
d07.PC	Position command counter	Command unit
d09.PC	Position feedback counter	Encoder unit
d11.PF	Feedback pulse counter	Encoder unit
d13.PE	Position error	Command unit
d15.PE	Position error	Encoder unit
d17.FS	Pulse command speed	rpm
d18.Fr	Pulse command frequency	KHz
d19.IS	<p>Indicates the status of the current drive input port:</p> <ul style="list-style-type: none"> ◆ The corresponding LED segment code is "on", indicating that the port has signal input ◆ The corresponding LED segment code is "off", indicating that the port has no signal input 	-
d20.oS	Indicates the current status of the drive output port	-

	<ul style="list-style-type: none"> ◆ The corresponding LED segment code is "on", indicating that the port signal output is valid ◆ The corresponding LED segment code is "off", indicating that the port signal output is invalid 	
d21.NA	Motor mechanical angle	Encoder unit
d22.EA	Motor electrical angle	°
d23.Ub	Drive bus voltage	V
d24.E5	Encoder status	-
d25.Eo	Encoder single-turn value	Encoder unit
d26.EN	Encoder multi-turn value	Circle
d27.Er	Encoder offset	Encoder unit
d28.PF	Feedback pulse counter	Command unit
d29.C5	<p>Status indication:</p> <p>Control mode display 0: Position control mode 1: Speed control mode 2: Torque control mode</p> <p>Servo status display nr: not ready ry: ready rn: run</p>  <p>RS485 sending indication USB serial port sending indication</p> <p>RS485 receiving indication USB serial port receiving indication</p>	-
d36.Er	Alarm code	-

5.2. Parameter Setting

Use the panel of the servo drive to set the parameters. For parameter details, please read [“Chapter 7 Parameter Description”](#).

Take the LED display panel display parameter menu as an example, change the servo drive P03.06 (Number of position commands for one motor rotation) from the default value of 10000 to 5000 as an example, and proceed with the operation instructions:



Remark:

After confirming and modifying the parameters, they will be immediately written to the EEPROM chip of the driver, and no additional parameter saving operations are required.

5.3. Auxiliary Function

5.3.1. Parameter Management

- ◆ Factory reset: set parameter P12.00 to 1.
- ◆ Clear fault records: set parameter P12.00 to 2.

5.3.2. Fault Reset

- ◆ Fault reset: set parameter P12.08 to 1.

5.3.3. Absolute Value Operation

- ◆ Clear encoder faults: set parameter P12.05 to 1.
- ◆ Clear encoder faults and multi-turn values: set parameter P12.05 to 2.

5.3.4. Jog Test Machine

Through this operation, the servo drive can be tested.

Press the key to select parameter P12.10, and press the S key to enter the next page. If the drive has no alarm or is not enabled, the LED panel will display the default JOG running speed of 100. You can modify the value by pressing the key, and then press the S key to confirm. The drive LED panel will display "ready". At this time, you can control the operation of the motor by pressing the up and down keys of the key.

- ◆ Note: When using this operation, please disable the servo enable signal.

6. Control Mode

6.1. Position Control Mode

Position control mode is mainly used in occasions that require positioning control, such as manipulators, placement machines, engraving (Pulse train command), CNC machine, etc. Set the value of parameter P01.00 to 0 to enable the drive to work in position control mode.

6.1.1. Position Command Input Setting

In position control mode, the position command source should be set through P03.00 first.

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P03.00	Position command source	0: Pulse command 1: Step size 2: Multi-segment position command 3: Reserve (Don't set) 4: Reserve (Don't set) 5: Reserve (Don't set)	Set the source of the position command. The pulse command is an external position command, and the others are internal position commands.	Set after stopping	Effective immediately	0

1. The source of position command is pulse command (P03.00=0)

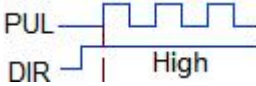
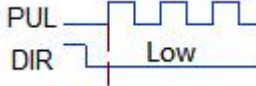

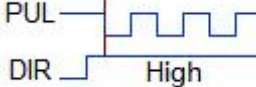
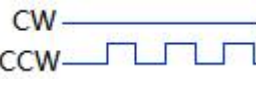
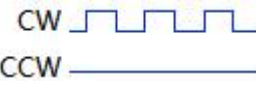
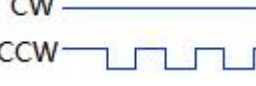
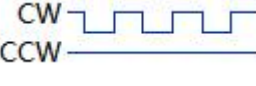
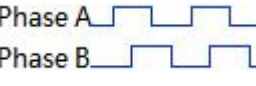
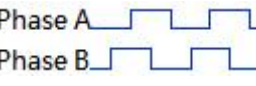
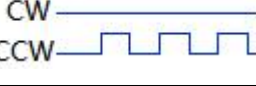
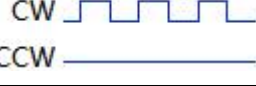


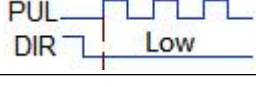
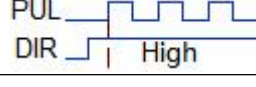
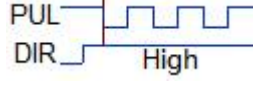

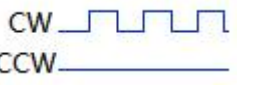
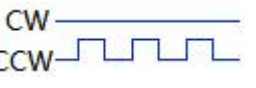
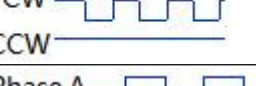
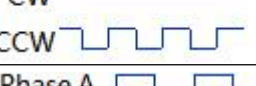
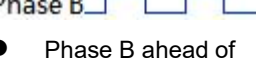
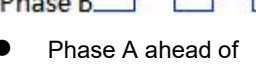
When setting the position command source as pulse command, it is necessary to correctly set the command type of external pulse according to the host computer or other pulse output device:

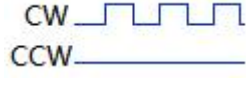
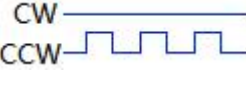


- ◆ Direction + pulse (positive logic or negative logic)
- ◆ A phase + B phase quadrature pulse, 4 times frequency
- ◆ Positive pulse / Negative pulse (CW + CCW)

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P03.02	Pulse command type	0: Direction + pulse (positive logic) 1: Direction + pulse (negative logic) 2: CW + CCW (Idle time coupling off) 3: A phase + B phase quadrature pulse, 4 times frequency 4: CW + CCW (Idle time coupling on) 5: Reserve (Don't set)	Select the type of external pulse command	Set after stopping	Save and restart	0

★ Description of pulse command types

P01.01 Rotation direction selection	P03.02 Command type setting	Command type	Signal	Schematic diagram of positive pulse	Schematic diagram of reverse pulse
0	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW (Idle time coupling off)	PUL(CW) DIR(CCW)		
					
	3	A phase + B phase quadrature pulse 4 times frequency	PUL(A phase) DIR(B phase)	 ● Phase A ahead of phase B by 90°.	 ● Phase B ahead of phase A by 90°.
	4	CW+CCW (Idle time coupling on)	PUL(CW) DIR(CCW)		
					
5	Reserve (Don't set)	-	-	-	
1	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW (Idle time coupling off)	PUL(CW) DIR(CCW)		
					
3	A phase + B phase quadrature pulse	PUL(A phase) DIR(B phase)	 ● Phase B ahead of	 ● Phase A ahead of	

		4 times frequency		phase A by 90°.	phase B by 90°.
	4	CW+CCW (Idle time coupling on)	PUL(CW) DIR(CCW)		
					
	5	Reserve (Don't set)	-	-	-

2. The position command source is the step size (P03.00=1)

Under this position command source, there is a function that controls the fixed-length forward/reverse rotation of the motor through the external input terminal, the direction of operation is determined by the positive and negative signs of the pulse command stroke.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P03.28	Step size	-32768~32767	Command Unit	Set the stroke of the motor for fixed-length operation: Positive number means forward rotation Negative number means reverse rotation	Set when running	Effective immediately	10000

The startup mode is as follows:

Set the corresponding IN terminal Function to 13 (FunIN13: step position trigger), and confirm the valid logic of the IN terminal [Group P02: Terminal Input/Output Parameters](#)

★ Associated parameter description

Coding	Function name	Function
FunIN.13	Step position trigger	The servo running status is as follows: Valid: the motor runs the position command stroke set by parameter P03.28. Invalid: the servo motor is in a locked state
FunIN.20	Position command direction selection	0: The running direction is normal 1: The running direction is reversed

FunIN.13 (step position trigger) is valid for edge trigger, the step position command is completed, and the servo motor enters the locked state;if FunIN.13 is triggered again, it is valid, and the servo motor will repeatedly execute the position command stroke set by P03.28.

◆ Note: If the current position command of the motor does not stop running, it will not respond to the re-triggering signal. The user can receive the output signal (FunOUT. 5: internal position command shutdown) through the upper computer, which is used to determine whether the internal pulse of the servo drive has been sent, so as to determine the effectiveness of the second trigger.

3. The source of position command is multi-segment position command (P03.00=2)

The servo drive has multi-segment position operation function. It means that there are 16 position commands stored in the servo drive, and the displacement, maximum operating speed, acceleration and deceleration time of each segment can be set separately. The waiting time and connection mode between the segments can also be selected according to actual needs.

(1) Set multi-segment running mode

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P09.00	Multi-segment running mode	0: stop at the end of a single operation 1: Cycle operation 2: Switch through the external IN port	Set the connection mode between operation sections in multi-segment position	Set after stopping	Effective immediately	0
P09.01	The number of end segments of position command	1~16	Set the total segments of the multi-segment position command	Set after stopping	Effective immediately	1
P09.03	Waiting time unit	0: ms 1: s	Set the waiting time unit. Note: the waiting time is only valid when P09.00=0 or 1	Set after stopping	Effective immediately	0
P09.04	Displacement command type selection	0: Incremental position command 1: Absolute position command	Set the type of multi-segment displacement command	Set after stopping	Effective immediately	0

◆ Stop at the end of a single operation (P09.00=0)

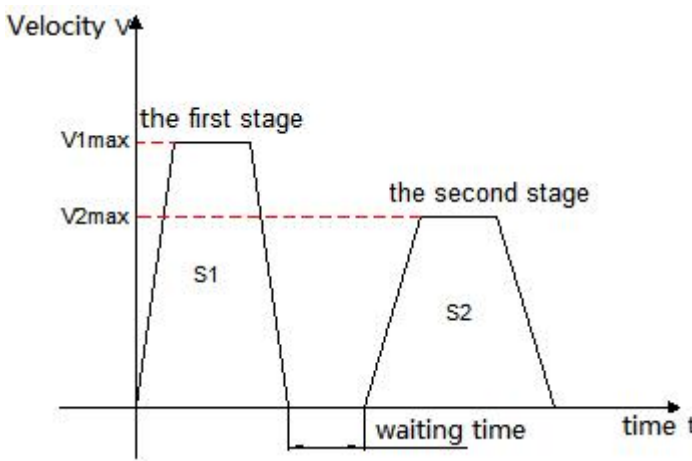
Mode description	Running curve
<ul style="list-style-type: none"> ● Run 1 round ● The segment number is automatically incremented and switched ● The waiting time can be set between each segment ● FunIN.21 (multi-segment position command enable) signal is level effective 	<p>V1max, V2max: Maximum operating speed of the first and second segment</p>

	<p>S1、S2: Segment 1 and segment 2 displacement</p> <ul style="list-style-type: none"> ● After each segment of operation is completed, the motor's internal command stop signal output is valid. ● When the multi-segment position command is enabled OFF during operation, the driver gives up the uncompleted displacement of this segment and stops, and the positioning completion signal is valid after the stop is completed. ● Re-enable the multi-segment position command, and the driver will start to run sequentially from the first segment again.
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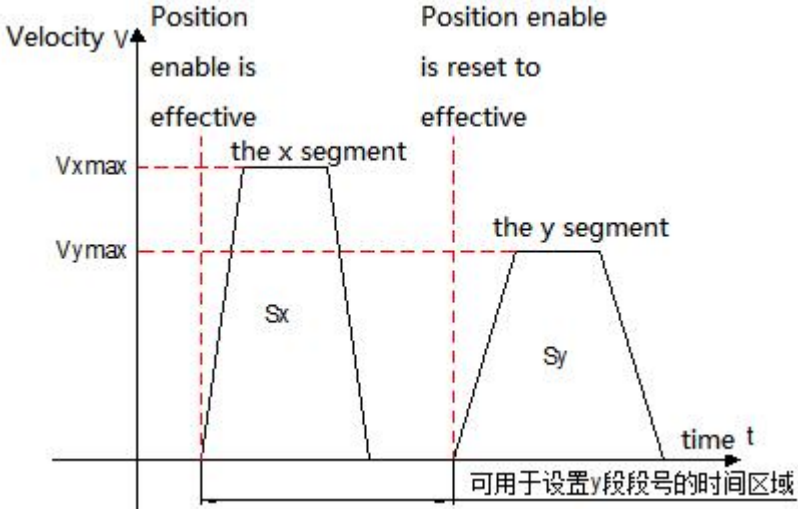
★ Term explanation

The total number of multi-segment position commands set by P09.01 when the drive completes one run is called the completion of one round of operation.

◆ Cycle operation (P09.00=1)

Mode description	Running curve
<ul style="list-style-type: none"> ● Cyclic running, the starting section number of each round is 1 ● The section number is automatically incremented switched ● Waiting time can be set between each segment ● FunIN. 21 (multi-segment position command enable) Signal is the level valid, and its signal is valid, and the drive will maintain the cyclic running state 	 <p>V1max、V2max: Maximum operating speed of the first and second segment S1、S2: The first segment and the second segment displacement</p> <ul style="list-style-type: none"> ● After each segment of operation is completed, the motor's internal command stop signal output is valid. ● When the multi-segment position command is enabled OFF during operation, the driver gives up the uncompleted displacement of this segment and stops, and the positioning completion signal is valid after the stop is completed. ● Re-enable the multi-segment position command, and the driver will start to run sequentially from the first segment again.

◆ Switch through the external IN port (P09.00=2)

Mode description	Running curve
<ul style="list-style-type: none"> When running the current segment number, the next running segment number can be set, and the motor will stop after completing the position command set by the current segment number. After the multi-segment position command enable is set to ON again, run this time period number command The segment number is determined by the IN terminal logic There is no waiting time between each segment, the interval time is determined by the command delay of the host computer FunIN.21 (segment position command enable) signal is valid for edge change 	 <p>Vxmax、Vymax: Maximum operating speed of the x-th and y-th segment Sx、Sy: The x-th segment and the y-th segment displacement</p> <ul style="list-style-type: none"> After each stage of operation is completed, the internal command stop signal output of the motor is valid; During operation, the multi-segment position command enable is OFF, the driver continues to execute the unfinished displacement of this segment, and outputs the positioning completion signal The switching segment numbers must be in the following order: <ol style="list-style-type: none"> The segment number switch is invalid before the positioning of the x-th segment is completed During the x-th segment displacement operation or after the positioning is completed, turn off the multi-segment position command first, and then switch the segment number from x to y (if x=y, the driver will execute the x-segment displacement again) After the x-th segment displacement positioning is completed, the multi-segment position command enable is set to ON, and the driver executes the y-th segment displacement

When the multi-segment position operation mode is set to IN switching operation, please configure the 4 IN terminals of the drive (the number of IN terminals required can be set according to the actual number of running stages) as functions 14~17 (FunIN.14~FunIN.17: position/speed table switch), and confirm the valid logic of IN terminal.

★ Description of related coding function

Coding	Name	Function name	Function
FunIN.14	CMD1	Position/speed table 1	The multi-segment number is a 4-digit binary number, and the corresponding relationship between CMD1~CMD4 and the segment

FunIN.15	CMD2	Position/speed table 2	number is as follows: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>CMD4</th> <th>CMD3</th> <th>CMD2</th> <th>CMD1</th> <th>Segment</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td colspan="5" style="text-align: center;">.....</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>15</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>16</td> </tr> </tbody> </table> The logic of the IN terminal is level valid, the CMD value is 1 when the input level is valid, otherwise it is 0	CMD4	CMD3	CMD2	CMD1	Segment	0	0	0	0	1	0	0	0	1	2					1	1	1	0	15	1	1	1	1	16
CMD4	CMD3	CMD2		CMD1	Segment																												
0	0	0		0	1																												
0	0	0		1	2																												
.....																																	
1	1	1	0	15																													
1	1	1	1	16																													
FunIN.16	CMD3	Position/speed table 3																															
FunIN.17	CMD4	Position/speed table 4																															

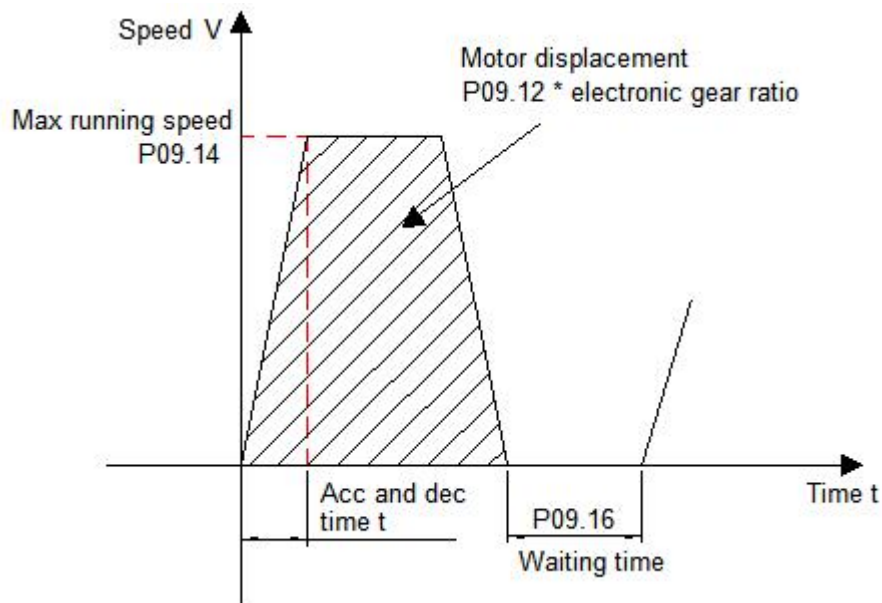
(2) Set multi-segment position running curve

The multi-segment position running function can set 16 different position commands, and the displacement, maximum running speed, acceleration and deceleration speed of each segment and the waiting time between segments can be set separately. Take the 1st segment as an example:

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P09.12	Segment 1 moving displacement	-1073741824 ~ 1073741824	Command unit	Set the sum of position commands in the segment 1	Set when running	Effective immediately	10000
P09.14	Maximum running speed of segment 1 displacement	1~6000	rpm	Set the maximum running speed of segment 1	Set when running	Effective immediately	100
P09.15	Acceleration and deceleration time constant of segment 1 displacement	0~65535	ms	Set the time of constant speed change from 0rpm to 1000rpm for the segment 1 of motor in multi-segment position	Set when running	Effective immediately	100
P09.16	Waiting time after the completion of segment 1 displacement	0~65535	ms(s)	Set the waiting time after the segment 1 positioning is completed	Set when running	Effective immediately	100

According to the above settings, the actual running curve of the motor is shown in the figure below:



Therefore, the actual acceleration time t to P09.14 (Maximum running speed of segment 1 displacement):

$$t = \frac{P09.14}{1000} \times P09.15$$

For the setting of the remaining 15 parameters, please refer to the parameter descriptions in [Chapter 7](#).

(3) Multi-segment position command enable

When selecting multi-segment position command as the source of position command, please configure 1 IN terminal of the servo drive as function 21 (FunIN.21: multi-segment position command enable), and confirm the valid logic of IN terminal.

★ Associated parameter description

Coding	Function name	Function
FunIN.21	Position/speed table running enable	Valid: motor runs multi-segment position command Invalid: the motor is in a locked state Note: When P09.00=0/1, the IN terminal logic corresponding to the FunIN.21 signal is level valid When P09.00=2, the IN terminal logic corresponding to the FunIN.21 signal is valid for edge changes

6.1.2. Electronic Gear Ratio

1. Electronic gear ratio concept

In the position control mode, the input position command (command unit) is to set the load displacement, and the motor position command (encoder unit) is to set the motor displacement, in order to establish the proportional relationship between the motor position command and the input position command, the electronic gear ratio function is introduced.

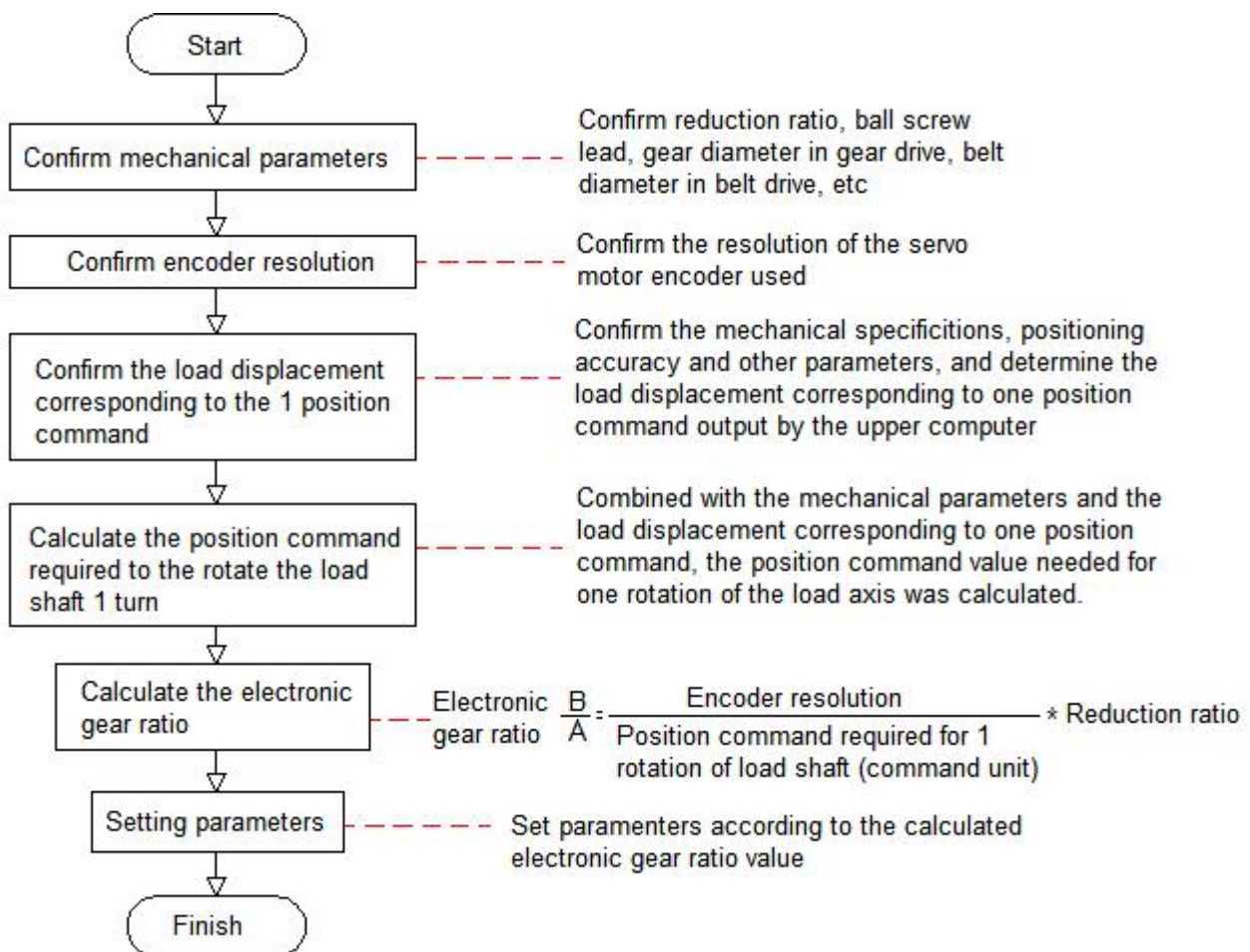
Through the frequency division (electronic gear ratio < 1) or frequency multiplication (electronic gear ratio > 1) function of the electronic gear ratio, the actual displacement of the motor rotation or movement can be set when the input position command is 1 command unit.

★ Term explanation

Command unit: Refers to the minimum recognizable value input from the upper device to the drive.

Encoder unit: Refers to the value of the input command after processing the electronic gear ratio.

2. Setting steps of electronic gear ratio



★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P03.06	Pulse per revolution	0~8388608	p/r	Set the number of position commands required for one rotation of motor	Set after stopping	Effective immediately	10000
P03.08	Electronic gear ratio 1 numerator	1~1073741824	-	Set the numerator of electronic gear ratio 1 ● Effective when P03.06/P03.07 is set to 0	Set after stopping	Effective immediately	1
P03.10	Electronic gear ratio 1 denominator	1~1073741824	-	Set the denominator of electronic gear ratio 1 ● Effective when P03.06/P03.07 is set to 0	Set after stopping	Effective immediately	1
P03.12	Electronic gear ratio 2 numerator	1~1073741824	-	Set the numerator of electronic gear ratio 2 ● Effective when P03.06/P03.07 is set to 0	Set after stopping	Effective immediately	1
P03.14	Electronic gear ratio 2 denominator	1~1073741824	-	Set the denominator of electronic gear ratio 2 ● Effective when P03.06/P03.07 is set to 0	Set after stopping	Effective immediately	1

- ◆ Note: When P03.06 (number of position commands for one motor rotation) is set to other than 0, the electronic gear ratio: $A/B = \text{Encoder resolution}/P03.06$, at this time, electronic gear ratio 1 (P03.08/P03.10) and electronic gear ratio 2 (P03.12/P03.14) are invalid.

6.1.3. Position Command Filtering

Position command filtering is to filter the position command (encoder unit) after the electronic gear ratio frequency division or frequency multiplication. The methods are average filtering and first-order low-pass filtering.

In the following applications, you should consider adding position command filtering:

- ◆ The position command output by the host computer has not been processed for acceleration and deceleration
- ◆ Low pulse command frequency
- ◆ When the electronic gear ratio is more than 10 times

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P03.04	Position command average filter time constant	1~1280	0.1ms	Set the time constant for the average value filter of the position command (encoder unit)	Set after stopping	Effective immediately	1
P03.05	Position command first-order low-pass filter time constant	0~65535	0.1ms	Set the first-order low-pass filter time constant of position command	Set after stopping	Effective immediately	0

Remark:

- ◆ This function has no effect on the displacement (total number of position commands).
- ◆ If the set value is too large, the response delay will increase. The filter time constant should be set according to the actual situation.

6.1.4. Positioning Complete Signal

The positioning completion function means that when the drive detects that the position error is less than P03.21 (P03.21: Positioning completed threshold), and it outputs the in-position completion signal when it is maintained for a certain period of time (P03.18: Positioning completed detect time).

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P03.18	Positioning completed detect time	0~65535	ms	Set the detection time when the positioning is completed and the positioning approach signal is valid	Set when running	Effective immediately	0
P03.20	Positioning completed output setting	0~2	-	Set the conditions for positioning completed signal output	Set when running	Effective immediately	0
P03.21	Positioning completed threshold	0~65535	-	Set the positioning accuracy when the motor positioning signal is output	Set when running	Effective immediately	91
P03.22	Positioning proximity threshold	0~65535	-	Set the positioning accuracy when the motor positioning proximity signal is output	Set when running	Effective immediately	91

The output settings for positioning completed are as follows:

◆ When P03.20=0 (Positioning completed output setting)

When the absolute value of the position error is less than P03.21 (positioning completed threshold), the positioning completed signal is output.

When the absolute value of the position error is less than P03.22 (positioning proximity threshold), the positioning proximity signal is output.

◆ When P03.20=1 (Positioning completed output setting)

When the absolute value of the position error is less than P03.21 (positioning completed threshold), and the position command increment after gear ratio transformation and smoothing is 0, and this state continues to exceed the time set in P03.18 (positioning detection time), the positioning completed signal is output;

When the absolute value of the position error is less than P03.22 (positioning proximity threshold), and the position command increment after gear ratio transformation and smoothing is 0, and this state continues to exceed the time set in P03.18 (positioning detection time), the positioning proximity signal is output;

◆ When P03.20=2 (Positioning completed output setting)

When the absolute value of the position error is less than P03.21 (positioning completed threshold), and the position command increment after gear ratio transformation is 0, and this state continues to exceed the time set in P03.18 (positioning detection time), the positioning completed signal is output.

When the absolute value of the position error is less than P03.22 (positioning proximity threshold), and the position command increment after gear ratio transformation is 0, and this state continues to exceed the time set in P03.18 (positioning detection time), the positioning completed signal is output.

The positioning completed signal is output

6.1.5. Homing Function

1. Function introduction

- ◆ **Origin/Mechanical origin:** The origin is also called mechanical origin, which can be expressed as the origin switch signal or limit switch signal, and is set by parameter P03.41 (Homing mode selection).
- ◆ **Zero point:** The positioning target point, which can be expressed as origin + offset (P03.46/P03.47: mechanical origin offset). When the offset is set to 0, the zero point coincides with the origin.
- ◆ **Homing function:** The homing function is a function that the motor will actively find the zero point and complete the positioning after triggering the homing function when the drive is enabled. During the operation of homing, other position commands (including the re-triggered homing enable signal)

are shielded; After the homing operation is completed, the drive can respond to other position commands. The homing function includes two modes: origin homing and electrical homing.

- ◆ **Origin homing:** After the drive receives the homing trigger signal, the drive will actively position the relative position between the motor shaft and the mechanical origin according to the preset mechanical origin. First find the origin, and then move the offset to the zero point position based on the origin. The origin homing is usually used to find the zero point for the first time.
- ◆ **Electrical homing:** After the zero point position is determined by the origin homing operation, take the current position as the starting point and move a relative displacement.

After the homing is completed (including the origin homing and electrical homing), the current position of the motor (P13.07/P13.08: position command counter) is consistent with the mechanical origin offset (P03.46/P03.47: mechanical origin offset). After the homing is completed, the drive outputs the origin homing completion signal, and the upper computer can confirm that the homing is completed after receiving the signal.

2. Origin homing

The following cases are used as examples to illustrate the operation mode of origin homing.

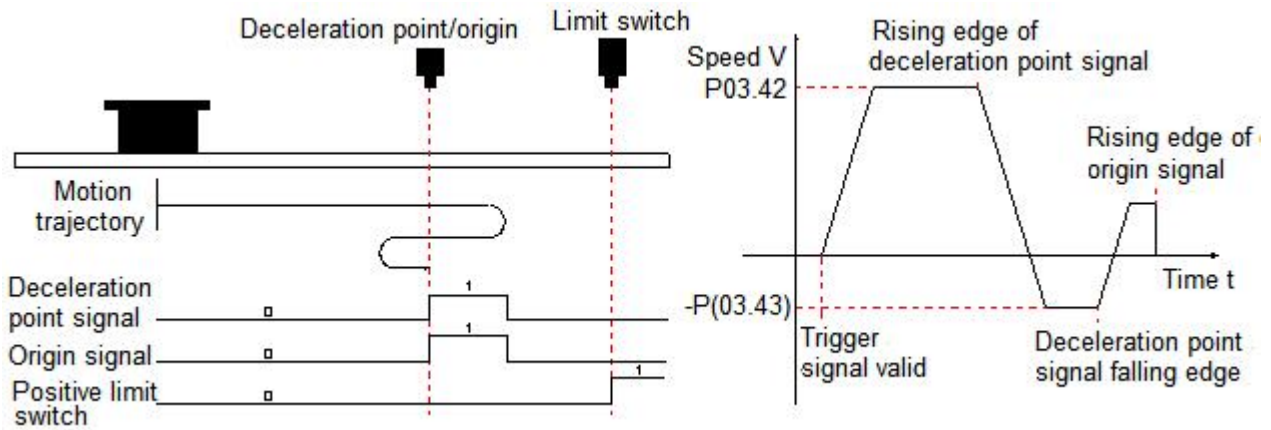
- ◆ Forward return to origin: deceleration point, origin as origin switch (P03.41 = 0)
- ◆ Forward return to origin: deceleration point, origin as forward limit switch (P03.41=2)
- ◆ Forward return to origin: deceleration point, origin as mechanical limit position (P03.41=4)

(1) Forward return to origin: deceleration point, origin as origin switch (P03.41 = 0)

1) The origin switch (decelerate point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is not triggered in the whole process.

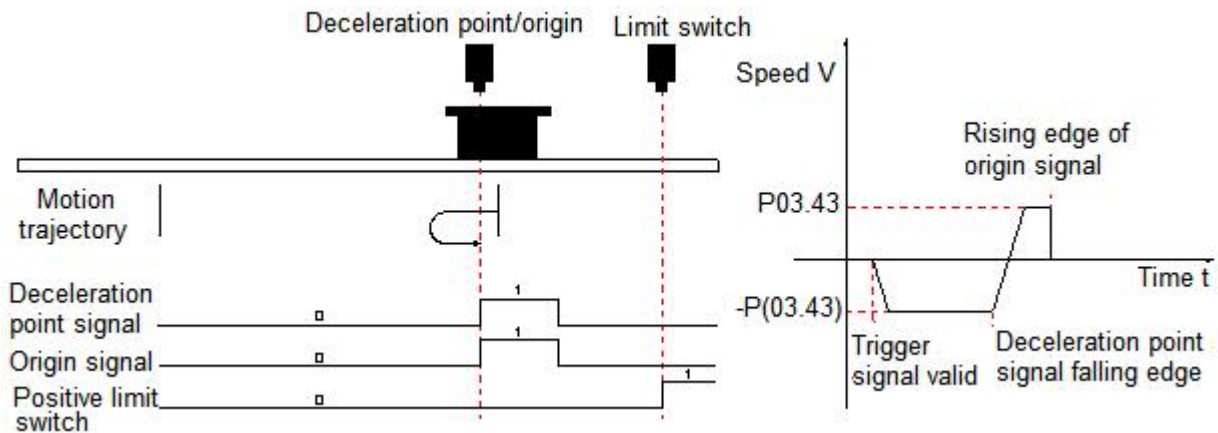
The motor first searches for the deceleration point signal in the forward direction at the set value of P03.42 (Speed in high-speed homing) until it encounters the rising edge of the deceleration point. After decelerating to 0 according to the deceleration time constant set in P03.44 (Homing acceleration and deceleration time), it reverses the acceleration to the set value of P03.43 (Low speed search origin switch signal) and searches for the deceleration point signal falling edge at low speed. When it encounters the falling edge of the deceleration point signal, it will decelerate and stop, and then continue to search for the rising edge of the deceleration point in the low speed forward direction with the set value of P03.43.

During forward acceleration or forward uniform speed operation, the machine will stop immediately when it encounters the rising edge signal of the origin signal.



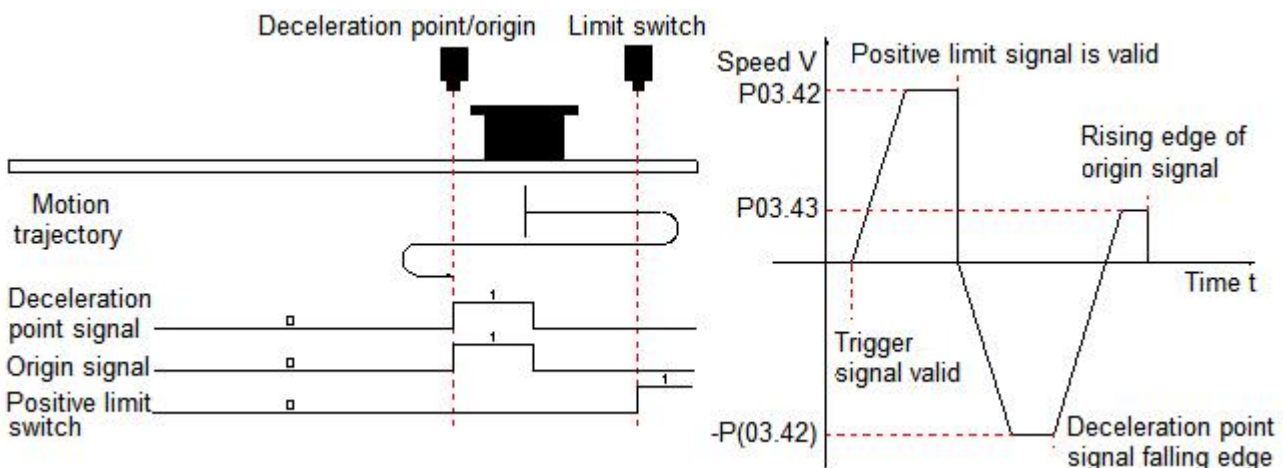
2) The origin switch (decelerate point) signal is valid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is not triggered in the whole process.

The motor directly searches for the falling edge of the deceleration point signal in the reverse direction at the set value of P03.43 (Low speed search origin switch signal speed), and decelerates to stop when it encounters the falling edge of the deceleration point signal, and then continues to search for the rising edge of the deceleration point signal in the forward direction with the set value of P03.43, and stops immediately when it encounters the rising edge of the origin signal in the forward direction of acceleration or uniform speed operation.



3) The origin switch (decelerate point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin, and the positive limit switch is triggered during the process of returning to origin.

The motor first searches for the deceleration point signal in the forward direction with the set value of P03.42 (High speed search origin switch signal speed), and stops after encountering the positive limit switch and decelerating to 0 according to the deceleration time constant set in P01.33 (Emergency stop deceleration time constant). And in accordance with P03.49 (Mechanical origin offset and limit processing method), immediately return to the origin in reverse direction (P03.49=2/3), or stop and wait for the upper device to give the trigger signal to return to origin again (P03.49=0/1). After the conditions are met, the motor searches for the falling edge of the deceleration point signal in the reverse direction with the set value of -P03.42. After encountering the deceleration point signal falling edge, decelerate the speed to 0 in accordance with the deceleration time set by P03.44 (Search for the acceleration and deceleration time constant of the zero switch signal), and then forward accelerate to the set value of P03.43 (Low speed search origin switch signal speed), and forward accelerate or forward uniformly in operation, and stop immediately when encountering the signal of the rising edge of the origin signal.

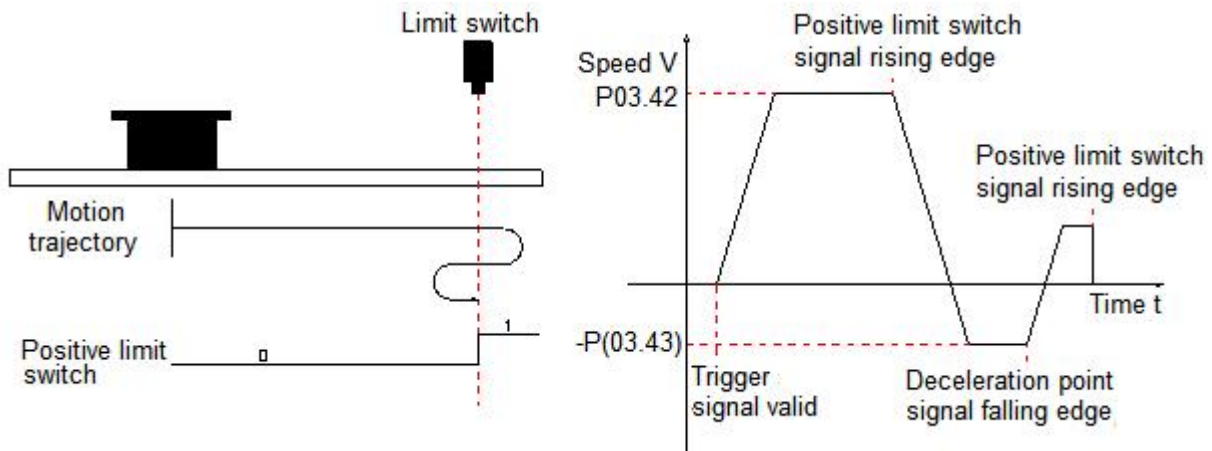


(2) Forward return to origin: deceleration point, origin as forward limit switch (P03.41=2)

1) Positive limit switch (deceleration point) signal is invalid (0 - invalid, 1 - valid) before the motor returns to origin.

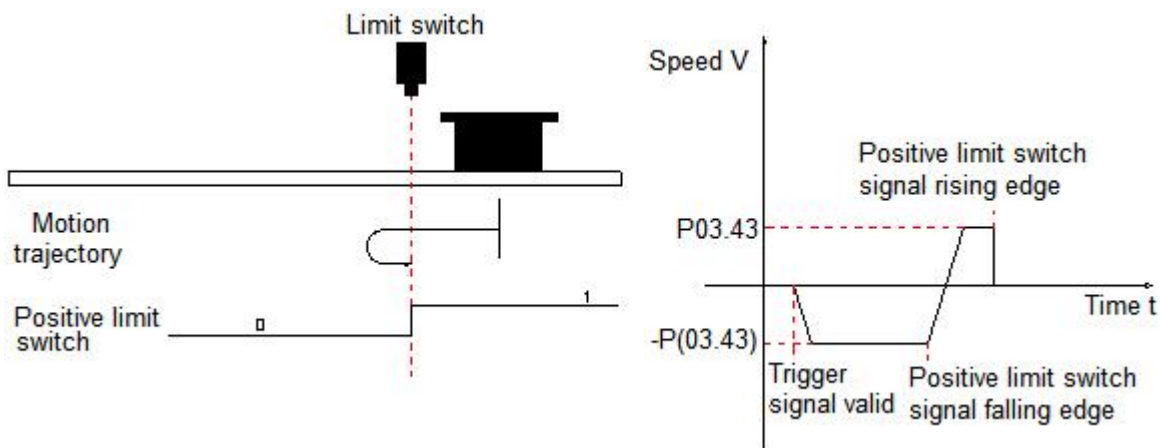
The motor first searches for the deceleration point signal in the forward direction at the value set in P03.42 (High speed search origin switch signal speed) until it encounters the rising edge of the deceleration point. After decelerating to 0 according to the deceleration time set in P03.44 (Search for the acceleration and deceleration time constant of the zero switch signal), the motor accelerates in the reverse direction to the value set in -P03.43 (Low speed search origin switch signal speed) and searches for the deceleration point signal falling edge at low speed. When it encounters the falling edge of the deceleration point signal, it will decelerate to stop, and then continue to search for the rising edge of the deceleration point in the low speed forward direction with the set value of P03.43. During forward

acceleration or forward uniform speed operation, will stop immediately when it encounters the rising edge signal of the positive limit switch signal.



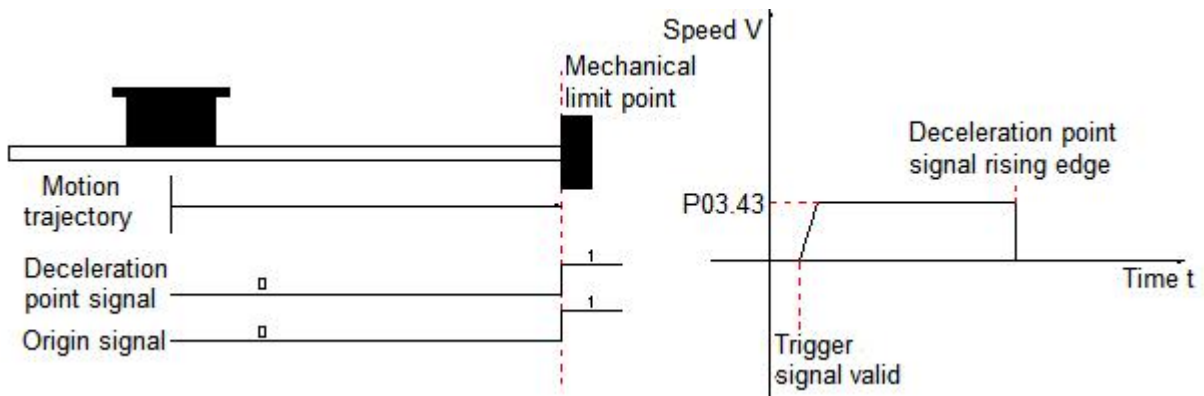
2) Positive limit switch (deceleration point) signal is valid (0 - invalid, 1 - valid) before the motor returns to origin.

The motor directly searches for the falling edge of the deceleration point signal in the reverse direction at the set value of -P03.43 (Low speed search origin switch signal speed), and immediately decelerates to stop when it encounters the falling edge of the deceleration point signal, and then continues to search for the rising edge of the deceleration point signal in the forward direction with the set value of P03.43, and stops immediately when it encounters the rising edge of the forward limit switch signal during positive acceleration or uniform speed operation.



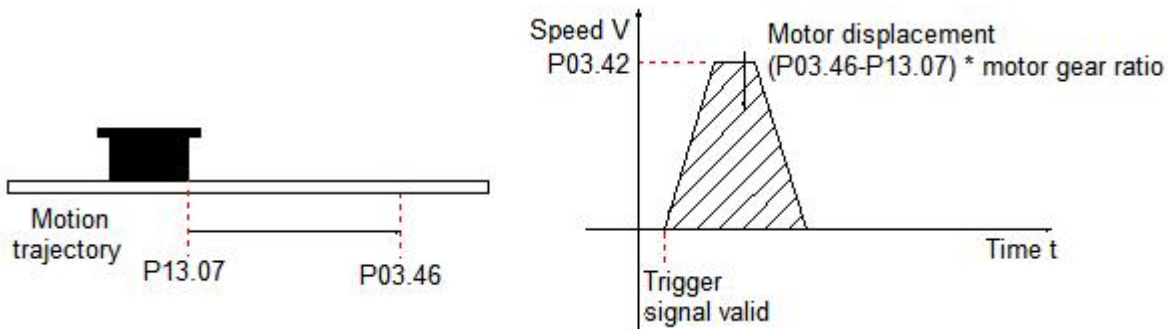
(3) Forward return to origin: deceleration point, origin as mechanical limit position (P03.41=4)

The motor first runs at low speed in the positive direction with the set value of P03.43 (Low speed search origin switch signal speed), and after collision to the mechanical limit position, if the motor torque reaches P03.52 (Touch stop homing torque limit) and the actual motor speed is lower than P03.51 (Touch stop homing speed judgment threshold), and this state is maintained for a certain time P03.50 (Touch stop homing time judgment threshold), it is judged that the motor runs to the mechanical limit position and stops immediately.



1) Electrical homing

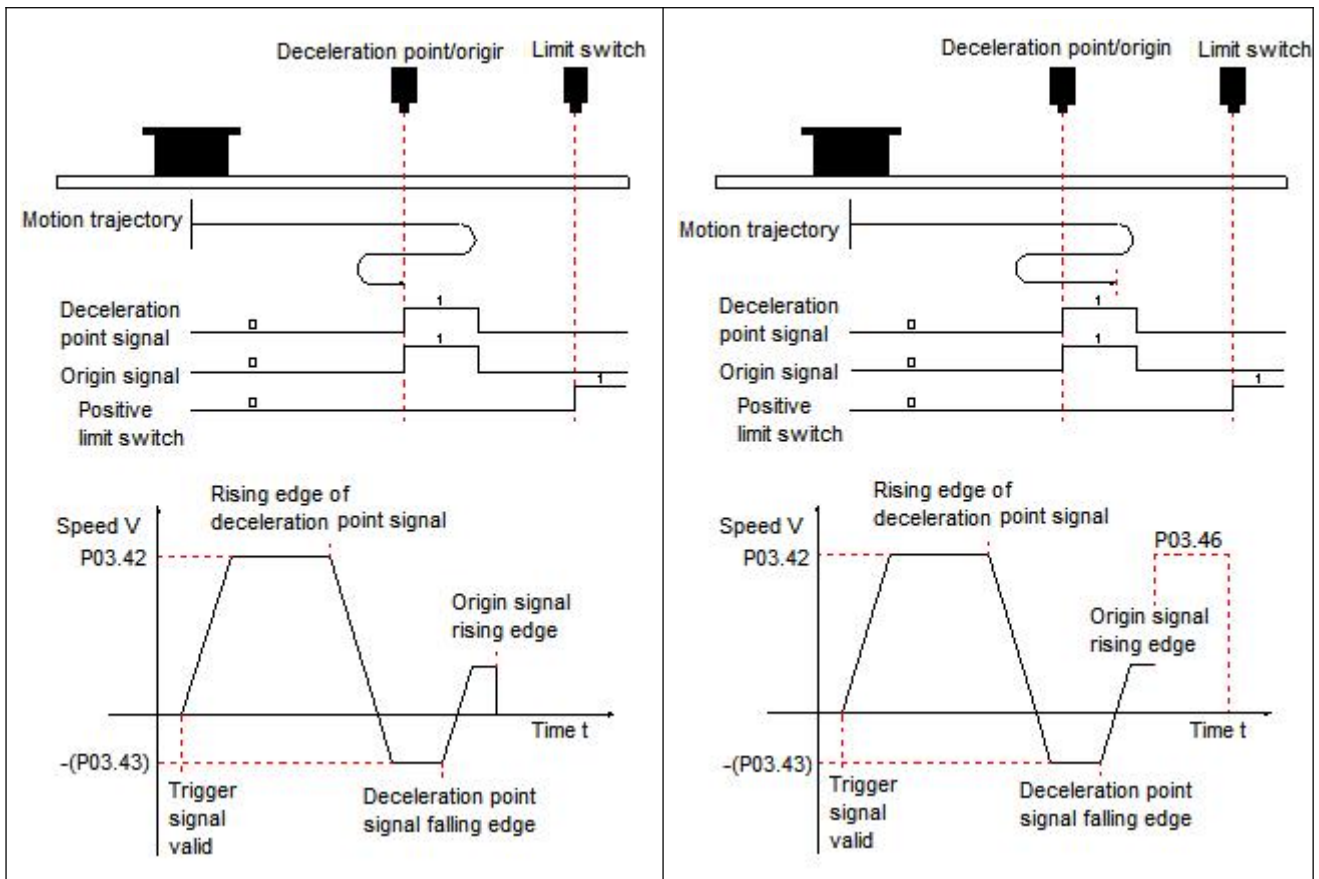
The mechanical zero point of the system is known after the motor has undergone a mechanical homing operation. At this time, after setting P03.46/P03.47, the motor can be moved from the current position (P13.07/P13.08) to the specified position (P03.46/P03.47). In the electrical homing mode, the motor runs at high speed at the set value of P03.42 (High speed search origin switch signal speed) throughout the entire process, and the total motor displacement is determined by the difference between P13.07/P13.08 and P03.46/P03.47, and the running direction is determined by the positive or negative of the total motor displacement. After the displacement command is completed, the motor will stop.



2) Mechanical origin and mechanical zero point

Take P03.41=0 as an example to illustrate the difference between mechanical origin and mechanical zero point:

The mechanical origin does not coincide with the mechanical zero point	The mechanical origin coincides with the mechanical zero point
<p>If the origin offset (P03.46/P03.47) is set and the mechanical origin does not coincide with the mechanical zero point (P03.49=0/2), during forward acceleration or forward uniform operation, the motor stops immediately after encountering the rising edge of the origin signal. And the current position of the motor P13.07/P13.08 is forced to the set value of P03.46/P03.47 after stopping.</p>	<p>If the origin offset (P03.46/P03.47) is set and the mechanical origin coincides with the mechanical zero point (P03.49=1/3), the motor stops immediately after encountering the rising edge of the origin signal during forward acceleration or forward uniform speed operation. After that, the motor stops after running the stroke of the set value P03.46/P03.47. At this time, the current position of the motor P13.07/P13.08 and the set value of P03.46/P03.47 are the same.</p>



6.2. Speed Control Mode

Set the value of parameter P01.00 to 1, to enable the drive to work in speed control mode.

6.2.1. Speed Command Input Setting

In speed control mode, the source of speed command should be set by parameter P04.00 first.

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P04.00	Speed command source A	0: Digital given 1: AI1 2: AI2 3: Reserved (Don't set) 4: Reserved (Don't set) 5: Multi-segment speed command	Set the speed command source for speed command source A	Set after stopping	Effective immediately	0
P04.01	Speed command source B	0: Digital given 1: AI1 2: AI2 3: Reserved (Don't set) 4: Reserved (Don't set) 5: Multi-segment speed command	Set the speed command source for speed command source B	Set after stopping	Effective immediately	0

P04.02	Speed command selection	0: Speed command source A 1: Speed command source B 2: Speed command source A+B 3: Speed command source A/B switching 4: Communication given (P04.30/31)	Set the source of speed command in speed control mode	Set after stopping	Effective immediately	0
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1. Speed command source is digital given

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.03	Digital given speed	-6000 ~ 6000	rpm	Set the maximum speed of motor running Speed is a signed value, a positive number means positive rotation, a negative number means reverse rotation	Set when running	Effective immediately	100
P04.05	Acceleration time constant	0~65535	ms	Set the time for the motor speed to uniformly accelerate from 0rpm to 1000rpm	Set when running	Effective immediately	100
P04.06	Deceleration time constant	0~65535	ms	Set the time for the motor speed to decelerate uniformly from 1000rpm to 0rpm	Set when running	Effective immediately	100

The startup method is as follows:

The motor starts to run when the servo is enabled, that is, the drive start and stop are controlled by the drive enable signal.

- ◆ The motor can modify the running speed through communication during running, and it will take effect immediately.
- ◆ The motor can select the running direction by setting the input terminal function to "FunIN.19 (speed command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P04.03 (Speed command digital given value)	Speed command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

2. The source of speed command is analog speed regulation

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P02.64	AI1 offset	-10000~10000	mV	Set the offset of analog input channel AI1	Set when running	Effective immediately	0
P02.65	AI1 filter time	0~65535	0.01ms	Set the low-pass filter time of analog input channel AI1	Set when running	Effective immediately	200
P02.66	AI1 dead zone	0~10000	0.1mV	Set the dead zone of analog input channel AI1	Set when running	Effective immediately	100
P02.67	AI1 zero drift	-5000~5000	0.1mV	Set the zero drift of analog input channel AI1	Set when running	Effective immediately	0
P02.68	AI2 offset	-10000~10000	mv	Set the offset of analog input channel AI2	Set when running	Effective immediately	0
P02.69	AI2 filter time	0~65535	0.01ms	Set the low-pass filter cutoff frequency of analog input channel AI2	Set when running	Effective immediately	200
P02.70	AI2 dead zone	0~10000	0.1mV	Set the dead zone of analog input channel AI2	Set when running	Effective immediately	100
P02.71	AI2 zero drift	-5000~5000	0.1mV	Set the zero drift of analog input channel AI2	Set when running	Effective immediately	0
P02.78	Speed value corresponding to 10V	0~6000	rpm	Set the corresponding motor speed when the analog input voltage is 10V	Set when running	Effective immediately	3000
P02.79	Torque value corresponding to 10V	0~5000	0.1%	Set the corresponding motor torque when the analog input voltage is 10V	Set when running	Effective immediately	1000
P12.14	AI zero drift calibration	0~2	-	Calibrate analog channel zero drift 1: Calibrate analog channel AI1 2: Calibrate analog channel AI2 After the zero drift calibration of the analog channel is completed, this parameter automatically changes to 0	Set when running	Effective immediately	0
P13.29	AI1 voltage	-	0.01V	Monitor the current AI1 input voltage (input voltage after zero drift and filtering)	Display	-	-
P13.34	AI2 voltage	-	0.01V	Monitor the current AI2 input voltage (input voltage after zero drift and filtering)	Display	-	-

The startup method is as follows:

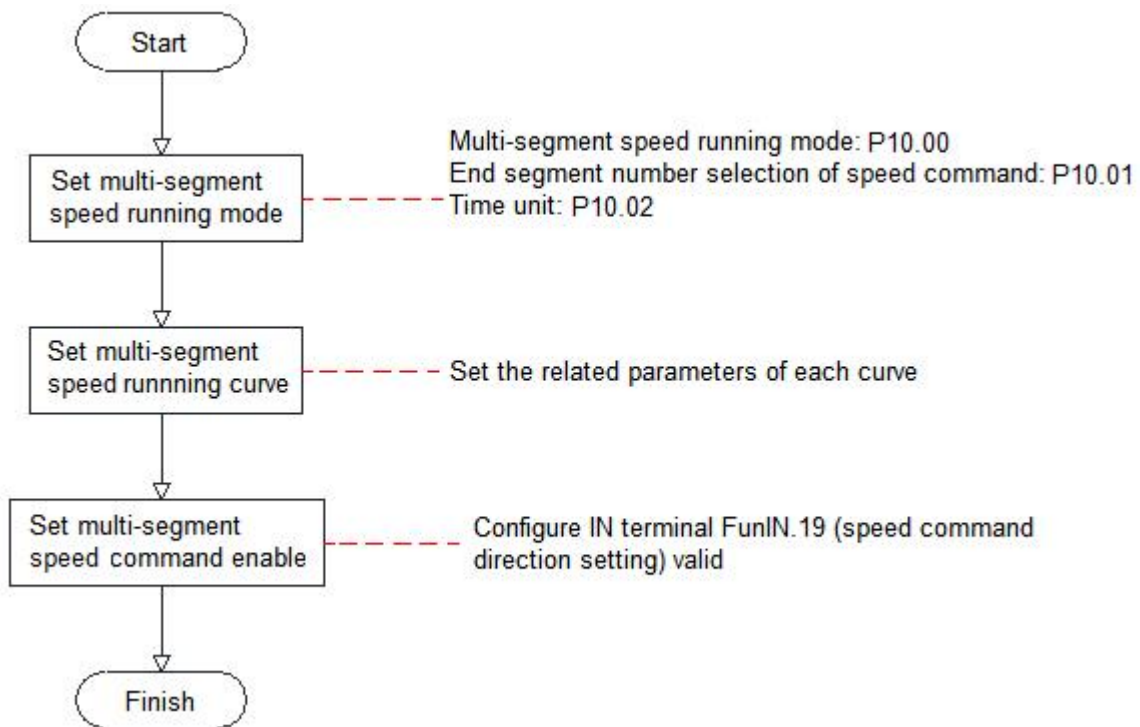
The motor starts running when the servo is enabled, that is, the start and stop of the drive are controlled by the drive enable signal.

- ◆ The motor can choose its running direction by setting the input terminal function to "FunIN.19 (speed command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P04.01 (Speed command digital given value)	Speed command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

3. Speed command source is multi-segment speed command

The servo drive has the function of multi-segment speed running. It means that there are 16 speed commands stored inside the servo drive, and the maximum running speed and running time of each segment can be set separately. And equipped with 7 groups of acceleration and deceleration time for selection. The setting process is as follows:



(1) Set multi-segment speed running mode

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P10.00	Multi-segment speed command running mode	0: Single run 1: Cycle run 2: IN input	Set multi-segment speed command running mode	Set when running	Effective immediately	0
P10.01	Number of speed command end segments	1~16	Set the number of segments required for a multi-step speed command	Set when running	Next run	16
P10.02	Running time unit	0: 0.1s 1: 1min	Select the unit of multi-segment speed command running time	Set when running	Next run	0

The external IN terminal can be configured with the function FunIN.19 (speed command direction setting) for multi-segment operation command direction selection.

Coding	Function name	Function
FunIN.19	Speed command direction setting	Invalid: default command direction Valid: the opposite direction of the command

Take P10.01=2 as an example to illustrate each mode:

1) Stop at the end of a single operation (P10.00=0)

P10.00 is set to 0 and the single run end stop mode is selected. After setting parameters P10.01 and P10.02 respectively according to the total number of executed segments and execution time units, and setting parameters such as command value, running time and acceleration/deceleration time of the corresponding segment according to the demand, the drive will run from segment 1 to segment N according to the segment code until it stops after running the last segment.

Mode description	Running curve
<ul style="list-style-type: none"> ● Run 1 round ● The segment number is automatically incremented and switched 	<p>V1max、V2max: Command speed of the 1st and 2nd segment. t1: The actual acceleration and deceleration time of the first segment. t3、t5: The actual acceleration and deceleration time of the second segment.</p> <ul style="list-style-type: none"> ● A certain period of running time: the shifting time of the previous speed command

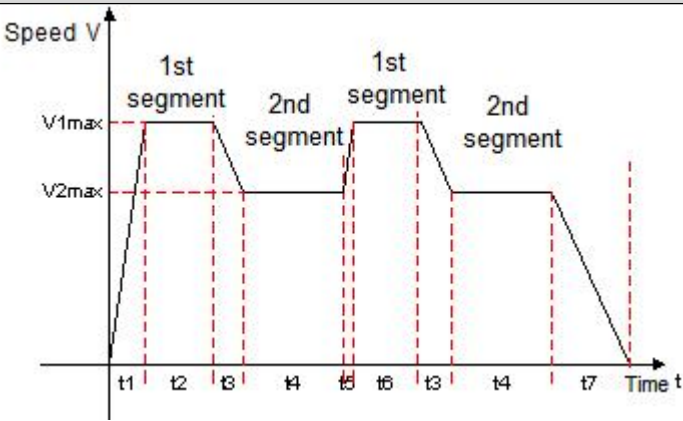
	<p>switching to this speed command + the constant speed running time of this segment(for example: the running time of the first segment in the figure is t_1+t_2, and the running time of the second segment is t_3+t_4. And so on)</p> <ul style="list-style-type: none"> When a certain period of running time is set to 0, the drive will skip this segment speed command and execute the next segment.
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★ Term explanation

The total number of multi-segment speed commands set by P10.01 when the drive completes one run is called the completion of one round of operation.

2) Cycle operation (P10.00=1)

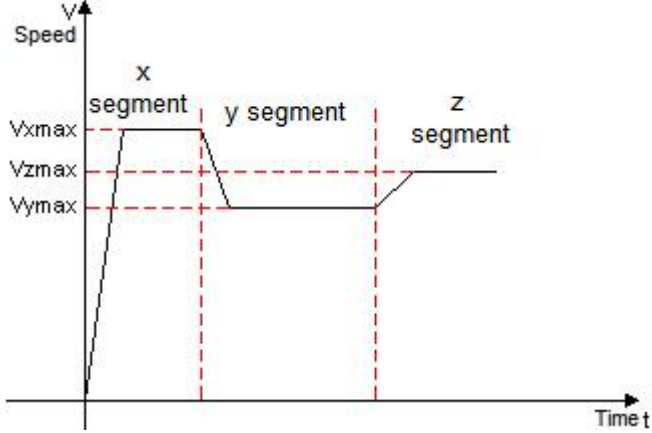
P10.00 is set to 1, and the cycle operation mode is selected. After setting the Parameters P10.01 and P10.02 respectively according to the total number of execution segments and execution time unit, and setting the command value, running time, acceleration/deceleration time and other parameters of the corresponding segment according to the demand, the module will run according to the setting of the command running time and acceleration/deceleration time of each segment, and the drive will run in the mode of speed segment from the first segment to the Nth segment, and automatically jump to the first segment for cycle operation after the last segment.

Mode description	Running curve
<ul style="list-style-type: none"> Cycle operation, the starting segment number of each round is 1 The segment number is automatically incremented and switched If the servo enable is valid, the cycle running state will always be maintained 	 <p>V1max、V2max: Command speed of the 1st and 2nd segment</p> <ul style="list-style-type: none"> A certain period of running time: the shifting time of the previous speed command switching to this speed command + the constant speed running time of this segment(for example: the running time of the first segment in the figure is t_1+t_2, and the running time of the second segment is t_3+t_4. And so on) When a certain period of running time is set to 0, the drive will skip this segment speed command and execute the next segment.

3) Switch through the external IN port (P10.00=2)

P10.00 is set to 2 to select the external IN port switching mode. After setting the parameter P10.01 according to the total number of execution segments, and set the corresponding segment command value, running time, acceleration/deceleration time and other parameters according to the requirements,

the drive will select the speed command value of the corresponding segment number according to the ON/OFF combination of external IN (multi-segment operation command switch x).

Mode description	Running curve
<ul style="list-style-type: none"> ● If the segment number is updated, it can run continuously ● The segment number is determined by the IN terminal logic ● The interval time between segments is determined by the command delay of the host computer ● If the servo enable is valid, the cycle running state will always be maintained. 	 <p>x, y: segment number, the logical relationship between segment number and IN terminal is as follows:</p> <ul style="list-style-type: none"> ● The running time of a certain segment is not affected by the parameter setting value. During the speed command operation of a certain segment, if the segment number changes, it will immediately switch to the new segment number to run.

When the multi-segment position operation mode is set to IN switching operation, please configure the 4 IN terminals of the drive as functions 14~17 (FunIN.14~FunIN.17: multi-segment running command switching), and confirm the valid logic of IN terminal. At the same time, one IN terminal of the servo drive can be configured as function 19 (FunIN.19: speed command direction setting) to switch the speed command direction.

Coding	Function name	Function																														
FunIN.14	Position/speed table 1	The multi-segment segment number is a 4-digit binary number, and the corresponding relationship between CMD1~CMD4 and the segment number is as follows: <table border="1" data-bbox="635 1534 1362 1798"> <thead> <tr> <th>CMD4</th> <th>CMD3</th> <th>CMD2</th> <th>CMD1</th> <th>Segment number</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td colspan="5" style="text-align: center;">.....</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>15</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>16</td> </tr> </tbody> </table>	CMD4	CMD3	CMD2	CMD1	Segment number	0	0	0	0	1	0	0	0	1	2					1	1	1	0	15	1	1	1	1	16
CMD4	CMD3		CMD2	CMD1	Segment number																											
0	0		0	0	1																											
0	0		0	1	2																											
.....																																
1	1	1	0	15																												
1	1	1	1	16																												
FunIN.15	Position/speed table 2																															
FunIN.16	Position/speed table 3																															
FunIN.17	Position/speed table 4																															
FunIN.19	Speed command direction selection	In multi-segment IN switching operation mode, used to set the speed command direction Invalid: keep the original command direction Valid: the direction of the speed command is reversed																														

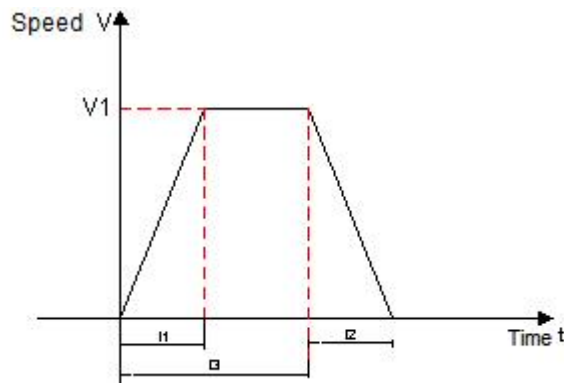
(2) Multi-segment speed running curve setting

Take the segment 1 speed command as an example, the relevant parameters are as follows:

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P10.03	Acceleration time constant 1	0~65535	ms	Set the first group acceleration and deceleration time constant	Set when running	Effective immediately	100
P10.04	Deceleration time constant 1	0~65535	ms		Set when running	Effective immediately	100
P10.15	Acceleration time constant 7	0~65535	ms	Set the 7th group acceleration and deceleration time constant	Set when running	Effective immediately	100
P10.16	Deceleration time constant 7	0~65535	ms		Set when running	Effective immediately	100
P10.20	Segment 1 speed command	-6000~6000	rpm	Set the first segment speed command value	Set when running	Effective immediately	100
P10.21	Segment 1 speed command running time	0~65535	0.1s/ 1min	Set the first segment command running time	Set when running	Effective immediately	10
P10.22	Segment 1 speed command acceleration and deceleration time constant selection	0~6	-	Select the first segment acceleration and deceleration mode	Set when running	Effective immediately	1

There are 7 groups of acceleration and deceleration time for selection in the multi-segment speed command parameters, except for the 1 to 16 segments of command value and command running time. The default mode is acceleration and deceleration time constant 1. In the multi-segment speed, P10.00=1, the end of a single operation is taken as an example, and the actual acceleration and deceleration time and running time are explained:



As shown in the figure above, the speed command of this segment is V1, and the actual acceleration time t1 is:

$$t_1 = \frac{V_1}{1000} * \text{The acceleration time of the speed setting}$$

Actual deceleration time t2:

$$t_2 = \frac{V_1}{1000} * \text{The deceleration time of the speed setting}$$

Running time: the shift time when the previous speed command is switched to this speed command + the constant speed running time of this segment, as shown in t3 in the figure.

4. The speed command source is communication given

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.30 P04.31	Communication given speed	-9000000 ~ 9000000	0.001rpm	Set the maximum speed of motor operation Speed is a signed value, a positive number means positive rotation, a negative number means reverse rotation	Set when running	Effective immediately	0
P04.05	Acceleration time constant	0~65535	ms	Set the time for the motor speed to uniformly accelerate from 0rpm to 1000rpm	Set when running	Effective immediately	100
P04.06	Deceleration time constant	0~65535	ms	Set the time for the motor speed to uniformly decelerate from 1000rpm to 0rpm	Set when running	Effective immediately	100

The startup method is as follows:

The motor starts running when the servo is enabled, that is, the start and stop of the drive are controlled by the drive enable signal.

◆ The motor can choose its running direction by setting the input terminal function to "FunIN.19 (speed command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P04.30 (Speed command digital given value)	Speed command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

6.2.2.Speed Related Output Signal

To use the speed signal output function, you need to set the drive output port function parameter to the corresponding output function value.

1. Motor rotation signal

When the absolute value of the actual motor speed after filtering reaches P04.08 (motor rotation speed), the motor can be regarded as rotating. At this time, the servo drive outputs a motor rotation signal, which is used to transmit that the motor has rotated. Conversely, when the absolute value of the actual motor speed is less than P04.08, it is considered that the motor is not in a rotating state. The judgment of the motor rotating output signal is not affected by the drive operation state and control mode.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.08	Motor rotation speed	0~6000	rpm	Set the motor rotation signal judgment threshold	Set when running	Effective immediately	10

2. Speed consistent signal

In speed control mode, when the absolute value of the deviation between the actual speed of the servo motor and the speed command after filtering is within the value range set by P04.09, it is considered that the actual speed of the motor reaches the speed command setting value, and the drive outputs a speed consistent signal at this time. Conversely, after filtering, the absolute value of the deviation between the actual speed of the servo motor and the speed command exceeds the set threshold, and the speed consistent signal is invalid.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.09	Speed consistent width threshold	0~500	rpm	Set speed consistent signal threshold	Set when running	Effective immediately	10

3. Speed arrival signal

When the absolute value of the actual speed of the servo motor after filtering exceeds the set value of P04.10, it is considered that the actual speed of the servo motor has reached the expected value, and the servo drive can output a speed arrival signal at this time. Conversely, if the absolute value of the actual speed of the servo motor after filtering is not greater than the set value, the speed arrival signal is invalid. The judgment of the motor speed reaching the output signal is not affected by the drive operation state and control mode.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.10	Speed reached threshold	0~6000	rpm	Set speed reached signal judgment threshold	Set when running	Effective immediately	1000

4. Zero speed signal

When the absolute value of the actual speed of the servo motor after filtering is less than the value set in P04.11, it is considered that the actual speed of the servo motor is close to static, and the servo drive can output a zero speed signal at this time. Conversely, if the absolute value of the actual speed of the servo motor is greater than the set value, it is considered that the motor is not at a standstill and the zero speed signal is invalid. The judgment of the zero speed output signal of the motor is not affected by the operating state and control mode of the drive.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P04.11	Zero speed output signal threshold	0~6000	rpm	Set the threshold for determining the zero-speed output signal of the motor	Set when running	Effective immediately	10

6.3. Torque Control Mode

6.3.1. Torque Command Input Setting

In the torque control mode, the speed command source should first be set via parameter P05.00.

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P05.00	Torque command source A	0: Digital given torque 1: AI1 given torque 2: AI2 given torque 3: Reserved (Don't set) 4: Reserved (Don't set) 5: Reserved (Don't set) 6: Reserved (Don't set) 7: Reserved (Don't set)	-	Set the command source of torque command source A	Set after stopping	Effective immediately	0
P05.01	Torque command source B	0: Digital given torque 1: AI1 given torque 2: AI2 given torque 3: Reserved (Don't set) 4: Reserved (Don't set) 5: Reserved (Don't set) 6: Reserved (Don't set) 7: Reserved (Don't set)	-	Set the command source of torque command source B	Set after stopping	Effective immediately	0
P05.02	Torque command source	0: Torque command source A 1: Torque command source B	-	Set the torque command source in torque mode	Set after stopping	Effective immediately	0

		2: Torque command source A+B 3: Torque command source A/B switching 4: Communication given torque					
--	--	---	--	--	--	--	--

1. The source of torque command is digital given

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P05.03	Digital given torque	-3000 ~ 3000	0.1%	Set the torque command of motor running torque is a signed value, a positive number means positive torque, a negative number means negative torque	Set when running	Effective immediately	0

The startup method is as follows:

The motor starts to run when the servo is enabled, that is, the drive start and stop are controlled by the drive enable signal.

- ◆ The motor can modify the running speed through communication during running, and it will take effect immediately.
- ◆ The motor can select the running direction by setting the input terminal function to "FunIN.18 (torque command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P05.03 (Torque command digital given value)	Torque command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

2. The source of the torque command is an analog

★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P02.64	AI1 offset	-10000~10000	mV	Set the offset of analog input channel AI1	Set when running	Effective immediately	0
P02.65	AI1 filter time	0~65535	0.01ms	Set the low-pass filter time of analog input channel AI1	Set when running	Effective immediately	200
P02.66	AI1 dead zone	0~10000	0.1mV	Set the dead zone of analog input channel AI1	Set when running	Effective immediately	100
P02.67	AI1 zero drift	-5000~5000	0.1mV	Set the zero drift of analog input channel AI1	Set when running	Effective immediately	0
P02.68	AI2 offset	-10000~10000	mv	Set the offset of analog input channel AI2	Set when running	Effective immediately	0
P02.69	AI2 filter time	0~65535	0.01ms	Set the low-pass filter cutoff frequency of analog input channel AI2	Set when running	Effective immediately	200
P02.70	AI2 dead zone	0~10000	0.1mV	Set the dead zone of analog input channel AI2	Set when running	Effective immediately	100
P02.71	AI2 zero drift	-5000~5000	0.1mV	Set the zero drift of analog input channel AI2	Set when running	Effective immediately	0
P02.78	Speed value corresponding to 10V	0~6000	rpm	Set the corresponding motor speed when the analog input voltage is 10V	Set when running	Effective immediately	3000
P02.79	Torque value corresponding to 10V	0~5000	0.1%	Set the corresponding motor torque when the analog input voltage is 10V	Set when running	Effective immediately	1000
P12.14	AI zero drift calibration	0~2	-	Calibrate analog channel zero drift 1: Calibrate analog channel AI1 2: Calibrate analog channel AI2 After the zero drift calibration of the analog channel is completed, this parameter automatically changes to 0	Set when running	Effective immediately	0
P13.29	AI1 voltage	-	0.01V	Monitor the current AI1 input voltage (input voltage after zero drift and filtering)	Display	-	-
P13.34	AI2 voltage	-	0.01V	Monitor the current AI2 input voltage (input voltage after zero drift and filtering)	Display	-	-

The startup method is as follows:

The motor starts running when the servo is enabled, that is, the start and stop of the drive are controlled by the drive enable signal.

- ◆ The motor can choose its running direction by setting the input terminal function to "FunIN.19 (speed command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P04.01 (Torque command digital given value)	Torque command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-	Valid	CW

3. The source of the torque command is communication given

- ★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P05.20	Communication given torque	-300000 ~ 300000	0.001%	Set the torque command of motor running torque is a signed value, a positive number means positive torque, a negative number means negative torque	Set when running	Effective immediately	0

The startup method is as follows:

The motor starts to run when the servo is enabled, that is, the drive start and stop are controlled by the drive enable signal.

- ◆ The motor can modify the running speed through communication during running, and it will take effect immediately.
- ◆ The motor can select the running direction by setting the input terminal function to "FunIN.18 (torque command direction selection)". The actual running direction of the motor is as follows:

P01.01 (Rotation direction selection)	P05.03 (Torque command digital given value)	Torque command direction setting	Actual running speed of motor
0	+	Invalid	CCW
	+	Valid	CW
	-	Invalid	CW
	-	Valid	CCW
1	+	Invalid	CW
	+	Valid	CCW
	-	Invalid	CCW
	-6:	Valid	CW

6.3.2. Torque Limiting Function

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P05.06	Torque limit source	0: Internal torque limit 1: Internal/external torque limit 2: ECAT control (The smaller values of 0x6072 and 0x60E0/0x60E1) 3: ECAT control (Switching between smaller values of 0x6072 and 0x60E0/0x60E1 or smaller values of external torque) 4: ECAT control (Switching between smaller values of internal torque limit 0x6072 and 0x60E0/0x60E1) 5: Internal torque switching 6: Internal/external torque limit 7: AI channel input limit 8: AI channel input limit or switching the external torque small value 9: Internal torque limit and AI channel input limit switching	Set the torque limit source/mode of the drive	Set when running	Effective immediately	2

P05.06 set value	Running direction	Torque limit input signal	Torque limit value
0	Forward	-	P05.08
	Reverse	-	P05.09
1	Forward	-	P05.08
			P05.10
	Reverse	-	P05.09
			P05.11
2			
3			
4			
5	Forward	-	P05.08
	Reverse	-	P05.09
6	Forward	-	P05.08
			P05.10
	Reverse	-	P05.09
			P05.11
7	Forward	-	AIx control (P05.07=0:AI1; P05.07=1:AI2)
	Reverse		

8	Forward	FunIN.33 is invalid	Alx control (P05.07=0:AI1; P05.07=1:AI2)
		FunIN.33 is valid	If Alx input is greater than P05.10: P05.10 If Alx input is less than P05.10: Alx Among than: Alx (P05.07=0: AI1; P05.07=1: AI2)
	Reverse	FunIN.34 is valid	Alx control (P05.07=0: AI1; P05.07=1: AI2)
		FunIN.34 is invalid	If Alx input is greater than P05.11: P05.11 If Alx input is less than P05.11: Alx Among than: Alx (P05.07=0: AI1; P05.07=1: AI2)
9	Forward	FunIN.33 is invalid	P05.08
		FunIN.33 is valid	Alx control (P05.07=0: AI1; P05.07=1: AI2)
	Reverse	FunIN.34 is invalid	P05.09
		FunIN.34 is valid	Alx control (P05.07=0: AI1; P05.07=1: AI2)

6.3.3.Speed Limit in Torque Mode

In the torque control mode, if the given torque command is too large and greater than the mechanical side load torque, the motor will continue to accelerate, overspeed may occur, and the mechanical equipment may be damaged. Therefore, in order to protect the machine, the speed of the motor must be limited.

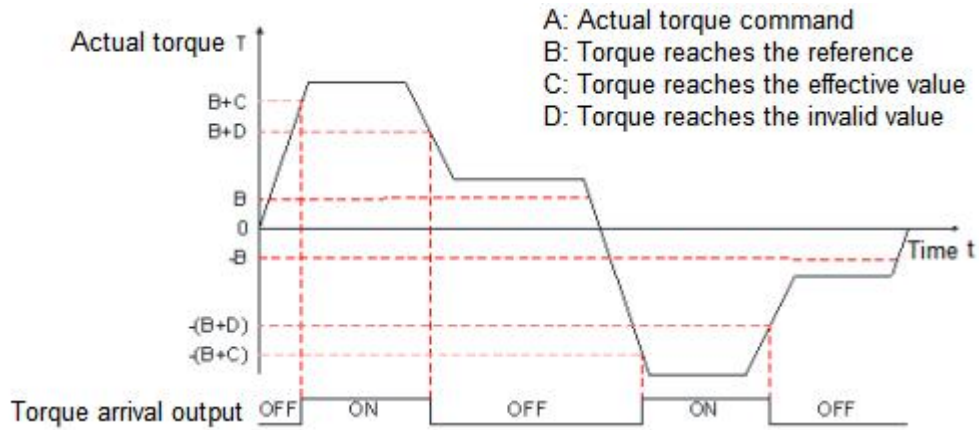
★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P05.12	Torque mode speed limit source	0: Internal speed limit 1: AI input speed limit 2: Select internal speed limit by IN	Set the forward speed limit value in torque control mode	Set when running	Effective immediately	1

P05.06 set value	Running direction	Torque limit input signal	Torque limit value
0	Forward	-	P05.14
	Reverse	-	P05.15
1	Forward	-	If Alx input is less than P05.14: Alx If Alx input is greater than P05.14: P05.14 Alx control (P05.13=0: AI1; P05.13=1: AI2)
	Reverse	-	If Alx input is less than P05.15: Alx If Alx input is greater than P05.15: P05.15 Alx control (P05.13=0: AI1; P05.13=1: AI2)
2	Forward	FunIN.35 is invalid	P05.14
		FunIN.35 is valid	P05.15
	Reverse	FunIN.35 is invalid	P05.14
		FunIN.35 is valid	P05.15

6.3.4. Torque Arrival Output

The torque arrival function is used to determine whether the actual torque command has reached the set interval. When the actual torque command reaches the torque command threshold, the drive can output the corresponding output signal (torque arrival) for the host computer to use the input/output parameters. [Group P02: Terminal Input/Output Parameters.](#)



Actual torque command (The value of parameter P13.03 can be read by communication):

When the torque reaches the output signal from invalid to valid, the actual torque command must satisfy:

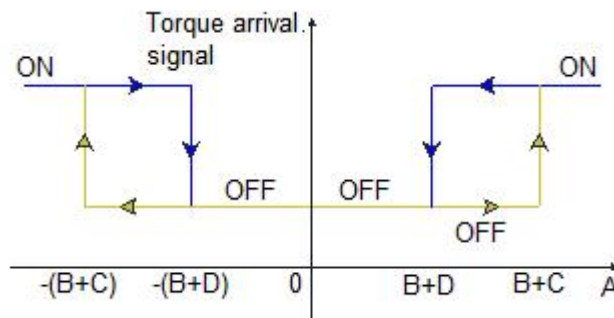
$$|A| \geq B + C$$

Otherwise, the torque arrival output signal remains invalid.

Conversely, when the torque arrival signal from valid to invalid, the actual torque command must satisfy:

$$|A| < B + D$$

Otherwise, the torque arrival output signal remains valid.



★ Associated parameter description

Parameter	Name	Range	Unit	Function	Setting method	Effective time	Default
P05.16	Torque reaches output reference value	0~3000	0.1%	Set the reference value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	0
P05.17	Torque reaches output effective value	0~3000	0.1%	Set the effective value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	300
P05.18	Torque reaches output invalid value	0~3000	0.1%	Set the invalid value of the motor torque when the running torque reaches the signal output	Set when running	Effective immediately	200

6.4. Hybrid Control Mode

The hybrid control mode means that when the servo enable bit is ON and the servo state is running, the working mode of the servo drive can be switched between different control modes.

There are four main types of mixed control modes:

- ◆ Speed mode - Torque mode
- ◆ Position mode - Speed mode
- ◆ Position mode - Torque mode
- ◆ Position mode - Speed mode - Torque mode

Set by parameter P01.00 (control mode selection), as shown in the following table:

★ Associated parameter description

Parameter	Name	Range	Function	Setting method	Effective time	Default
P01.00	Control mode selection	0: Position control mode 1: Speed control mode 2: Torque control mode 3: EtherCAT control mode 4: Speed mode - Torque mode 5: Position mode - Speed mode 6: Position mode - Torque mode 7: Position mode - Speed mode - Torque mode 8: CANopen control mode	Set the control mode of the servo drive	Set after stopping	Effective immediately	0

When P01.00 is set to 4/5/6, please configure an IN terminal of the servo drive as function 10 (FunIN.10: control mode selection 1), and determine the effective logic level value of the IN terminal. When P01.00 is set to 7, please configure the two IN terminals of the servo drive as function 10 (FunIN.10: control mode selection 1) and function 29 (FunIN.29: control mode selection 2) respectively. And determine the effective logic level of these two IN terminals.

★ Associated function coding

Coding	Name	Function																		
FunIN.10	Control mode selection 1	Used to set the current control mode of servo drive in hybrid control mode:																		
		<table border="1"> <thead> <tr> <th>P01.00</th> <th>FunIN.10 logic</th> <th>Control mode</th> </tr> </thead> <tbody> <tr> <td rowspan="2">4</td> <td>Invalid</td> <td>Speed control mode</td> </tr> <tr> <td>Valid</td> <td>Torque control mode</td> </tr> <tr> <td rowspan="2">5</td> <td>Invalid</td> <td>Position control mode</td> </tr> <tr> <td>Valid</td> <td>Speed control mode</td> </tr> <tr> <td rowspan="2">6</td> <td>Invalid</td> <td>Position control mode</td> </tr> <tr> <td>Valid</td> <td>Torque control mode</td> </tr> </tbody> </table>	P01.00	FunIN.10 logic	Control mode	4	Invalid	Speed control mode	Valid	Torque control mode	5	Invalid	Position control mode	Valid	Speed control mode	6	Invalid	Position control mode	Valid	Torque control mode
		P01.00	FunIN.10 logic	Control mode																
		4	Invalid	Speed control mode																
			Valid	Torque control mode																
		5	Invalid	Position control mode																
			Valid	Speed control mode																
		6	Invalid	Position control mode																
Valid	Torque control mode																			

FunIN.29	Control mode selection 2	Used to set the current control mode of servo drive in hybrid control mode:			
		P01.00	FunIN.29 logic	FunIN.10 logic	Control mode
		7	Invalid	Invalid	Position control mode
			Invalid	Valid	Speed control mode
Valid	-		Torque control mode		

6.5. Absolute System

6.5.1. Absolute System Instructions

The absolute encoder not only detects the position of the motor within one revolution, but also counts the number of motor rotations, and can memorize 16-bit multi-turn data. The absolute system composed of absolute encoders is divided into absolute position linear mode and absolute position rotation mode, which can be used in position, speed, and torque control modes. When the drive is powered off, the encoder backs up data through the battery. After power on, the drive calculates the mechanical absolute position through the encoder's absolute position, without the need to repeat the mechanical origin homing operation.

When the absolute value motor is first connected, AL.221 (encoder battery fault) or AL.222 (encoder multi-turn counting fault) will occur. After connecting the battery, set P12.05=1 (reset encoder fault), and then perform the homing operation.

- ◆ Note: When modifying P01.01 (running positive direction selection) or executing P12.05 (absolute value encoder reset), the absolute position of the encoder will undergo a sudden change, resulting in a change in the mechanical absolute position reference. Therefore, it is necessary to perform the mechanical zero return operation again. When using the internal zero return function of the driver, after the zero return is completed, the driver will automatically calculate the mechanical absolute position and encoder absolute position deviation, and store them in the EEPROM chip of the driver.
- ★ Associated parameter description

P01.03	Name	Position mode selection					Data structure	-	Data type	Uint16
	Data range	0~2	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO
Used to set the absolute position mode:										
0- Incremental position mode										
1- Absolute linear position mode										
2- Absolute rotation position mode (reserved, do not set)										
Note: After reading the parameters stored in the encoder storage chip when powered on by the driver, if the motor is a multi turn absolute value motor (i.e. when P00.34 is set to 1), the default factory parameters will automatically set the value of P01.03 to 1. If this function needs to be disabled, it can be resolved by setting P01.18 to 1.										

P01.18	Name	Auto setting absolute mode					Data structure	-	Data type	Uint16
	Data range	0~1	Factory setting	1	Accessibility	RW	Related mode	ALL	Mapping	NO

Set whether to automatically set the parameters of P01.03 to absolute linear position mode function based on encoder type P00.34:

0- Prohibit (the parameter value of P01.03 is set by the user)

1- Enable (if the current encoder type is multi turn absolute and the value of P01.03 is not 2 (absolute rotation position mode), automatically set the value of P01.03 to 1 (absolute linear position mode))

Note: The parameters need to be powered off and restarted before taking effect.

P01.51	Name	Disable encoder multi-turn overflow fault					Data structure	-	Data type	Uint16
	Data range	0~1	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO

Used to set the absolute position mode:

0- When encountering encoder multi-turn overflow fault, the drive reports an error

1- Prohibit encoder multi-turn overflow fault reporting

P12.05	Name	Absolute encoder reset					Data structure	-	Data type	Uint16
	Data range	0~2	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO

Used to set the absolute position mode:

0- No effect/reset operation completed

1- Reset absolute value encoder fault

2- Reset absolute encoder fault and multi-turn data

6.5.2.Encoder Position Feedback

P13.24	Name	Encoder single-turn value (Encoder unit)					Data structure	-	Data type	Int32
P13.25	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P13.26	Name	Encoder multi-turn value (Revolutions)					Data structure	-	Data type	Uint16
	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P13.60	Name	Encoder real-time position, low 32-bit (Encoder unit)					Data structure	-	Data type	Uint32
P13.61		Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping

P13.62	Name	Encoder real-time position, high 32-bit (Encoder unit)					Data structure	-	Data type	Int32
P13.63		Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping

- ◆ The absolute encoder number of turns (P13.26) is an unsigned number, ranging from 0 to 65535. Assuming the encoder resolution is R_2 ($R_2 = 2^{17}$), the absolute encoder single-turn value (P13.24) ranges from 0 to R_2 .
- ◆ Encoder real-time position ($P13.62 * 2^{32} + P13.60$) can be calculated through P13.24, P13.26 and R_2 , and the calculation formulas are as follows:

When the value of P13.26 is less than 32768, $P13.62 * 2^{32} + P13.60 = P13.24 * R_2 + P13.24$

When the value of P13.26 is greater than or equal to 32768, $P13.62 * 2^{32} + P13.60 = (P13.24 - 65536) * R_2 + P13.24$

6.5.3. Absolute Linear Position Mode

P13.09	Name	Actual position (Command unit)					Data structure	-	Data type	Int32
P13.10	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P03.64	Name	Absolute value zero offset, low 32-bit (Encoder unit)					Data structure	-	Data type	Uint32
P03.65	Data range	$0 \sim 2^{32}$	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO

P03.66	Name	Absolute value zero offset, high 32-bit (Encoder unit)					Data structure	-	Data type	Int32
P03.67	Data range	$-2^{31} \sim 2^{32} - 1$	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO

P13.64	Name	Real-time mechanical position, low 32-bit (Encoder unit)					Data structure	-	Data type	Uint32
P13.65	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P13.66	Name	Real-time mechanical position, high 32-bit (Encoder unit)					Data structure	-	Data type	Int32
P13.67	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

- ◆ The absolute linear position mode is mainly used in situations where the load stroke range of the device is fixed and the encoder's multi-turn data will not overflow.
- ◆ Assuming the real-time mechanical absolute position P13.64/P13.66 is P_m ($P_m = P13.66 * 2^{32} + P13.67$), encoder real-time position P13.60/P13.62 is P_B ($P_B = P13.60 * 2^{32} + P13.62$), with an absolute zero offset of P_O ($P_O = P03.64 * 2^{32} + P03.66$), then the relationship between the three is $P_m = P_B - P_O$.

- ◆ Assuming that the numerator/denominator of the electronic gear ratio is N/D, then the real-time position ($P13.09$) = $P_M * D/N$.
- ◆ The absolute zero offset (P03.64/P03.66) defaults to 0. After the internal homing function of the drive is completed, the drive automatically calculates the deviation between the encoder's real-time position and the real-time mechanical position. The deviation value is the value of P03.64/P03.66 and is saved in the drive's EEPROM.
- ◆ The absolute linear position mode encoder has a multi-turn data range of -32768 to 32767. If the number of forward turns is greater than 32767 or the number of reverse turns is less than -32768, the drive will experience AL.223 (encoder multi-turn count overflow fault), which can be masked by setting P01.51.

6.5.4.Absolute Rotation Position Mode

P03.68	Name	Absolute rotation mode mechanical gear ratio numerator					Data structure	-	Data type	Uint16	
	Data range	1~65535	Factory setting	1	Accessibility	RW	Related mode	ALL	Mapping	NO	

It only works when the number of encoder pulses (P03.70/P03.72) for one revolution of the load in absolute value rotation mode is set to 0. In this setting, assuming the encoder resolution is R_E and the number of encoder pulses corresponding to one revolution of the load is R_M , then $R_M = R_E * P03.68/P03.69$.

P03.69	Name	Absolute rotation mode mechanical gear ratio denominator					Data structure	-	Data type	Uint16	
	Data range	1~65535	Factory setting	1	Accessibility	RW	Related mode	ALL	Mapping	NO	

P03.70 P03.71	Name	Number of encoder pulses for one revolution of the load in absolute rotation mode, low 32-bit					Data structure	-	Data type	Uint32	
	Data range	0~2 ³²	Factory setting	1	Accessibility	RW	Related mode	ALL	Mapping	NO	

P03.72 P03.74	Name	Number of encoder pulses for one revolution of the load in absolute rotation mode, high 32-bit					Data structure	-	Data type	Int32	
	Data range	-2 ³¹ ~2 ³¹ -1	Factory setting	0	Accessibility	RW	Related mode	ALL	Mapping	NO	

When the number of encoder pulses (P03.70/P03.72) for one revolution of the load in absolute value rotation mode is set to 0, the number of encoder pulses corresponding to one revolution of the load is determined by P03.68 and P03.69. When the value set for this object is non-zero, assuming the encoder resolution is R_E and the number of encoder pulses corresponding to one revolution of the load is R_M , then $R_M = P03.72 * 2^{32} + P03.70$.

P13.09	Name	Actual position (Command unit)					Data structure	-	Data type	Int32
P13.10	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

At the initial stage of power on, its value is equal to the selected load single-turn position (P13.74/P13.75), and then the monitoring object accumulates and calculates based on the encoder position feedback. If the position feedback exceeds the value range of the object, there will be a winding phenomenon.

Assuming that the number of encoder pulses corresponding to one revolution of the load is R_M , then $P13.09 = \text{number of turntable revolutions} * R_M + P13.74$.

P13.64	Name	Real-time mechanical position, low 32-bit (Encoder unit)					Data structure	-	Data type	Uint32
P13.65	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P13.66	Name	Real-time mechanical position, high 32-bit (Encoder unit)					Data structure	-	Data type	Int32
P13.67	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

At the initial stage of power on, its value is equal to the selected load single-turn position (P13.70/P13.72), and then the monitoring object accumulates and calculates based on the encoder position feedback. If the position feedback exceeds the value range of the object, there will be a winding phenomenon.

Assuming that the number of encoder pulses corresponding to one revolution of the load is R_M , then real-time mechanical position $(P13.64 * 2^{32} + P13.66) = \text{number of turntable revolutions} * R_M + P13.74$.

P13.70	Name	Rotation load single-turn position, low 32-bit (Encoder unit)					Data structure	-	Data type	Uint32
P13.71	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

P13.72	Name	Rotation load single-turn position, high 32-bit (Encoder unit)					Data structure	-	Data type	Int32
P13.73	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

Assuming that the number of encoder pulses corresponding to one revolution of the load is R_M , then the numerical range for rotation load single-turn position (encoder unit, $P13.72 * 2^{32} + P13.70$) is $0 \sim R_M$

P13.74	Name	Rotation load single-turn position (Command unit)					Data structure	-	Data type	Int32
P13.75	Data range	-	Factory setting	0	Accessibility	RO	Related mode	ALL	Mapping	NO

Assuming that the numerator/denominator of the electronic gear ratio is N/D, the numerical range for rotation load single-turn position is $0 \sim R_M * D/N$. $P13.74 = (P13.72 * 2^{32} + P13.70 * D/N)$.

6.5.5. Precautions for using the absolute system battery box

- ◆ When the battery is first connected, AL.221 (encoder battery failure) will occur. P12.05=1 needs to be set to reset the encoder fault before proceeding with absolute position system operation.
- ◆ When the detected battery voltage is less than 3.0V, AL.418 (encoder battery warning) will occur.

Please replace the battery with a new one as follows:

Step 1: Power on the drive and put it in a non-operating state;

Step 2: Replace the battery;

Step 3: After the drive automatically releases AL.418 (encoder battery warning), there are no other abnormal warnings and it can operate normally.

Note:

- ◆ In the case of servo power failure, replacing the battery and powering on again will cause AL.221 (encoder battery failure), causing sudden changes in multi-turn data. Please set P12.05=1 to reset the encoder fault and perform the origin homing function operation again.
- ◆ If the drive is in a power-off state, please ensure that the maximum motor speed does not exceed 6000rpm to ensure that the encoder position information is accurately recorded.
- ◆ During storage, please store according to the specified ambient temperature and ensure reliable battery contact and sufficient power, otherwise it may cause the loss of encoder position information.
- ◆ Encoder battery specification: 3.6V, 2500mAh.

7. Parameter Description

Parameter group	Parameter group description
P00	Servo drive/motor parameters
P01	Basic control parameters
P02	Input/output terminal parameters
P03	Position control parameters
P04	Speed control parameters
P05	Torque control parameters
P06	Gain parameters
P07	Auto-tuning parameters
P08	Communication parameters
P09	Multi-segment position parameters
P10	Multi-segment speed parameters
P12	Auxiliary parameters
P13	Monitor parameters

7.1. Group P00: Servo Drive/Motor Parameters

P00.00	Name	Motor model			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	5000

P00.01	Name	Drive model			Related mode	Display
	Setting range	0~65535	Unit	-	Factory setting	34

Display servo drive model

Display value	Description	Display value	Description	Display value	Description
0x10(16)	RS100E	0x20(32)	RS100	0x30(48)	RS100C
0x11(17)	RS200E	0x21(33)	RS200	0x31(49)	RS200C
0x12(18)	RS400E	0x22(34)	RS400	0x32(50)	RS400C
0x13(19)	RS750E	0x23(35)	RS750	0x33(51)	RS750C
0x14(20)	RS1000E	0x24(36)	RS1000	0x34(52)	RS1000C
0x15(21)	RS1500E	0x25(37)	RS1500	0x35(53)	RS1500C
0x16(22)	RS3000E	0x26(38)	RS3000	0x36(54)	RS3000C

P00.02	Name	Servo software version			Related mode	Display
	Setting range	XXX.YY	Unit	-	Factory setting	-

P00.05	Name	Drive hardware version			Related mode	Display
	Setting range	-	Unit	-	Factory setting	-

P00.07	Name	Servo customized No.			Related mode	Display
	Setting range	-	Unit	-	Factory setting	-

P00.09	Name	Reserved			Related mode	Display
	Setting range	-	Unit	-	Factory setting	-

P00.10	Name	Reserved			Related mode	Display
	Setting range	-	Unit	-	Factory setting	-

P00.16	Name	Motor ID			Related mode	Display
	Setting range	0~65535	Unit	-	Factory setting	50604

P00.17	Name	Motor rated power			Related mode	-
	Setting range	0~65535	Unit	0.01KW	Factory setting	40

P00.18	Name	Motor rated voltage			Related mode	-
	Setting range	0~65535	Unit	V	Factory setting	220
P00.19	Name	Motor rated current			Related mode	-
	Setting range	0~65535	Unit	0.1A	Factory setting	23
P00.20	Name	Motor rated speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	3000
P00.21	Name	Motor maximum speed			Related mode	-
	Setting range	0~65535	Unit	rpm	Factory setting	5000
P00.22	Name	Motor rated torque			Related mode	-
	Setting range	0~65535	Unit	0.01Nm	Factory setting	127
P00.23	Name	Motor maximum torque			Related mode	-
	Setting range	0~65535	Unit	0.01Nm	Factory setting	381
P00.24	Name	Motor moment of inertia			Related mode	-
	Setting range	0~65535	Unit	0.01kg.cm ²	Factory setting	63
P00.25	Name	Motor pole pairs			Related mode	-
	Setting range	0~65535	Unit	Pole-pairs	Factory setting	5
P00.26	Name	Motor stator resistance			Related mode	-
	Setting range	0~65535	Unit	0.001Ω	Factory setting	3350
P00.27	Name	Motor stator inductance Lq			Related mode	-
	Setting range	0~65535	Unit	0.01mH	Factory setting	725
P00.28	Name	Motor stator inductance Ld			Related mode	-
	Setting range	0~65535	Unit	0.01mH	Factory setting	725
P00.29	Name	Motor back-EMF coefficient			Related mode	-
	Setting range	0~65535	Unit	0.01mV/rpm	Factory setting	3530

P00.30	Name	Motor torque coefficient			Related mode	-
	Setting range	0~65535	Unit	0.01Nm/Arms	Factory setting	55

P00.31	Name	Motor electric time constant			Related mode	-
	Setting range	0~65535	Unit	0.01ms	Factory setting	50

P00.32	Name	Motor mechanical time constant			Related mode	-
	Setting range		Unit	0.01ms	Factory setting	360

P00.34	Name	Motor encoder type			Related mode	-
	Setting range	1~2	Unit	-	Factory setting	2

Set the motor encoder type, please set this parameter correctly, otherwise the drive cannot work normally.

Set value	Encoder type
1	Multi-turn absolute
2	Single-turn absolute

P00.35	Name	Absolute zero offset			Related mode	-
	Setting range	0~4294967295	Unit	Encoder unit	Factory setting	0

P00.37	Name	Encoder resolution			Related mode	-
	Setting range	0~65535	Unit	Bits	Factory setting	17

P00.50	Name	Frequency-division output numerator			Related mode	-
	Setting range	1~8388608	Unit	-	Factory setting	10000

P00.52	Name	Frequency-division output denominator			Related mode	-
	Setting range	1~8388608	Unit	-	Factory setting	131072

P00.54	Name	Exchange frequency-division output AB phase sequence			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P00.55	Name	Encoder version			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P00.56	Name	Frequency-division output Z-phase width			Related mode	-
	Setting range	1~255	Unit	-	Factory setting	8

P00.57	Name	Frequency-division output Z-phase polarity			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P00.58	Name	Disable frequency-division output Z-phase configuration error			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

7.2. Group P01: Basic Control Parameters

P01.00	Name	Control mode selection			Related mode	-
	Setting range	0~8	Unit	-	Factory setting	0

Select the servo drive control mode.

Set value	Control mode
0	Position control mode
1	Speed control mode
2	Torque control mode
3	EtherCAT control mode
4	Speed - Torque control mode
5	Position - Speed control mode
6	Position - Torque control mode
7	Position -Speed - Torque control mode
8	CANopen control mode

P01.01	Name	Rotation direction selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Set the forward direction of motor rotation when observed from the motor output shaft.

Set value	Direction of rotation	Remark
0	Take the CCW direction as the forward direction	In the case of a forward command, from the side of the motor shaft, the motor rotation direction is the CCW direction, that is, the motor rotates counterclockwise.
1	Take the CW direction as the forward direction	In the case of a positive command, from the side of the motor shaft, the motor rotation direction is the CW direction, that is, the motor rotates clockwise.

P01.03	Name	Position mode selection			Related mode	Display
	Setting range	0: Incremental position mode 1: Absolute linear position mode 2: Absolute rotation position mode	Unit	-	Factory setting	-

P01.04	Name	Delay from servo OFF to brake output			Related mode	Display
	Setting range	0~1000	Unit	ms	Factory setting	500

P01.05	Name	Servo OFF to brake output speed limit			Related mode	Display
	Setting range	0~3000	Unit	rpm	Factory setting	30

P01.06	Name	Servo OFF stop mode selection			Related mode	Display
	Setting range	0~4	Unit	-	Factory setting	3

Set value	Servo OFF stop mode selection
0	Coast to stop, keeping de-energized state
1	Stop at zero speed, keeping de-energized state
2	Coast to stop, keeping DB state
3	Stop by DB, keeping DB state
4	Stop at zero speed, keeping DB state

P01.07	Name	Overtravel stop mode selection			Related mode	Display
	Setting range	0~4	Unit	-	Factory setting	3

Set value	Servo OFF stop mode selection
0	Coast to stop, keeping de-energized state
1	Coast to stop, keeping DB state
2	Stop by DB, keeping DB state
3	Stop at zero speed, keeping position lock state
4	Stop at zero speed, keeping de-energized state

P01.08	Name	Fault 2 stop mode selection			Related mode	Display
	Setting range	0~5	Unit	-	Factory setting	2

Set value	Servo OFF stop mode selection
0	Coast to stop, keeping de-energized state
1	Coast to stop, keeping DB state
2	Stop by DB, keeping DB state
3	Stop at zero speed, keeping de-energized state
4	Stop at zero speed, keeping DB state
5	Stop by DB, keeping de-energized state

P01.09	Name	Fault 1 stop mode selection			Related mode	Display										
	Setting range	0~3	Unit	-	Factory setting	2										
<table border="1"> <thead> <tr> <th>Set value</th> <th>Servo OFF stop mode selection</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Coast to stop, keeping de-energized state</td> </tr> <tr> <td>1</td> <td>Coast to stop, keeping DB state</td> </tr> <tr> <td>2</td> <td>Stop by DB, keeping DB state</td> </tr> <tr> <td>3</td> <td>Stop by DB, keeping de-energized state</td> </tr> </tbody> </table>							Set value	Servo OFF stop mode selection	0	Coast to stop, keeping de-energized state	1	Coast to stop, keeping DB state	2	Stop by DB, keeping DB state	3	Stop by DB, keeping de-energized state
Set value	Servo OFF stop mode selection															
0	Coast to stop, keeping de-energized state															
1	Coast to stop, keeping DB state															
2	Stop by DB, keeping DB state															
3	Stop by DB, keeping de-energized state															

P01.10	Name	S-ON OFF zero speed stop function			Related mode	Display
	Setting range	0: Disable 1: Enable	Unit	-	Factory setting	0

P01.11	Name	Delay from servo ON to brake output			Related mode	Display
	Setting range	0~2000	Unit	ms	Factory setting	0

P01.12	Name	Delay from brake output to command received			Related mode	Display
	Setting range	0~2000	Unit	ms	Factory setting	100

P01.13	Name	Delay from brake output to servo OFF			Related mode	Display
	Setting range	1~2000	Unit	ms	Factory setting	200

P01.16	Name	Servo ON filter time			Related mode	Display
	Setting range	0~999	Unit	ms	Factory setting	10

P01.17	Name	Disable warning display			Related mode	Display
	Setting range	0: Enable 1: Disable	Unit	-	Factory setting	0

P01.18	Name	Auto setting absolute mode			Related mode	Display
	Setting range	0: Enable 1: Disable	Unit	-	Factory setting	0

P01.19	Name	Disable frequency-division output alarm			Related mode	-										
	Setting range	0~3	Unit	-	Factory setting	30										
<table border="1"> <thead> <tr> <th>Set value</th> <th>Disable frequency-division output alarm mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Enable frequency-division bandwidth/Enable gear ratio fault</td> </tr> <tr> <td>1</td> <td>Disable frequency-division bandwidth/Enable gear ratio fault</td> </tr> <tr> <td>2</td> <td>Enable frequency-division bandwidth/Disable gear ratio fault</td> </tr> <tr> <td>3</td> <td>Disable frequency-division bandwidth/Disable gear ratio fault</td> </tr> </tbody> </table>							Set value	Disable frequency-division output alarm mode	0	Enable frequency-division bandwidth/Enable gear ratio fault	1	Disable frequency-division bandwidth/Enable gear ratio fault	2	Enable frequency-division bandwidth/Disable gear ratio fault	3	Disable frequency-division bandwidth/Disable gear ratio fault
Set value	Disable frequency-division output alarm mode															
0	Enable frequency-division bandwidth/Enable gear ratio fault															
1	Disable frequency-division bandwidth/Enable gear ratio fault															
2	Enable frequency-division bandwidth/Disable gear ratio fault															
3	Disable frequency-division bandwidth/Disable gear ratio fault															

P01.20	Name	Permissible minimum resistance of brake resistor			Related mode	Display
	Setting range	-	Unit	Ω	Factory setting	40

P01.23	Name	Resistance heat dissipation coefficient			Related mode	-
	Setting range	10~100	Unit	-	Factory setting	30

When setting and using a braking resistor, the heat dissipation coefficient of the resistor is valid for both built-in and external braking resistors. Please set this parameter according to the actual heat dissipation conditions of the resistor.

Recommended value: generally, when natural cooling, P01.23 does not exceed 30%; when forced air cooling, P01.23 does not exceed 50%.

P01.24	Name	Brake resistor type selection			Related mode	Display
	Setting range	0~3	Unit	-	Factory setting	1

Set value	Brake resistor type
0	Internal brake resistor
1	External brake resistor
2	No brake resistor
3	External brake resistor with air-cooled

P01.25	Name	External brake resistor power			Related mode	-
	Setting range	1~65535	Unit	W	Factory setting	75

P01.26	Name	External brake resistor resistance			Related mode	-
	Setting range	1~2000	Unit	Ω	Factory setting	50

P01.27	Name	Brake threshold voltage			Related mode	-
	Setting range	0~999	Unit	V	Factory setting	380

P01.28	Name	Brake feedback mode			Related mode	-
	Setting range	0: Enable feedback detection 1: Disable feedback detection	Unit	-	Factory setting	1

P01.29	Name	Brake maximum duration			Related mode	-
	Setting range	500~65535	Unit	ms	Factory setting	8000

P01.30	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P01.31	Name	Fan voltage control			Related mode	-																								
	Setting range	0~8	Unit	-	Factory setting	0																								
<table border="1"> <thead> <tr> <th>Set value</th> <th>Fan voltage control</th> <th>Set value</th> <th>Fan voltage control</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>100%</td> <td>5</td> <td>75%</td> </tr> <tr> <td>1</td> <td>95%</td> <td>6</td> <td>70%</td> </tr> <tr> <td>2</td> <td>90%</td> <td>7</td> <td>65%</td> </tr> <tr> <td>3</td> <td>85%</td> <td>8</td> <td>60%</td> </tr> <tr> <td>4</td> <td>80%</td> <td></td> <td></td> </tr> </tbody> </table>							Set value	Fan voltage control	Set value	Fan voltage control	0	100%	5	75%	1	95%	6	70%	2	90%	7	65%	3	85%	8	60%	4	80%		
Set value	Fan voltage control	Set value	Fan voltage control																											
0	100%	5	75%																											
1	95%	6	70%																											
2	90%	7	65%																											
3	85%	8	60%																											
4	80%																													

P01.32	Name	Disable update current gain			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P01.34	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.35	Name	LED default monitoring object selection			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	1

P01.36	Name	LED blinking setting			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	0

P01.37	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.38	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.39	Name	Manufacturer password			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.40	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.41	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.42	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.48	Name	Overvoltage protection			Related mode	-
	Setting range	0~999	Unit	V	Factory setting	420

P01.49	Name	Undervoltage protection			Related mode	-
	Setting range	0~999	Unit	V	Factory setting	200

P01.50	Name	Disable encoder eeprom			Related mode	-									
	Setting range	0~1	Unit	-	Factory setting	0									
P01.51	Name	Disable encoder multi-turn overflow fault			Related mode	-									
	Setting range	0: Enable multi-turn overflow fault 1: Disable multi-turn overflow fault	Unit	-	Factory setting	0									
P01.52	Name	Enable power-off parameter saving function			Related mode	-									
	Setting range	0~1	Unit	-	Factory setting	0									
P01.53	Name	Soft limit function selection			Related mode	-									
	Setting range	0: Disable soft limit 1: Enable soft limit immediately 2: Enable after successful homing	Unit	-	Factory setting	0									
P01.54	Name	Maximum input pulse frequency			Related mode	-									
	Setting range	100~4000	Unit	KHz	Factory setting	2000									
P01.55	Name	Overspeed decision threshold			Related mode	-									
	Setting range	0~10000	Unit	-	Factory setting	0									
P01.56	Name	Enable runaway protection			Related mode	-									
	Setting range	0~1	Unit	-	Factory setting	1									
P01.57	Name	Locked rotor fault detection time			Related mode	-									
	Setting range	10~65535	Unit	ms	Factory setting	200									
P01.58	Name	Enable locked rotor fault			Related mode	-									
	Setting range	0~1	Unit	-	Factory setting	1									
P01.59	Name	Motor overload protection coefficient			Related mode	-									
	Setting range	40~500	Unit	%	Factory setting	100									
P01.60	Name	Reserved (Don't set)			Related mode	-									
	Setting range	0~65535	Unit	-	Factory setting	0									
P01.61	Name	Overload setting			Related mode	-									
	Setting range	0~3	Unit	-	Factory setting	3									
		<table border="1"> <thead> <tr> <th>Set value</th> <th>Overload setting</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>Enable motor overload, disable drive load</td> </tr> <tr> <td>2</td> <td>Disable motor overload, enable drive load</td> </tr> <tr> <td>3</td> <td>Enable motor overload, enable drive load</td> </tr> </tbody> </table>		Set value	Overload setting	0	Disable	1	Enable motor overload, disable drive load	2	Disable motor overload, enable drive load	3	Enable motor overload, enable drive load		
Set value	Overload setting														
0	Disable														
1	Enable motor overload, disable drive load														
2	Disable motor overload, enable drive load														
3	Enable motor overload, enable drive load														

P01.62	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.63	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.64	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.65	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.66	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.67	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.68	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.69	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P01.78	Name	Disable running timeout fault			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	1

P01.79	Name	ECAT limit warning locked			Related mode	-
	Setting range	0~7	Unit	-	Factory setting	0

Select ECAT limit warning locked mode:

Set value	ECAT limit warning locked mode
0	Update status word, update fault code, enable limit warning
1	No update status word, update fault code, enable limit warning
2	Update status word, no update fault code, enable limit warning
3	No update status word, no update fault code, enable limit warning
4	Update status word, update fault code, disable limit warning
5	No update status word, update fault code, disable limit warning
6	Update status word, no update fault code, disable limit warning
7	No update status word, no update fault code, disable limit warning

P01.80	Name	Disable overspeed fault			Related mode	-
	Setting range	0: Enable overspeed fault 1: Disable overspeed fault	Unit	-	Factory setting	0

7.3. Group P02: Input/Output Terminal Parameters

P02.00	Name	IN1 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	1

Set the IN function corresponding to the hardware IN1 terminal. Please refer to the following table for parameter setting:

Set value	IN terminal function	Set value	IN terminal function
0	FunIN.0: Normal input	21	FunIN.21: Position/speed table running enable
1	FunIN.1: Servo enable	22	FunIN.22: Homing enable
2	FunIN.2: Fault reset	23	FunIN.23: Home switch
3	FunIN.3: Pulse command inhibit	24	FunIN.24: USER1
4	FunIN.4: Position deviation clearing	25	FunIN.25: USER2
5	FunIN.5: Positive limit	26	FunIN.26: USER3
6	FunIN.6: Negative limit	27	FunIN.27: USER4
7	FunIN.7: Gain switching	28	FunIN.28: USER5
8	FunIN.8: Electronic gear ratio switching	29	FunIN.29: Control mode selection 2
9	FunIN.9: Zero speed clamping enable	30	FunIN.30: ECAT probe 1
10	FunIN.10: Control mode selection 1	31	FunIN.31: ECAT probe 2
11	FunIN.11: Emergency stop	32	FunIN.32: Speed table direction selection
12	FunIN.12: Position command inhibit	33	FunIN.33: Forward external torque limit
13	FunIN.13: Step amount enable	34	FunIN.34: Reverse external torque limit
14	FunIN.14: Position/speed table 1	35	FunIN.35: Torque mode speed limit source selection
15	FunIN.15: Position/speed table 2	36	FunIN.36: Interrupt fixed length state release
16	FunIN.16: Position/speed table 3	37	FunIN.37: Interrupt fixed length inhibit
17	FunIN.17: Position/speed table 4	38	FunIN.38: Speed command source selection
18	FunIN.18: Torque command direction selection	39	FunIN.39: Jog forward enable
19	FunIN.19: Speed command direction selection	40	FunIN.40: Jog reverse enable
20	FunIN.20: Position command direction selection		

P02.01	Name	IN1 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0

Set the level logic of the hardware IN1 terminal when the IN function selected by IN1 is valid. Please set the effective level logic correctly according to the host computer and peripheral circuit.

Set value	IN terminal logic when IN function is valid
0	Normally open
1	Normally closed
2	Rising edge
3	Falling edge
4	Rising/falling edge

P02.02	Name	IN2 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	5
P02.03	Name	IN2 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.04	Name	IN3 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	6
P02.05	Name	IN3 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.06	Name	IN4 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	2
P02.07	Name	IN4 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.08	Name	IN5 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	3
P02.09	Name	IN5 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.10	Name	IN6 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	23
P02.11	Name	IN6 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.12	Name	IN7 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	22
P02.13	Name	IN7 terminal logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0
P02.14	Name	IN8 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	11
P02.15	Name	IN8 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0

P02.16	Name	IN9 function selection			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	8

P02.17	Name	IN9 logic selection			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0

P02.32	Name	OUT1 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	4

Set the OUT function corresponding to the OUT1 terminal. Refer to the following table for parameter Settings.

Set value	OUT terminal function	Set value	OUT terminal function
0	FunOUT.0: Brake	16	FunOUT.16: Interrupt fixed length completed
1	FunOUT.1: Fault	17	FunOUT.17: Motor rotation state
2	FunOUT.2: Positioning completed	18	FunOUT.18: Speed consistent
3	FunOUT.3: Speed reached	19	FunOUT.19: Motor zero speed state
4	FunOUT.4: Servo ready	20	FunOUT.20: Warning
5	FunOUT.5: Internal command completed	21	FunOUT.21: Reserved (Don't set)
6	FunOUT.6: Origin homing completed	22	FunOUT.22: Reserved (Don't set)
7	FunOUT.7: USER1	23	FunOUT.23: Reserved (Don't set)
8	FunOUT.8: USER2	24	FunOUT.24: Positioning proximity
9	FunOUT.9: USER3	25	FunOUT.25: Torque limited
10	FunOUT.10: USER4	26	FunOUT.26: Speed limited
11	FunOUT.11: USER5	27	FunOUT.27: Electrical homing completed
12	FunOUT.12: USER6	28	FunOUT.28: Reserved (Don't set)
13	FunOUT.13: Torque reached	29	FunOUT.29: Reserved (Don't set)
14	FunOUT.14: Reserved (Don't set)	30	FunOUT.30: Reserved (Don't set)
15	FunOUT.15: Reserved (Don't set)	31	FunOUT.31: No function selection

P02.33	Name	OUT1 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Set the OUT function corresponding to the OUT1 terminal. Refer to the following table for parameter Settings.

Set value	OUT1 terminal logic when the OUT function is valid
0	Normally open
1	Normally closed

P02.34	Name	OUT2 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	2

P02.35	Name	OUT2 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P02.36	Name	OUT3 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	1
P02.37	Name	OUT3 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0
P02.38	Name	OUT4 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	6
P02.39	Name	OUT4 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0
P02.40	Name	OUT5 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	0
P02.41	Name	OUT5 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0
P02.42	Name	OUT6 function selection			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	5
P02.43	Name	OUT6 logic selection			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0
P02.54	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0
P02.55	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0
P02.56	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0
P02.57	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0
P02.58	Name	Reserved (Don't set)			Related mode	-
	Setting range	0~63	Unit	-	Factory setting	0

P02.64	Name	AI1 offset			Related mode	-
	Setting range	-10000~10000	Unit	1mV	Factory setting	0
P02.65	Name	AI1 filter time			Related mode	-
	Setting range	0~65535	Unit	0.01ms	Factory setting	200
P02.66	Name	AI1 dead zone			Related mode	-
	Setting range	0~10000	Unit	0.1mV	Factory setting	100
P02.67	Name	AI1 zero drift			Related mode	-
	Setting range	0~65535	Unit	0.1mV	Factory setting	0
P02.68	Name	AI2 offset			Related mode	-
	Setting range	-10000~10000	Unit	0.1mV	Factory setting	0
P02.69	Name	AI2 filter time			Related mode	-
	Setting range	0~65535	Unit	0.01ms	Factory setting	200
P02.70	Name	AI2 dead zone			Related mode	-
	Setting range	0~10000	Unit	0.1mV	Factory setting	100
P02.71	Name	AI2 zero drift			Related mode	-
	Setting range	0~65535	Unit	0.1mV	Factory setting	0
P02.78	Name	Speed corresponding to analog 10V			Related mode	-
	Setting range	0~6000	Unit	rpm	Factory setting	3000
P02.79	Name	Torque corresponding to analog 10V			Related mode	-
	Setting range	0~5000	Unit	0.1%	Factory setting	1000
P02.83	Name	IN terminal filter time			Related mode	-
	Setting range	0~999	Unit	ms	Factory setting	0
P02.84	Name	AI1 full-scale gain			Related mode	-
	Setting range	0~250000	Unit	1mV	Factory setting	18268
P02.85	Name	AI2 full-scale gain			Related mode	-
	Setting range	0~250000	Unit	1mV	Factory setting	18268

7.4. Group P03: Position Control Parameters

P03.00	Name	Position command source			Related mode	-
	Setting range	0~5	Unit	-	Factory setting	0

In position control mode, it is used to select the source of position command. Among them, the pulse command belongs to the external position command, and the step operation, the multi-segment position command, and the internal test position command belong to the internal position command.

Set value	Command source	Command acquisition method
0	Pulse command	The host computer or other pulse generating devices generate position commands and input them to the servo drive through hardware terminals.
1	Step amount command	The step displacement is set by the parameter P03.28/P03.29, and the step operation is triggered by the IN function FunIN.13.
2	Multi-segment position command	The multi-segment position operation mode is set by the P09 group parameters, and the multi-segment position operation is triggered by the IN function FunIN.21.
3	Reserved (Don't set)	
4	Reserved (Don't set)	
5	Reserved (Don't set)	

P03.02	Name	Pulse command type			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	0

When setting the position command source as pulse command (P03.00=0), input the pulse form.

P01.01 Rotation direction selection	P03.02 Command type setting	Command type	Signal	Schematic diagram of positive pulse	Schematic diagram of reverse pulse
0	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW (Idle time coupling off)	PUL(CW) DIR(CCW)		
3	A phase + B phase quadrature pulse 4 times frequency	PUL(A phase) DIR(B phase)			

	4	CW+CCW (Idle time coupling on)	PUL(CW) DIR(CCW)		
	5	Reserve (Don't set)	-	-	-
1	0	Pulse + direction positive logic	PUL DIR		
	1	Pulse + direction negative logic	PUL DIR		
	2	CW+CCW (Idle time coupling off)	PUL(CW) DIR(CCW)		
	3	A phase + B phase quadrature pulse 4 times frequency	PUL(A phase) DIR(B phase)	<ul style="list-style-type: none"> ● Phase B ahead of phase A by 90°. 	<ul style="list-style-type: none"> ● Phase A ahead of phase B by 90°.
	4	CW+CCW (Idle time coupling on)	PUL(CW) DIR(CCW)		
5	Reserve (Don't set)	-	-	-	

P03.03	Name	Pulse filter time/bandwidth			Related mode	-
	Setting range	0~7	Unit	0.1ms	Factory setting	6

Display value	Description
0x00(0)	50KHz
0x01(1)	100KHz
0x02(2)	150KHz
0x03(3)	200KHz
0x04(4)	500KHz
0x05(5)	700KHz
0x06(6)	1000KHz
0x07(7)	2000KHz

P03.04	Name	Position command average filter time			Related mode	-
	Setting range	1~1280	Unit	0.1ms	Factory setting	0

Set the average filter time constant of the position command (encoder unit). This function has no effect on the total number of position commands. If the set value is too large, the response delay will increase. The filter time constant should be set according to the actual situation.

P03.05	Name	Position command low-pass filter time			Related mode	-
	Setting range	0~65535	Unit	0.1ms	Factory setting	0

Set the first-order low-pass filter time constant of the position command (encoder unit). This function has no effect on the total number of position commands. If the set value is too large, the response delay will increase. The filter time constant should be set according to the actual situation.

P03.06	Name	Pulse per revolution			Related mode	-
	Setting range	0~8388608	Unit	Pulse/revolution	Factory setting	10000

P03.08	Name	Electronic gear ratio numerator 1			Related mode	P
	Setting range	1~1073741824	Unit	-	Factory setting	1

Set the first group of electronic gear ratio numerator for position command (command unit) frequency division. P03.08 and P03.09 are combined into a 32-bit value, where P03.08 is the low 16-bit value, and P03.09 is the high 16-bit value. Subsequent use P03.08 to represent the 32-bit parameter.
P03.06 (number of position command pulses per motor rotation)=0 is valid.

P03.10	Name	Electronic gear ratio denominator 1			Related mode	P
	Setting range	1~1073741824	Unit	-	Factory setting	1

Set the first group of electronic gear ratio denominator for position command (command unit) frequency division. P03.10 and P03.11 are combined into a 32-bit value, where P03.10 is the low 16-bit value, and P03.11 is the high 16-bit value. Subsequent use P03.10 to represent the 32-bit parameter.
P03.06 (number of position command pulses per motor rotation)=0 is valid.

P03.12	Name	Electronic gear ratio numerator 2			Related mode	P
	Setting range	1~1073741824	Unit	-	Factory setting	1

Set the second group of electronic gear ratio numerator for position command (command unit) frequency division. P03.12 and P03.13 are combined into a 32-bit value, where P03.12 is the low 16-bit value, and P03.13 is the high 16-bit value. Subsequent use P03.12 to represent the 32-bit parameter.
P03.06 (number of position command pulses per motor rotation)=0 is valid.

P03.14	Name	Electronic gear ratio denominator 2			Related mode	P
	Setting range	1~1073741824	Unit	-	Factory setting	1

Set the second group of electronic gear ratio denominator for position command (command unit) frequency division. P03.14 and P03.15 are combined into a 32-bit value, where P03.14 is the low 16-bit value, and P03.15 is the high 16-bit value. Subsequent use P03.14 to represent the 32-bit parameter.
P03.06 (number of position command pulses per motor rotation) = 0, valid

P03.16	Name	Enable electronic gear ratio switching			Related mode	P
	Setting range	1~1	Unit	-	Factory setting	0

P03.17	Name	Reserved (Don't set)			Related mode	P
	Setting range	0~65535	Unit	-	Factory setting	0

P03.18	Name	Positioning completed detect time			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	0

P03.20	Name	Positioning completed output setting			Related mode	P
	Setting range	0~2	Unit	-	Factory setting	0

P03.21	Name	Positioning completed threshold			Related mode	P
	Setting range	0~65535	Unit	-	Factory setting	91

Set the threshold for the absolute value of position deviation when the servo drive outputs the positioning completed signal.

P03.22	Name	Positioning proximity threshold			Related mode	P
	Setting range	0~65535	Unit	-	Factory setting	0

P03.23	Name	Position deviation clearing mode			Related mode	P
	Setting range	0~2	Unit	-	Factory setting	0

Set the clear mode of position deviation when servo enable is OFF.

Set value	Position deviation clearing mode
0	Servo OFF and fault
1	Servo fault
2	IN input terminal

P03.24	Name	Disable excessive position deviation alarm			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

P03.25	Name	Excessive deviation fault threshold			Related mode	P
	Setting range	1~1073741824	Unit	-	Factory setting	1310720

Set the fault threshold for excessive position deviation in position control mode. When the position deviation of the servo motor is greater than the threshold, the servo drive will generate AL.240 (excessive position deviation).

P03.28	Name	Number of step running pulse			Related mode	-
	Setting range	-32768~32767	Unit	Pulse	Factory setting	10000

P03.40	Name	Homing control			Related mode	P
	Setting range	0~7	Unit	-	Factory setting	0

Set the homing mode and trigger signal source.

Set value	Speed command source	Remark	
		Homing mode	Trigger signal
0	Disable homing	Disable homing	None
1	IN trigger mechanical homing	Origin homing	IN signal FunIN.22 (homing start)
2	IN trigger electrical homing	Electrical homing	IN signal FunIN.22 (homing start)
3	Mechanical homing immediately after power on	Origin homing	The drive is powered on and enabled for the first time
4	Communication trigger mechanical homing	Origin homing	The drive is enabled, after returning to the origin is completed, P03.40=0
5	Communication trigger electrical homing	Electrical homing	The drive is enabled, after returning to the origin is completed, P03.40=0
6	The present position is used as the home	Origin homing	The drive is enabled, after returning to the origin is completed, P03.40=0

P03.41	Name	Homing mode			Related mode	P
	Setting range	0~9	Unit	-	Factory setting	0

Set the motor rotation direction, deceleration point and origin when returning to the origin.

Set value	Homing mode	Set value	Homing mode
0	Positive homing	8	Positive - Origin switch (deceleration point)- Z phase (Origin)
1	Negative homing	9	Negative - Origin switch (deceleration point)- Z phase (Origin)
2	Positive limit	10	Positive - Positive limit (deceleration point)- Z phase (Origin)
3	Negative limit	11	Negative - Negative limit (deceleration point)- Z phase (Origin)
4	Positive mechanical limit position (Reserved, don't set)	12	Positive - Mechanical limit (deceleration point)- Z phase (Origin) (Reserved, don't set)
5	Negative mechanical limit position (Reserved, don't set)	13	Negative - Mechanical limit (deceleration point)- Z phase (Origin) (Reserved, don't set)
6	Positive Z phase	14	Nearby back to Z-phase
7	Negative Z phase	15	Nearby back to Z-phase

P03.42	Name	Speed in high-speed homing			Related mode	P
	Setting range	0~3000	Unit	rpm	Factory setting	100

Set the motor speed when the origin is back to zero and search the origin signal at high speed.

P03.43	Name	Speed in low-speed homing			Related mode	P
	Setting range	0~1000	Unit	rpm	Factory setting	10

Set the motor speed when the origin is back to zero and the signal of the deceleration point is searched at low speed.

P03.44	Name	Homing acceleration and deceleration time			Related mode	P
	Setting range	0~1000	Unit	ms	Factory setting	100

Set the time for the speed to change uniformly from 0rpm to 1000rpm when the origin is back to zero.

P03.45	Name	Homing time limit			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	5000

P03.46	Name	Home offset			Related mode	P
	Setting range	0~65535	Unit	Command pulse	Factory setting	0

Set the offset relationship between the mechanical origin and the mechanical zero when returning to the origin.

P03.48	Name	Homing stable waiting time			Related mode	-
	Setting range	0~65535	Unit	ms	Factory setting	1000

P03.49	Name	Homing limit and offset processing			Related mode	P
	Setting range	0~3	Unit	-	Factory setting	0

Set the offset relationship between the mechanical origin and the mechanical zero point when origin homing.

Set value	Mechanical origin offset processing method	Remark	
		Mechanical origin	Limit processing method
0	P03.46 is the coordinate after homing, when the limit is met, the homing function is triggered again and the homing is enabled to find the origin in the reverse direction.	The mechanical origin does not coincide with the mechanical zero point. After the origin homing is completed, the motor stops at the mechanical origin, and the mechanical origin coordinate is forced to P03.46.	Give the homing trigger signal again, the servo will perform the homing in the reverse direction.
1	P03.46 is the relative offset after homing. Re-trigger the homing function when the limit is met, and find the origin in the reverse direction after the homing is enabled.	The mechanical origin coincides with the mechanical zero point. After the motor locates the mechanical origin, it will continue to move the displacement set by P03.46 and then stop.	Give the homing trigger signal again, the servo will perform the origin return in the reverse direction.
2	P03.46 is the coordinate after homing, and it will automatically change in the reverse direction when it encounters a limit.	The mechanical origin does not coincide with the mechanical zero point. After the origin homing is completed, the motor stops at the mechanical origin, and the mechanical origin coordinate is forced to P03.46.	Servo automatically reverses, continue to perform homing function.
3	P03.46 is the relative offset after homing, and it will automatically change in the reverse direction when it encounters a limit.	The mechanical origin coincides with the mechanical zero point. After the motor locates the mechanical origin, it will continue to move the displacement set.	Servo automatically reverses, continue to perform homing function.

P03.50	Name	Torque homing time determination			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	1000
Set the time threshold for judging that the load reaches the mechanical position during the touch stop homing.						

P03.51	Name	Torque homing speed determination			Related mode	P
	Setting range	0~6000	Unit	rpm	Factory setting	10
Set the speed threshold for judging that the load reaches the mechanical position during the touch stop homing.						

P03.52	Name	Torque homing torque determination			Related mode	P
	Setting range	0~3000	Unit	0.1%	Factory setting	500
Set the maximum positive and negative torque limits during touch stop homing.						

P03.63	Name	Absolute multi-turn offset			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P03.64	Name	Absolute zero offset			Related mode	-
	Setting range	$-2^{63} \sim 2^{63} - 1$	Unit	-	Factory setting	0

P03.68	Name	Absolute rotation mode mechanical gear ratio numerator			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	1

P03.69	Name	Absolute rotation mode mechanical gear ratio denominator			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	1

P03.70	Name	Absolute rotation mode position upper limit			Related mode	-
	Setting range	$0 \sim 2^{63} - 1$	Unit	-	Factory setting	0

P03.75	Name	Reserved (Don't set)			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P03.77	Name	Position out of tolerance threshold source			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

Set value	Position out of tolerance threshold mode
0	Encoder eeprom
1	Drive eeprom

7.5. Group P04: Speed Control Parameters

P04.00	Name	Speed command source A			Related mode	S
	Setting range	0~5	Unit	-	Factory setting	0

Set the source of the speed command.

Set value	Speed command source
0	Digital given speed
1	AI1
2	AI2
3	Reserved (Don't set)
4	Reserved (Don't set)
5	Multi-segment speed command

P04.01	Name	Speed command source B			Related mode	S
	Setting range	0~5	Unit	-	Factory setting	0

Set the source of the speed command.

Set value	Speed command source
0	Digital given speed
1	AI1
2	AI2
3	Reserved (Don't set)
4	Reserved (Don't set)
5	Multi-segment speed command

P04.02	Name	Speed command selection			Related mode	S
	Setting range	0~4	Unit	-	Factory setting	0

Set the source of the speed command.

Set value	Speed command source
0	Speed command source A
1	Speed command source B
2	Speed command source A+B
3	Speed command source A/B switching
4	Communication given

P04.03	Name	Digital given speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100

Set the speed command source as the speed command value when digital setting (P04.00=0). The running acceleration time constant and deceleration time constant are set by P04.04 and P04.05.

P04.04	Name	Jog speed			Related mode	S
	Setting range	0~6000	Unit	rpm	Factory setting	100

When setting the keystroke jog function of the servo drive, set the jog speed command value. To use the keystroke jog function of the servo drive, please set the servo enable to OFF. The operation acceleration time constant and deceleration time constant are set by P04.04 and P04.05.

P04.05	Name	Acceleration time constant			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

Set the time for the speed to change uniformly from 0rpm to 1000rpm.

P04.06	Name	Deceleration time constant			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

Set the time for the speed to change uniformly from 1000rpm to 0rpm when P04.01 and P04.04 are in motion.

P04.07	Name	Zero clamp speed			Related mode	S
	Setting range	0~65535	Unit	rpm	Factory setting	10

Set the speed threshold for the zero speed clamp operation to take effect only when the actual motor speed is lower than the set value.

Note: The host computer gives a zero speed clamp signal, and when the actual motor speed is lower than the set value, the motor is clamped at the current position.

P04.08	Name	Motor rotation speed			Related mode	S
	Setting range	0~6000	Unit	rpm	Factory setting	10

P04.09	Name	Motor speed consistent width threshold			Related mode	S
	Setting range	0~500	Unit	rpm	Factory setting	10

P04.10	Name	Speed reached threshold			Related mode	-
	Setting range	0~6000	Unit	rpm	Factory setting	1000

When the filtered absolute value of the actual speed of the servo motor exceeds the threshold set by P04.10, it is considered that the actual speed of the servo motor has reached the desired value, and the servo drive can output a speed arrival signal at this time. On the contrary, if the absolute value of the actual speed of the servo motor after filtering is not greater than this value, the speed arrival signal is invalid. The judgment of the speed arrival signal is not affected by the operating state and control mode of the drive.

P04.11	Name	Speed reached threshold			Related mode	-
	Setting range	1~6000	Unit	rpm	Factory setting	10

P04.12	Name	Maximum speed limit			Related mode	-
	Setting range	0~6000	Unit	rpm	Factory setting	5000

P04.13	Name	Forward speed limit			Related mode	-
	Setting range	0~6000	Unit	rpm	Factory setting	5000

P04.14	Name	Reverse speed limit			Related mode	-
	Setting range	0~6000	Unit	rpm	Factory setting	5000

P04.15	Name	Speed feedforward selection			Related mode	-
	Setting range	0~3	Unit	-	Factory setting	1

Set the speed feedforward selection mode:

Set value	Speed feedforward selection
0	No speed feedforward
1	Internal speed feedforward
2	AI1 input as speed feedforward
3	AI2 input as speed feedforward

P04.28	Name	Speed state filter time			Related mode	S
	Setting range	0~5000	Unit	ms	Factory setting	10

P04.29	Name	Speed display filter time			Related mode	S
	Setting range	0~5000	Unit	ms	Factory setting	50

P04.30	Name	Communication given speed			Related mode	S
	Setting range	-9000000~9000000	Unit	0.01rpm	Factory setting	0

P04.81	Name	Encoder data length error counter			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P04.82	Name	Encoder data null error counter			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P04.83	Name	Encoder data check error counter			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P04.84	Name	Encoder count error counter			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P04.85	Name	Encoder real-time error times			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P04.86	Name	Encoder error tolerance threshold			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	10

P04.87	Name	Encoder receive command error times			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

7.6. Group P05: Torque Control Parameters

P05.00	Name	Torque command source A			Related mode	T
	Setting range	0~4	Unit	-	Factory setting	0

Set the command source of torque command source A.

Set value	Torque command source
0	Digital given torque
1	A11 given torque (Reserved)
2	A12 given torque (Reserved)
3	Reserved (Don't set)
4	Reserved (Don't set)
5	Reserved (Don't set)
6	Reserved (Don't set)
7	Reserved (Don't set)

P05.01	Name	Torque command source B			Related mode	T
	Setting range	0~7	Unit	-	Factory setting	0

Set the command source of torque command source B.

Set value	Torque command source
0	Digital given torque
1	A11 given torque (Reserved)
2	A12 given torque (Reserved)
3	Reserved (Don't set)
4	Reserved (Don't set)
5	Reserved (Don't set)
6	Reserved (Don't set)
7	Reserved (Don't set)

P05.02	Name	Torque command source			Related mode	T
	Setting range	0~4	Unit	-	Factory setting	0

Set the source of torque command

Set value	Torque command source
0	Torque command source A
1	Torque command source B
2	Torque command source A+B
3	Torque command source A/B switching
4	Communication given torque

P05.03	Name	Digital given torque			Related mode	T
	Setting range	-3000~3000	Unit	0.1%	Factory setting	0
Set the torque command value when the torque command source is digital setting (P05.00=0). 100% corresponds to 1 times the rated torque of the motor.						

P05.06	Name	Torque limit source			Related mode	T
	Setting range	0~4	Unit	0.1%	Factory setting	2
Set the torque limit source mode:						
		Set value	Torque limit source mode			
		0	Internal torque limit			
		1	Internal/external torque limit			
		2	ECAT control (The smaller values of 0x6072 and 0x60E0/0x60E1)			
		3	ECAT control (Switching between smaller values of 0x6072 and 0x60E0/0x60E1 or smaller values of external torque)			
		4	ECAT control (Switching between smaller values of internal torque limit 0x6072 and 0x60E0/0x60E1)			
		5	Internal torque switching			
		6	Internal/external torque limit			
		7	AI channel input limit			
		8	AI channel input limit or switching the external torque small value			
		9	Internal torque limit and AI channel input limit switching			

P05.07	Name	Analog torque limit channel selection			Related mode	T
	Setting range	0: AI1 channel 1: AI2 channel	Unit	-	Factory setting	0

P05.08	Name	Forward internal torque limit			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	3000

P05.09	Name	Reverse internal torque limit			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	3000

P05.10	Name	Forward external torque limit			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	3000

P05.11	Name	Reverse external torque limit			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	3000

P05.12	Name	Torque mode speed limit source			Related mode	T
	Setting range	0~2	Unit	-	Factory setting	1

Set the source of speed limit in torque mode:

Set value	Torque mode speed limit source mode
0	Internal speed limit
1	ECAT use the 0x607F limit
2	Select internal speed limit by IN
0	Internal speed limit
1	AI input speed limit
2	Select internal speed limit by IN

P05.13	Name	Torque mode speed limit AI channel selection			Related mode	T
	Setting range	0: AI1 channel 1: AI2 channel	Unit	-	Factory setting	0

P05.14	Name	Torque mode forward internal speed limit			Related mode	T
	Setting range	0~6000	Unit	rpm	Factory setting	3000

Set the forward speed limit value in torque control mode.

P05.15	Name	Torque mode reverse internal speed limit			Related mode	T
	Setting range	0~6000	Unit	rpm	Factory setting	3000

Set the reverse speed limit value in torque control mode.

P05.16	Name	Torque reaches the reference value			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	0

P05.17	Name	Torque reaches output effective value			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	300

P05.18	Name	Torque reaches output invalid value			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	200

P05.20	Name	Communication given torque			Related mode	T
	Setting range	-300000~300000	Unit	0.001%	Factory setting	0

P05.44	Name	Torque feedforward selection			Related mode	T
	Setting range	0: No torque feedforward 1: Internal torque feedforward 2: ECAT control	Unit	-	Factory setting	1

P05.45	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0
P05.46	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0
P05.47	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0
P05.48	Name	Torque command filter time constant 1			Related mode	T
	Setting range	0~3000	Unit	0.01ms	Factory setting	80
P05.49	Name	Torque command filter time constant 2			Related mode	T
	Setting range	0~3000	Unit	0.01ms	Factory setting	80
P05.50	Name	Emergency stop torque			Related mode	T
	Setting range	0~3000	Unit	0.1%	Factory setting	1000
P05.51	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0
P05.52	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0
P05.53	Name	Current PI parameter source			Related mode	T
	Setting range	0: Encoder eeprom 1: Drive eeprom	Unit	-	Factory setting	0
P05.54	Name	Torque feedback filter time constant 1			Related mode	T
	Setting range	0~3000	Unit	0.01ms	Factory setting	80
P05.55	Name	Torque feedback filter time constant 2			Related mode	T
	Setting range	0~3000	Unit	0.01ms	Factory setting	80

7.7. Group P06: Gain Parameters

P06.00	Name	Speed loop gain			Related mode	-
	Setting range	1~50000	Unit	0.1Hz	Factory setting	250

Set the proportional gain of the speed regulator. This parameter determines the response of the speed regulator. The larger the value, the faster the speed response. However, too large a value may cause vibration.

In position mode, if the position gain is increased, the speed gain must be increased.

P06.01	Name	Speed loop integration time			Related mode	-
	Setting range	15~51200	Unit	0.1ms	Factory setting	3183

Set the integral time constant of the speed regulator. The smaller the set value, the stronger the integral effect, and the faster the speed deviation when stopping is close to zero.

- Note: When P06.01 is set to 30000, there is no integral effect.

P06.02	Name	Position loop gain			Related mode	-
	Setting range	0~50000	Unit	0.1Hz	Factory setting	400

Set the proportional gain of the position. This parameter determines the response performance of the position. Setting a larger position gain can shorten the positioning time. But too large a set value may cause mechanical vibration.

P06.03	Name	Speed loop gain 2			Related mode	-
	Setting range	1~50000	Unit	0.1Hz	Factory setting	400

P06.04	Name	Speed loop integration time 2			Related mode	-
	Setting range	15~51200	Unit	0.01ms	Factory setting	2000

P06.05	Name	Position loop gain 2			Related mode	-
	Setting range	0~50000	Unit	0.1Hz	Factory setting	640

P06.11	Name	Current PI selection			Related mode	-
	Setting range	0: PI group 1 1: PI group 2	Unit	-	Factory setting	0

P06.12	Name	Load inertia ratio			Related mode	-
	Setting range	0~12000	Unit	1%	Factory setting	100

P06.14	Name	Speed feedforward filter time			Related mode	-
	Setting range	0~6400	Unit	0.01ms	Factory setting	50

Set the speed feedforward filter time

P06.15	Name	Speed feedforward gain			Related mode	-
	Setting range	0~1000	Unit	0.1%	Factory setting	0

In the position control mode, multiply the speed feedforward signal by the parameter P06.15, and the result obtained becomes the speed feedforward as part of the speed command. Increasing this parameter can increase the response speed of the position command and reduce the position deviation at a fixed speed.

P06.16	Name	Torque feedforward filter time			Related mode	-
	Setting range	0~6400	Unit	0.01ms	Factory setting	50

Set the filter frequency of the torque feedforward.

P06.17	Name	Torque feedforward gain			Related mode	-
	Setting range	0~1000	Unit	0.1%	Factory setting	0

In the non-torque control mode, multiply the torque feedforward signal by the parameter P06.17, and the result obtained becomes the torque feedforward as part of the torque command. Increasing this parameter can improve the response speed to changing speed commands.

P06.18	Name	Speed feedback source			Related mode	-
	Setting range	0: No filtering 1: After filtering	Unit	-	Factory setting	0

P06.19	Name	Speed feedback smoothing filtering			Related mode	-
	Setting range	0~4	Unit	-	Factory setting	0

Set value	Function
0	No filtering
1	2 times of smooth filtering
2	4 times of smooth filtering
3	8 times of smooth filtering
4	16 times of smooth filtering

P06.20	Name	Speed feedback low-pass filter cut-off frequency			Related mode	-
	Setting range	100~4000	Unit	1Hz	Factory setting	4000

P06.21	Name	Speed PDFF control Kref			Related mode	-
	Setting range	0~1000	Unit	0.1%	Factory setting	1000

P06.22	Name	Speed PDFF control Krdb			Related mode	-
	Setting range	0~1000	Unit	0.1%	Factory setting	0

P06.50	Name	2 nd gain mode			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

Set value	Function
0	1 st gain fixed
1	1 st and 2 nd gain switching

P06.51	Name	Gain switching condition			Related mode	-
	Setting range	0~10	Unit	-	Factory setting	0

Set value	Function
0	1 st gain fixed
1	Gain switching with input IN signal
2	Torque command
3	Speed command
4	Speed command change rate
5	Speed command high and low speed thresholds
6	Position deviation
7	With position command
8	Positioning incomplete
9	Actual speed
10	With position command and actual speed

P06.52	Name	Gain switching delay time			Related mode	-
	Setting range	0~50000	Unit	0.1ms	Factory setting	50
P06.53	Name	Gain switching level			Related mode	-
	Setting range	0~50000	Unit	-	Factory setting	50
P06.54	Name	Gain switching hysteresis			Related mode	-
	Setting range	0~50000	Unit	-	Factory setting	30
P06.55	Name	Position gain switching ramp time			Related mode	-
	Setting range	0~50000	Unit	0.1ms	Factory setting	30
P06.60	Name	D-axis current proportional gain 1			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	180
P06.61	Name	D-axis current integral gain 1			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	200
P06.63	Name	Q-axis current proportional gain 1			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	180
P06.64	Name	Q-axis current integral gain 1			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	200
P06.66	Name	D-axis current proportional gain 2			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	180
P06.67	Name	D-axis current integral gain 2			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	200
P06.68	Name	Q-axis current proportional gain 2			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	180
P06.69	Name	Q-axis current integral gain 2			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	200
P06.76	Name	Flux-weakening control coefficient			Related mode	-
	Setting range	0~2250	Unit	0.1%	Factory setting	2250

P06.77	Name	Flux-weakening control single increment			Related mode	-
	Setting range	0~3000	Unit	0.1%	Factory setting	10

P06.78	Name	Flux-weakening control single reduction			Related mode	-
	Setting range	0~3000	Unit	0.1%	Factory setting	50

P06.80	Name	Vd output limit			Related mode	-
	Setting range	350~1000	Unit	0.1%	Factory setting	707

P06.81	Name	Flux-weakening voltage reference coefficient			Related mode	-
	Setting range	75~100	Unit	1%	Factory setting	90

7.8. Auto-tuning Parameters

P07.00	Name	Auto-tuning mode			Related mode	-
	Setting range	0~8	Unit	-	Factory setting	0

Set value	Function
0	Invalid
1	Standard stiffness table mode
2	Positioning mode

P07.01	Name	Stiffness table level setting			Related mode	-
	Setting range	0~31	Unit	-	Factory setting	12

The larger the value, the higher the rigidity. Excessive rigidity can cause vibration and noise.

P07.05	Name	Offline inertia auto-tuning mode			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P07.06	Name	Maximum speed of inertia auto-tuning			Related mode	-
	Setting range	100~1000	Unit	rpm	Factory setting	500

P07.07	Name	Acceleration time of inertia auto-tuning			Related mode	-
	Setting range	200~800	Unit	ms	Factory setting	125

P07.08	Name	Inertia auto-tuning interval			Related mode	-
	Setting range	50~10000	Unit	ms	Factory setting	1000

P07.09	Name	Number of motor revolutions per inertia auto-tuning			Related mode	-
	Setting range	-	Unit	0.1 turns	Factory setting	-

P07.11	Name	Adaptive notch mode selection			Related mode	-										
	Setting range	0~4	Unit	-	Factory setting	0										
<table border="1"> <thead> <tr> <th>Set value</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable adaptive notch</td> </tr> <tr> <td>1</td> <td>Adaptive notch setting group 3</td> </tr> <tr> <td>2</td> <td>Adaptive notch setting group 3/4</td> </tr> <tr> <td>3</td> <td>Restore default notch settings</td> </tr> </tbody> </table>							Set value	Function	0	Disable adaptive notch	1	Adaptive notch setting group 3	2	Adaptive notch setting group 3/4	3	Restore default notch settings
Set value	Function															
0	Disable adaptive notch															
1	Adaptive notch setting group 3															
2	Adaptive notch setting group 3/4															
3	Restore default notch settings															

P07.12	Name	Frequency of the 1 st notch			Related mode	-
	Setting range	50~4000	Unit	1Hz	Factory setting	4000

P07.13	Name	Width level of the 1 st notch			Related mode	-
	Setting range	0~20	Unit	-	Factory setting	2

P07.14	Name	Depth level of the 1 st notch			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	0

P07.15	Name	Frequency of the 2 nd notch			Related mode	-
	Setting range	50~4000	Unit	1Hz	Factory setting	4000

P07.16	Name	Width level of the 2 nd notch			Related mode	-
	Setting range	0~20	Unit	-	Factory setting	2

P07.17	Name	Depth level of the 2 nd notch			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	0

P07.18	Name	Frequency of the 3 rd notch			Related mode	-
	Setting range	50~4000	Unit	1Hz	Factory setting	4000

P07.19	Name	Width level of the 3 rd notch			Related mode	-
	Setting range	0~20	Unit	-	Factory setting	2

P07.20	Name	Depth level of the 3 rd notch			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	0

P07.21	Name	Frequency of the 4 th notch			Related mode	-
	Setting range	50~4000	Unit	1Hz	Factory setting	4000

P07.22	Name	Width level of the 4 th notch			Related mode	-
	Setting range	0~20	Unit	-	Factory setting	2

P07.23	Name	Depth level of the 4 th notch			Related mode	-
	Setting range	0~99	Unit	-	Factory setting	0
P07.28	Name	Disturbance compensation gain			Related mode	-
	Setting range	-1000~1000	Unit	0.1%	Factory setting	0
P07.29	Name	Disturbance observer filter time			Related mode	-
	Setting range	0~2500	Unit	0.01ms	Factory setting	50
P07.30	Name	Gravity compensation value			Related mode	-
	Setting range	-1000~1000	Unit	0.1%	Factory setting	0
P07.31	Name	Forward friction compensation value			Related mode	-
	Setting range	-1000~1000	Unit	0.1%	Factory setting	0
P07.32	Name	Reverse friction compensation value			Related mode	-
	Setting range	-1000~1000	Unit	0.1%	Factory setting	0

7.9. Group P08: Communication Parameters

P08.00	Name	RS485 station address			Related mode	-														
	Setting range	1~247	Unit	-	Factory setting	1														
<p>Set the servo drive axis address.</p> <p>0: broadcast address. The upper computer device can write to all servo drives through the broadcast address. The drive operates according to the broadcast data frame, but does not respond.</p> <p>1~247: when multiple servo drives are networking, each servo drive can only have a unique address, otherwise it will lead to abnormal communication or failure of communication.</p>																				
P08.01	Name	RS485 communication baud rate			Related mode	-														
	Setting range	0~5	Unit	-	Factory setting	5														
<p>Set the communication baud rate between the servo drive and the upper computer device. The communication baud rate of the servo drive must be consistent with the communication baud rate of the upper computer device, otherwise it cannot communicate.</p> <table border="1" data-bbox="534 1646 1053 1948"> <thead> <tr> <th>Set value</th> <th>Baud rate setting</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4800 Kbps</td> </tr> <tr> <td>1</td> <td>9600 Kbps</td> </tr> <tr> <td>2</td> <td>19200 Kbps</td> </tr> <tr> <td>3</td> <td>38400 Kbps</td> </tr> <tr> <td>4</td> <td>57600 Kbps</td> </tr> <tr> <td>5</td> <td>115200 Kbps</td> </tr> </tbody> </table>							Set value	Baud rate setting	0	4800 Kbps	1	9600 Kbps	2	19200 Kbps	3	38400 Kbps	4	57600 Kbps	5	115200 Kbps
Set value	Baud rate setting																			
0	4800 Kbps																			
1	9600 Kbps																			
2	19200 Kbps																			
3	38400 Kbps																			
4	57600 Kbps																			
5	115200 Kbps																			

P08.02	Name	RS485 communication data format			Related mode	-
	Setting range	0~5	Unit	-	Factory setting	0

Set the data format when the servo drive communicates with the upper computer device. The data format of servo drive must be consistent with the upper computer device, otherwise it cannot communicate.

Set value	Data Format
0	8-bit data, no parity, 1 stop bit
1	8-bit data, no parity, 2 stop bits
2	8-bit data, even parity, 1 stop bit
3	8-bit data, even parity, 2 stop bits
4	8-bit data, odd parity, 1 stop bit
5	8-bit data, odd parity, 2 stop bits

P08.11	Name	EEPROM operation mode			Related mode	-
	Setting range	0~7	Unit	-	Factory setting	0

EEPROM operation mode selection:

Set value	EEPROM operation mode
0	Communication modification parameters are not saved to eeprom
1	Modbus communication modification parameters are saved to eeprom
2	ECAT modification factory parameters are saved to eeprom
3	Modbus and ECAT modification factory parameters are saved to eeprom
4	ECAT modification CIA402 parameters are saved to eeprom
5	Modbus and ECAT modification CIA402 parameters are saved to eeprom
6	ECAT modification factory and CIA402 parameters are saved to eeprom
7	Modbus and ECAT modification parameters are saved to eeprom

P08.12	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.13	Name	Modbus response timeout			Related mode	T
	Setting range	0~5000	Unit	-	Factory setting	0

P08.14	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.15	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.16	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.17	Name	Enable virtual IN			Related mode	T
	Setting range	0~1	Unit	-	Factory setting	0

P08.18	Name	Virtual IN default initial value			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.19	Name	Enable virtual OUT			Related mode	T
	Setting range	0~1	Unit	-	Factory setting	0

P08.20	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.31	Name	RS232 communication baud rate			Related mode	-
	Setting range	0~5	Unit	-	Factory setting	5

Set the RS232 communication baud rate, please refer to parameter P08.01 (RS485 communication data format selection) for the setting method.

Set value	Baud rate setting
0	4800 Kbps
1	9600 Kbps
2	19200 Kbps
3	38400 Kbps
4	57600 Kbps
5	115200 Kbps

P08.32	Name	RS232 communication data format			Related mode	-
	Setting range	0~5	Unit	-	Factory setting	0

Set the RS232 communication data format, please refer to parameter P08.02 (RS485 communication data format selection) for the setting method.

Set value	Baud rate setting
0	4800 Kbps
1	9600 Kbps
2	19200 Kbps
3	38400 Kbps
4	57600 Kbps
5	115200 Kbps

P08.33	Name	Reinitialize USB			Related mode	T
	Setting range	0~1	Unit	-	Factory setting	0

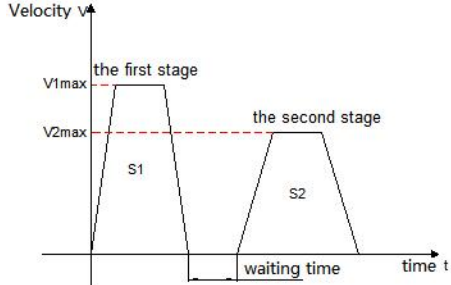
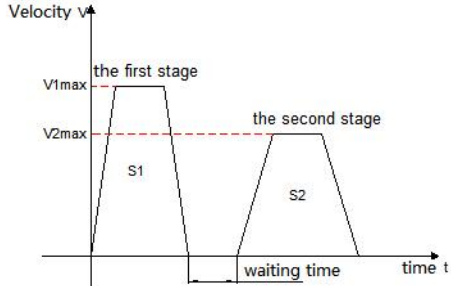
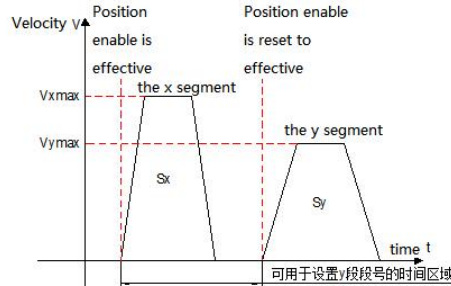
P08.55	Name	Serial port receiving error count			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

P08.56	Name	Modbus CRC error count			Related mode	T
	Setting range	0~65535	Unit	-	Factory setting	0

7.10. Group P09: Multi-segment Position Parameters

P09.00	Name	Multi-segment position operation mode			Related mode	P
	Setting range	0~2	Unit	-	Factory setting	0

In the position control mode, when the source of the set position command is multi-stage position command (p03.00=2), set the multi-stage position operation mode.

Set value	Operation mode	Remark	Operating waveform
0	Shutdown at the end of a single operation	<p>Stop after running for 1 round;</p> <p>The segment number is automatically switched in increasing order;</p> <p>Waiting time can be set between segments;</p> <p>Multi-segment position enable is level effective;</p>	 <p>V_{1max}、V_{2max}: maximum operating speed of the first and second segments;</p> <p>S1、S2: displacement of the first and second segments;</p>
1	Cyclic operation	<p>Cycle operation, the starting segment number after the first round is 1;</p> <p>The segment number is automatically switched in increasing order;</p> <p>Waiting time can be set between segments;</p> <p>Multi-segment position enable is level effective;</p>	 <p>V_{1max}、V_{2max}: maximum operating speed of the first and second segments;</p> <p>S1、S2: displacement of the first and second segments;</p>
2	IN switching operation	<p>If the segment number is updated, it can run continuously;</p> <p>The segment number is determined by IN terminal logic;</p> <p>The interval between segments is determined by the command delay time of the host computer;</p> <p>Multi-segment position enable is effective for edge change;</p>	 <p>可用于设置 y 段段号的时间区域: It can be used to set the time zone of the y segment number.</p> <p>V_{xmax}、V_{ymax}: maximum operating speed of the x and y segments;</p> <p>S1、S2: displacement of the x and y segments;</p>

P09.01	Name	Number of displacement			Related mode	P
	Setting range	1~16	Unit	-	Factory setting	1

Set the total number of segments of the multi-segment position command. Different segments can set different displacement, running speed, acceleration and deceleration.

When P09.00=0/1, the multi-segment segment number will automatically increase and switch, and the switching sequence: 1, 2, 3,..., P09.01.

When P09.01=2, 4 INs should be set as input functions FunIN.14~FunIN.17 (multi-segment running command switching 1: CMD1~multi-segment running command switching 4: CMD4), and the logic of the IN terminal is controlled by the upper computer to achieve Segment number switching. The multi-segment segment number is a 4-digit binary number, and the corresponding relationship between CMD1 ~ CMD4 and the segment number is shown below.

FunIN.17	FunIN.16	FunIN.15	FunIN.14	segment number
CMD4	CMD3	CMD2	CMD1	
0	0	0	0	1
0	0	0	1	2
.....				
1	1	1	0	15
1	1	1	1	16

The value of CMD(n) is 1 when the IN terminal logic is valid, otherwise it is 0.

P09.02	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~1	Unit	-	Factory setting	1

P09.03	Name	Waiting time unit			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

When the multi-segment position function is used for operation and p09.00=0/1 is set, the unit of waiting time between segments is set.

Waiting time: the time interval from the end of this command to the beginning of the next command.

Set value	Time unit
0	ms
1	s

P09.04	Name	Position command type selection			Related mode	P
	Setting range	0~1	Unit	-	Factory setting	0

When using the multi-segment position function to run, set the type of displacement command.

Displacement command: the sum of position commands in a period of time.

The relative displacement is the increment of the target position relative to the current position of the motor; the absolute displacement is the increment of the target position relative to the motor origin. For example: the movement displacement of the nth segment is P_n ($P_n > 0$), and the movement displacement of the mth segment is P_m ($P_m > 0$). Assuming $P_m > P_n$, the comparison is as follows:

Set value	Position command type	Remark
0	Relative displacement command	
1	Absolute displacement command	

P09.05	Name	Reserved (Don't set)			Related mode	T
	Setting range	0~1	Unit	-	Factory setting	1

P09.12	Name	1 st displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

Multi-segment position first segment movement displacement (command unit). P09.12 and p09.13 are combined into a 32-bit signed value, where p09.12 is the low 16 bit value and p09.13 is the high 16 bit value. Subsequently, p09.12 is used to represent this 32-bit parameter.

P09.14	Name	Running speed of the 1 st displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
<p>Maximum operating speed of the first segment at multi-segment position. The maximum running speed refers to the uniform running speed at which the motor is not in the acceleration and deceleration process. If the 1st position command (p09.12) is too small, the actual speed of the motor will be less than p09.14.</p>						

P09.15	Name	Acceleration and deceleration time of the 1 st displacement			Related mode	P
	Setting range	1~65535	Unit	ms	Factory setting	100
<p>In the first stage of multi-segment position, the time of the motor from 0rpm uniform speed to 1000rpm.</p>						

P09.16	Name	Waiting time upon completion of the 1 st displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
<p>After the first stage of the multi-segment position is completed, the waiting time before running the next stage of displacement.</p>						

P09.17	Name	2 nd displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.19	Name	Running speed of the 2 nd displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.20	Name	Acceleration and deceleration time of the 2 nd displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.21	Name	Waiting time upon completion of the 2 nd displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.22	Name	3 rd displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.24	Name	Running speed of the 3 rd displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.25	Name	Acceleration and deceleration time of the 3 rd displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.26	Name	Waiting time upon completion of the 3 rd displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.27	Name	4 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.29	Name	Running speed of the 4 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.30	Name	Acceleration and deceleration time of the 4 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.31	Name	Waiting time upon completion of the 4 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.32	Name	5 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.34	Name	Running speed of the 5 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.35	Name	Acceleration and deceleration time of the 5 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.36	Name	Waiting time upon completion of the 5 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.37	Name	6 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.39	Name	Running speed of the 6 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.40	Name	Acceleration and deceleration time of the 6 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.41	Name	Waiting time upon completion of the 6 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.42	Name	7 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.44	Name	Running speed of the 7 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.45	Name	Acceleration and deceleration time of the 7 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.46	Name	Waiting time upon completion of the 7 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.47	Name	8 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.49	Name	Running speed of the 8 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.50	Name	Acceleration and deceleration time of the 8 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.51	Name	Waiting time upon completion of the 8 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.52	Name	9 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.54	Name	Running speed of the 9 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.55	Name	Acceleration and deceleration time of the 9 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.56	Name	Waiting time upon completion of the 9 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.57	Name	10 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.59	Name	Running speed of the 10 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.60	Name	Acceleration and deceleration time of the 10 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.61	Name	Waiting time upon completion of the 10 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.62	Name	11 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.64	Name	Running speed of the 11 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.65	Name	Acceleration and deceleration time of the 11 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.66	Name	Waiting time upon completion of the 11 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.67	Name	12 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.69	Name	Running speed of the 12 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.70	Name	Acceleration and deceleration time of the 12 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.71	Name	Waiting time upon completion of the 12 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.72	Name	13 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000
P09.74	Name	Running speed of the 13 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100
P09.75	Name	Acceleration and deceleration time of the 13 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.76	Name	Waiting time upon completion of the 13 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100
P09.77	Name	14 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.79	Name	Running speed of the 14 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.80	Name	Acceleration and deceleration time of the 14 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.81	Name	Waiting time upon completion of the 14 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.82	Name	15 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.84	Name	Running speed of the 15 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

P09.85	Name	Acceleration and deceleration time of the 15 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.86	Name	Waiting time upon completion of the 15 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms(s)	Factory setting	100

P09.87	Name	16 th displacement			Related mode	P
	Setting range	-1073741824~1073741824	Unit	Command pulse	Factory setting	10000

P09.89	Name	Running speed of the 16 th displacement			Related mode	P
	Setting range	1~6000	Unit	rpm	Factory setting	100

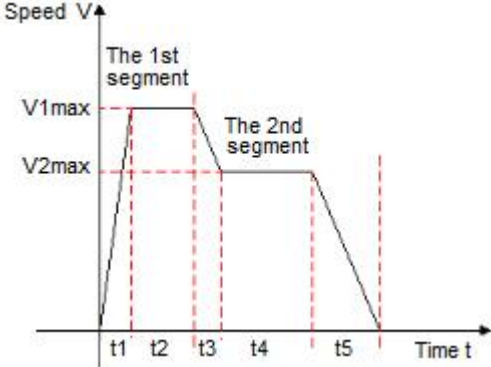
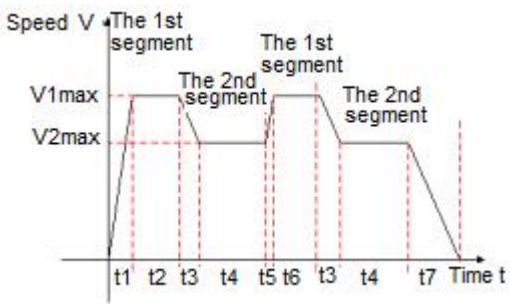
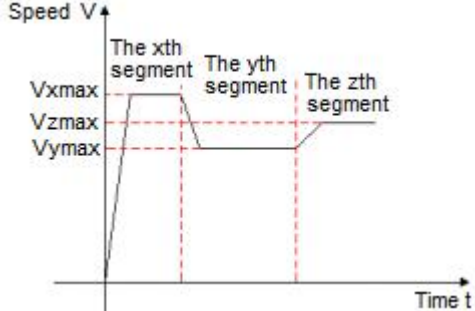
P09.90	Name	Acceleration and deceleration time of the 16 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

P09.91	Name	Waiting time upon completion of the 16 th displacement			Related mode	P
	Setting range	0~65535	Unit	ms	Factory setting	100

7.11. Group P10: Multi-segment Speed Parameters

P10.00	Name	Multi-segment speed running mode			Related mode	S
	Setting range	0~2	Unit	-	Factory setting	0

In speed control mode, when the speed command source is a multi-segment speed command (P04.00=1), set the multi-segment speed command operation mode:

Set value	Operation mode	Remark	Operating waveform
0	Shutdown at the end of a single operation	Stop after running for 1 round; The segment number is automatically switched in increasing order.	 <p>V1max, V2max: the first and second command speeds; t1: the actual acceleration and deceleration time of the first segment; t3, t5: the second segment of acceleration and deceleration time.</p>
1	Cyclic operation	Cycle operation, the starting segment number of each round is 1; the segment number is automatically switched in increasing order; If the servo enable is valid, the cycle running state will always be maintained.	 <p>V1max, V2max: the first and second segment maximum operating speeds.</p>
2	Switch through the external IN port	If the servo is enabled, it can run continuously; The segment number is determined by the IN terminal logic; The running time of each speed command is only determined by the switching interval time of the segment number; FunIN.19 (speed command direction setting) can be used to switch the speed command direction.	 <p>x, y: segment number, please refer to P10.01 for the logical relationship between segment number and IN terminal; Vx, Vy: the speed command of the xth section and the yth section; The segment number determined by IN will not change, and the speed command of this segment will continue to run without being affected by the command running time.</p>

During the operation of each speed command, the servo enable must be ensured, otherwise, the servo driver will stop.

P10.01	Name	Number of speeds			Related mode	S
	Setting range	1~16	Unit	-	Factory setting	16

Set the total number of segments of the speed command. Different segments can set different speeds and running times, and there are 7 groups of acceleration and deceleration times for selection.

When P10.00≠2, the multi-segment segment numbers are automatically switched in increasing order, the switching sequence: 1, 2, ..., P10.01.

When P10.00=2, 4 INs should be set as IN functions 14~17 (FunIN.14~FunIN.17), and the upper computer controls the IN logic to realize the segment number switching. The multi-segment segment number is a 4-digit binary number. The corresponding relationship between FunIN.14~FunIN.17 and the segment number is shown in the following table.

FunIN.17	FunIN.16	FunIN.15	FunIN.14	Segment number
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
.....				
1	1	1	1	16

When the IN terminal logic is valid, the value of FunIN.n is 1, otherwise it is 0.

P10.02	Name	Running time unit			Related mode	S
	Setting range	0~1	Unit	-	Factory setting	0

Set multi-segment speed running time unit.

Set value	Time unit
0	0.1s (second)
1	1min (minute)

P10.03	Name	Acceleration time constant 1			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

For each multi-segment speed command, there are 7 groups of acceleration and deceleration time constants for selection.

Acceleration time constant: the time for the servo motor to uniformly accelerate from 0rpm to 1000rpm.

Deceleration time constant: the time for the servo motor to decelerate uniformly from 1000rpm to 0rpm.

P10.04	Name	Deceleration time constant 1			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.05	Name	Acceleration time constant 2			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.06	Name	Deceleration time constant 2			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.07	Name	Acceleration time constant 3			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.08	Name	Deceleration time constant 3			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.09	Name	Acceleration time constant 4			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.10	Name	Deceleration time constant 4			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.11	Name	Acceleration time constant 5			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.12	Name	Deceleration time constant 5			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.13	Name	Acceleration time constant 6			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.14	Name	Deceleration time constant 6			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.15	Name	Acceleration time constant 7			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.16	Name	Deceleration time constant 7			Related mode	S
	Setting range	0~65535	Unit	ms	Factory setting	100

P10.20	Name	1 st speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100

P10.21	Name	Running time of the 1 st speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10

Set the running time of the first segment speed command.

Running time: the shifting time of the previous speed command switching to this speed command + this constant speed running time.

If the running time is set to 0, the servo drive will automatically skip this speed command.

When P10.02=2, as long as the segment number determined by the external IN terminal does not change, the speed command of this segment will continue to run without being affected by the command running time.

P10.22	Name	Acceleration and deceleration selection of the 1 st speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1

Select the acceleration and deceleration time constant of the first segment speed command.

Set value	Acceleration and deceleration time constant	Remark
1	Acceleration and deceleration time constant 1	Acceleration time: P10.03 Deceleration time: P10.04
2	Acceleration and deceleration time constant 2	Acceleration time: P10.05 Deceleration time: P10.06
3	Acceleration and deceleration time constant 3	Acceleration time: P10.07 Deceleration time: P10.08
4	Acceleration and deceleration time constant 4	Acceleration time: P10.09 Deceleration time: P10.10
5	Acceleration and deceleration time constant 5	Acceleration time: P10.11 Deceleration time: P10.12
6	Acceleration and deceleration time constant 6	Acceleration time: P10.13 Deceleration time: P10.14
7	Acceleration and deceleration time constant 7	Acceleration time: P10.15 Deceleration time: P10.16

V1max, V2max: the first and second segment command speeds;

t1: the actual acceleration and deceleration time of the first segment;

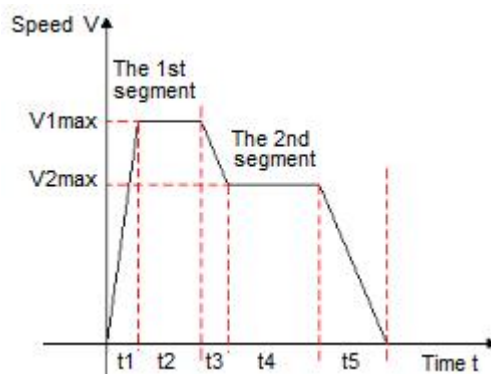
t3、 t5: the actual acceleration and deceleration time of the second segment;

A certain period of running time: the shifting time of the previous speed command switching to this speed command + the constant speed running time of this section (for example: the running time of the first segment in the figure is t1+t2, and the running time of the second segment is t3+t4. And so on);

When a certain period of running time is set to 0, the driver will skip this section of speed command and execute the next section;

$$t_1 = \frac{V_1}{1000} \times \text{Acceleration time set for this speed segment}$$

$$t_3 = \frac{|V_2 - V_1|}{1000} \times \text{The acceleration time set in the second segment}$$



P10.23	Name	2 nd speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.24	Name	Running time of the 2 nd speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.25	Name	Acceleration and deceleration selection of the 2 nd speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.26	Name	3 rd speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.27	Name	Running time of the 3 rd speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.28	Name	Acceleration and deceleration selection of the 3 rd speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.29	Name	4 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.30	Name	Running time of the 4 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.31	Name	Acceleration and deceleration selection of the 4 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.32	Name	5 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.33	Name	Running time of the 5 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.34	Name	Acceleration and deceleration selection of the 5 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.35	Name	6 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.36	Name	Running time of the 6 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.37	Name	Acceleration and deceleration selection of the 6 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1

P10.38	Name	7 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.39	Name	Running time of the 7 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.40	Name	Acceleration and deceleration selection of the 7 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.41	Name	8 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.42	Name	Running time of the 8 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.43	Name	Acceleration and deceleration selection of the 8 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.44	Name	9 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.45	Name	Running time of the 9 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.46	Name	Acceleration and deceleration selection of the 9 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
10.47	Name	10 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.48	Name	Running time of the 10 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.49	Name	Acceleration and deceleration selection of the 10 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.50	Name	11 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.51	Name	Running time of the 11 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.52	Name	Acceleration and deceleration selection of the 11 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1

P10.53	Name	12 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.54	Name	Running time of the 12 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.55	Name	Acceleration and deceleration selection of the 12 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.56	Name	13 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.57	Name	Running time of the 13 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.58	Name	Acceleration and deceleration selection of the 13 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.59	Name	14 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.60	Name	Running time of the 14 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.61	Name	Acceleration and deceleration selection of the 14 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.62	Name	15 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.63	Name	Running time of the 15 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.64	Name	Acceleration and deceleration selection of the 15 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1
P10.65	Name	16 th speed			Related mode	S
	Setting range	-6000~6000	Unit	rpm	Factory setting	100
P10.66	Name	Running time of the 16 th speed			Related mode	S
	Setting range	0~65535	Unit	0.1s/1min	Factory setting	10
P10.67	Name	Acceleration and deceleration selection of the 16 th speed			Related mode	S
	Setting range	0~6	Unit	-	Factory setting	1

7.12. Group P12: Auxiliary Parameters

P12.00	Name	Parameters initialization			Related mode	-								
	Setting range	0~65535	Unit	-	Factory setting	0								
<table border="1"> <thead> <tr> <th>Set value</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No effect</td> </tr> <tr> <td>1</td> <td>Reset</td> </tr> <tr> <td>2</td> <td>Clear fault log</td> </tr> </tbody> </table>							Set value	Function	0	No effect	1	Reset	2	Clear fault log
Set value	Function													
0	No effect													
1	Reset													
2	Clear fault log													

P12.04	Name	Encoder calibration			Related mode	-
	Setting range	0~2	Unit	-	Factory setting	0

P12.05	Name	Absolute encoder reset			Related mode	-								
	Setting range	0~2	Unit	-	Factory setting	0								
<table border="1"> <thead> <tr> <th>Set value</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No effect</td> </tr> <tr> <td>1</td> <td>Reset</td> </tr> <tr> <td>2</td> <td>Clear encoder fault and multi-turn value</td> </tr> </tbody> </table>							Set value	Function	0	No effect	1	Reset	2	Clear encoder fault and multi-turn value
Set value	Function													
0	No effect													
1	Reset													
2	Clear encoder fault and multi-turn value													

P12.06	Name	Communication encoder storage operation			Related mode	-										
	Setting range	0~3	Unit	-	Factory setting	0										
<table border="1"> <thead> <tr> <th>Set value</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No effect</td> </tr> <tr> <td>1</td> <td>Write encoder data</td> </tr> <tr> <td>2</td> <td>Read encoder data</td> </tr> <tr> <td>3</td> <td>Read-write operation fault display</td> </tr> </tbody> </table>							Set value	Function	0	No effect	1	Write encoder data	2	Read encoder data	3	Read-write operation fault display
Set value	Function															
0	No effect															
1	Write encoder data															
2	Read encoder data															
3	Read-write operation fault display															

P12.07	Name	Software reset DSP			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.08	Name	Fault reset			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.09	Name	Emergency stop			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.10	Name	JOG running			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P12.11	Name	Offline inertia auto-tuning			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	0

P12.14	Name	Parameters initialization			Related mode	P								
	Setting range	0~2	Unit	-	Factory setting	0								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Set value</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No effect / Calibration complete</td> </tr> <tr> <td>1</td> <td>AI1 zero drift correction</td> </tr> <tr> <td>2</td> <td>AI2 zero drift correction</td> </tr> </tbody> </table>							Set value	Function	0	No effect / Calibration complete	1	AI1 zero drift correction	2	AI2 zero drift correction
Set value	Function													
0	No effect / Calibration complete													
1	AI1 zero drift correction													
2	AI2 zero drift correction													

P12.16	Name	Reserved			Related mode	PS
	Setting range	0~65535	Unit	-	Factory setting	0

P12.17	Name	Reserved			Related mode	PS
	Setting range	0~65535	Unit	-	Factory setting	0

P12.18	Name	Reserved			Related mode	PS
	Setting range	0~65535	Unit	-	Factory setting	0

P12.19	Name	Reserved			Related mode	PS
	Setting range	0~65535	Unit	-	Factory setting	0

P12.20	Name	Enable torque PI auto-tuning			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.25	Name	Torque PI auto-tuning mode			Related mode	-
	Setting range	0: PI tuning 1 1: PI tuning 2	Unit	-	Factory setting	0

P12.26	Name	Torque PI auto-tuning torque			Related mode	-
	Setting range	0~3000	Unit	0.1%	Factory setting	200

P12.27	Name	Disable heartbeat function			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.28	Name	Reserved			Related mode	-
	Setting range	0~1	Unit	-	Factory setting	0

P12.29	Name	Debug command (manufacturer reserved)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	100

P12.30	Name	Debug data (manufacturer reserved)			Related mode	-
	Setting range	0~65535	Unit	-	Factory setting	200

7.13. Group P13: Monitoring Parameters

P13.00	Name	Servo running status			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.01	Name	Motor speed			Related mode	-
	Setting range	-	Unit	rpm	Factory setting	-

Display the actual speed of the servo motor, after rounding the display, the accuracy is 1rpm.

P13.02	Name	Speed command			Related mode	-
	Setting range	-	Unit	rpm	Factory setting	-

Display the current speed command value of the servo drive, after rounding the display, the accuracy is 1rpm.

P13.03	Name	Motor torque			Related mode	-
	Setting range	-	Unit	0.1%	Factory setting	-

Display actual servo motor torque, 100% corresponding to 1 times motor rated torque.

P13.04	Name	Torque command			Related mode	-
	Setting range	-	Unit	0.1%	Factory setting	-

Display the current torque command value of the servo drive, 100% corresponding to 1 times the motor rated torque.

P13.05	Name	Average load ratio			Related mode	-
	Setting range	-	Unit	0.1%	Factory setting	-

P13.07	Name	Position command			Related mode	-
	Setting range	-	Unit	Command pulse	Factory setting	-

In position control mode, during servo operation, the number of position commands that have not been divided and multiplied by the electronic gear ratio are counted and displayed. P13.07 and P13.08 are combined into a 32-bit value, where P13.07 is the low 16-bit value, and P13.08 is the high 16-bit value. Subsequent use P13.07 to represent the 32-bit parameter.

P13.09	Name	Actual position			Related mode	-
	Setting range	-	Unit	Command pulse	Factory setting	-

In position control mode, during servo operation, the number of position commands that have not been divided and multiplied by the electronic gear ratio are counted and displayed. P13.09 and P13.10 are combined into a 32-bit value, where P13.09 is the low 16-bit value, and P13.10 is the high 16-bit value. Subsequent use P13.09 to represent the 32-bit parameter.

P13.11	Name	Position feedback counter			Related mode	-
	Setting range	-	Unit	Encoder pulse	Factory setting	-

Used to count the number of encoder feedback pulses since the last clearing. P13.11 and P13.12 are combined into a 32-bit value, where P13.11 is the lower 16-bit value and P13.12 is the upper 16-bit value. Subsequent use P13.11 to represent the 32-bit parameter.

P13.13	Name	Position error			Related mode	-
	Setting range	-	Unit	Command pulse	Factory setting	-
<p>In position control mode, statistics and display the position command deviation value. P13.13 and P13.14 are combined into a 32-bit value, where P13.13 is the low 16-bit value, and P13.14 is the high 16-bit value. Subsequent use P13.13 to represent the 32-bit parameter.</p>						

P13.15	Name	Position error			Related mode	-
	Setting range	-	Unit	Encoder unit	Factory setting	-
<p>In the position control mode, statistics and display the position deviation value after the electronic gear ratio is divided and multiplied. P13.15 and P13.16 are combined into a 32-bit value, where P13.15 is the low 16-bit value, and P13.16 is the high 16-bit value. Subsequent use P13.15 to represent the 32-bit parameter.</p>						

P13.17	Name	Position command speed			Related mode	-
	Setting range	-	Unit	rpm	Factory setting	-
<p>Display the speed value corresponding to the position command of a single position control cycle of the drive.</p>						

P13.19	Name	Input signal monitoring			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.20	Name	Output signal monitoring			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.21	Name	Mechanical angle			Related mode	-
	Setting range	-	Unit	Encoder unit	Factory setting	-
<p>Display the current mechanical angle of the motor (encoder unit), 0 corresponds to the mechanical angle 0.</p>						

P13.22	Name	Electrical angle			Related mode	-
	Setting range	-	Unit	0.1°	Factory setting	-
<p>Display the current electrical angle of the motor, $P13.22 = (P13.21 \div \text{encoder pulse number}) * 360^\circ$</p>						

P13.23	Name	Bus voltage			Related mode	-
	Setting range	-	Unit	0.1V	Factory setting	-

P13.24	Name	Encoder single-turn value			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.26	Name	Encoder multi-turn value			Related mode	-
	Setting range	-	Unit	Revolutions	Factory setting	-

P13.29	Name	AI1 voltage			Related mode	-
	Setting range	-	Unit	0.01V	Factory setting	-

P13.30	Name	Actual position			Related mode	-
	Setting range	-	Unit	Command pulse	Factory setting	-
P13.32	Name	Total servo running time			Related mode	-
	Setting range	-	Unit	0.1s	Factory setting	-
P13.34	Name	AI2 voltage			Related mode	-
	Setting range	-	Unit	0.01V	Factory setting	-
P13.35	Name	History fault selection			Related mode	-
	Setting range	0~9	Unit	-	Factory setting	-
P13.36	Name	Fault code of the selected fault			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.37	Name	U-phase current upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	0.01A	Factory setting	-
P13.38	Name	V-phase current upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	0.01A	Factory setting	-
P13.39	Name	Input status upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.40	Name	Output status upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.41	Name	Bus voltage upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	V	Factory setting	-
P13.42	Name	Motor speed upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	RPM	Factory setting	-
P13.43	Name	Running time upon occurrence of the selected fault			Related mode	-
	Setting range	-	Unit	0.1s	Factory setting	-
P13.51	Name	Abnormal group No.			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.52	Name	Abnormal intra-group offset			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.53	Name	Internal fault code			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.54	Name	Real-time pulse counter			Related mode	-
	Setting range	-	Unit	Command pulse	Factory setting	-
P13.59	Name	Internal fault code of the selected fault			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.60	Name	Encoder real-time position			Related mode	-
	Setting range	-	Unit	Encoder pulse	Factory setting	-
P13.64	Name	Real-time mechanical position			Related mode	-
	Setting range	-	Unit	Encoder pulse	Factory setting	-
P13.70	Name	Absolute rotation mode mechanical single-turn position			Related mode	-
	Setting range	-	Unit	Encoder unit	Factory setting	-
P13.74	Name	Absolute rotation mode mechanical single-turn position			Related mode	-
	Setting range	-	Unit	Command unit	Factory setting	-
P13.76	Name	Motor speed			Related mode	-
	Setting range	-	Unit	0.1rpm	Factory setting	-
P13.82	Name	Cycle running cycle			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.83	Name	Cycle running time			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.84	Name	Speed loop running time			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.85	Name	Position loop running time			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

P13.88	Name	D-axis given torque			Related mode	-
	Setting range	-	Unit	0.1%	Factory setting	-
P13.89	Name	D-axis feedback torque			Related mode	-
	Setting range	-	Unit	0.1%	Factory setting	-
P13.90	Name	Deviation value at ECAT synchronous deviation alarm			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.91	Name	ECAT synchronous deviation compensation excessive count			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.92	Name	ECAT synchronous deviation real-time value			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.93	Name	Maximum value of ECAT synchronous deviation			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.94	Name	Status flag			Related mode	-
	Setting range	-	Unit	-	Factory setting	-
P13.95	Name	Status flag			Related mode	-
	Setting range	-	Unit	-	Factory setting	-

8. Communication

The servo drive has Modbus RTU (RS-232, RS-485) communication function, with the upper computer communication software, it can realize multiple functions such as parameter modification, parameter query and servo drive status monitoring.

8.1. Communication Parameters Setting

The RS-485 communication protocol has a single-master multi-slave communication mode, which can support network operation of multiple servo drives. RS-232 communication protocol does not support networking of multiple servo drives.

◆ Servo drive default communication settings:

Communication mode	Axis address	Baud rate	Data Format
RS485 communication	1	115200 bps	1 start bit + 8 data bits + 1 stop bit
RS232 communication	1 (Fixed and unchangeable)	115200 bps	1 start bit + 8 data bits + 1 stop bit

1. RS485 communication settings

(1) Set the servo drive axis address P08.00

When multiple servo drives are networked, each drive can only have a unique address, otherwise it will cause communication abnormalities and fail to communicate. Among them:

- ◆ 0: broadcast address
- ◆ 1~127: slave address

The host computer can write to all slave drives through the broadcast address. The slave drive receives the broadcast address data frame and performs corresponding operations, but does not respond to data.

(2) Set the communication rate between the servo drive and the host computer P08.01

The speed of the servo drive and the communication speed of the host computer must be set to be consistent, otherwise the communication will not be possible. When multiple servo drives are networked, if the communication baud rate of a servo drive is inconsistent with the host, it will cause the servo axis communication error and may affect the normal communication of other servo drives.

(3) Set the data frame format P08.02 for the communication between the drive and the master

Servo drive provides 6 communication data formats:

P08.02 setting value	Communication data frame format
0	1 start bit + 8 data bits + 1 stop bit
1	1 start bit + 8 data bits + 2 stop bits
2	1 start bit + 8 data bits + 1 even parity bit + 1 stop bit
3	1 start bit + 8 data bits + 1 even parity bit + 2 stop bits
4	1 stop bit + 8 data bits + 1 odd parity bit + 1 stop bit
5	1 stop bit + 8 data bits + 1 odd parity bit + 2 stop bits

Remark:

The data frame format of the host computer must conform to the above format, otherwise it cannot communicate with the drive.

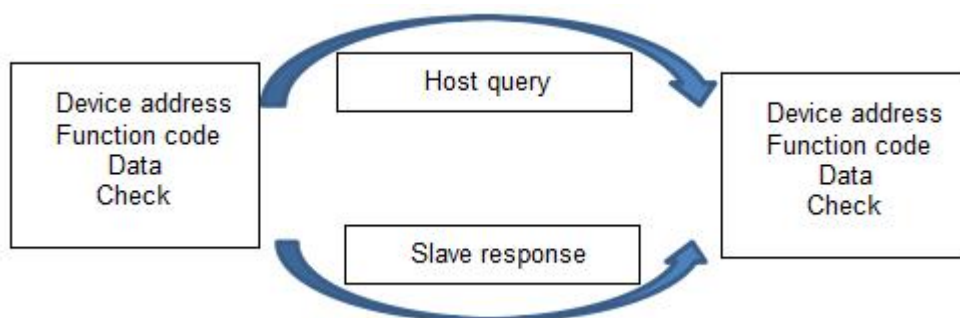
2. RS232 communication settings

★ Associated parameter description

Parameter	Name	Range	Function	Effective time	Default
P08.30	RS232 communication axis address	-	Set the station number of RS232 communication	After saving and restarting	1
P08.31	RS232 communication baud rate	0~5	Set the baud rate of RS232 communication	After saving and restarting	5
P08.32	RS232 communication data format	0~5	Set the data format of RS232 communication	After saving and restarting	0

8.2. MODBUS Communication Protocol

The Modbus protocol, designed by MODICON company, is a bus protocol that allows a master and one or more slaves to share data, which consists of 16-bit registers. The master can read and write a single register or multiple registers. The standard Modbus port on a Modicon controller is using an RS-232 compatible serial interface that defines the connector, wiring cable, signal class, transmission baud rate and parity. Controller communication uses master-slave technology, where the master initiates the data transfer, called a query. And other devices (slaves) return data in response to the query, or process the action requested by the query. Master devices include processors, programmers, and PLCs, and slaves include programmable controllers, servo drives, and stepper drives. The master-slave query-feedback mechanism is shown below:



◆ Note: The communication data frame structure of this servo drive adopts RTU mode.

The MODBUS communication function code used by the servo drive is described as follows:

Function code	Definition
0x03	Read register data
0x06	Write single register data
0x10	Write multiple register data

- ◆ Note: The relationship between the parameter number in the manual and the register address in Modbus communication: if the parameter number is P08.02, the Modbus communication register address is 802 (Decimal)

8.2.1. Read Register Data: 0x03

1. Request frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x03
REGISTER_ADDRH	Register start address high byte
REGISTER_ADDRL	Register start address low byte
DATA_NUMBERH	The number of registers to be read N (H), high byte
DATA_NUMBERL	The number of registers to be read N (L), low byte
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

- ◆ Note: The register start address range is 0x0000 to 0xFFFF, and the register number range is 0x1 to 0x7D

2. Response frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x03
DATA_LENGTH	Number of data bytes returned, equal to the number of registers N*2
DATA[0]	Starting data value, high byte
DATA[1]	Starting data value, low byte
DATA[...]
DATA[N*2-1]	Last data value, low byte
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

3. Example

(1) Host sends request frame

0x01	0x03	0x00	0x64	0x00	0x02	CRCL	CRCH
------	------	------	------	------	------	------	------

This request frame means: read 2 (0x0002) word length data from the servo drive whose axis address is 0x01 and the start register address is 100 (0x0064).

(2) Slave response frame

0x01	0x03	0x04	0x01	0x20	0x00	0x59	CRCL
------	------	------	------	------	------	------	------

The response frame means: the slave returns 4 bytes (2 words long) of data, and the data content is 0x0120, 0x0059.

8.2.2. Write a Single Register: 0x06

1. Request frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x06
REGISTER_ADDRH	High byte of written register address
REGISTER_ADDRL	Low byte of written register address
DATA[0]	Write data, high byte
DATA[1]	Write data, low byte
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

2. Response frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x06
REGISTER_ADDRH	High byte of written register address
REGISTER_ADDRL	Low byte of written register address
DATA[0]	Write data, high byte
DATA[1]	Write data, low byte
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

3. Example

(1) Host sends request frame

0x01	0x06	0x00	0x64	0x00	0x02	CRCL	CRCH
------	------	------	------	------	------	------	------

This request frame means: write data value 0x0002 to the servo drive with axis address 0x01 and register address 100 (0x0064).

(2) Slave response frame

0x01	0x06	0x00	0x64	0x00	0x02	CRCL	CRCH
------	------	------	------	------	------	------	------

This response frame indicates that the host has successfully written data into the servo drive register.

8.2.3. Write Multiple Registers: 0x10

1. Request frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x10
REGISTER_ADDRH	High byte of the start address of the written register
REGISTER_ADDRL	Low byte of the start address of the written register
DATA_NUMBERH	The number of registers to be written N (H), high byte
DATA_NUMBERL	The number of registers to be written N (L), low byte
DATA_LENGTH	Need to write the number of bytes corresponding to the number of registers N*2
DATA[0]	Write high byte of start register data
DATA[1]	Write low byte of start register data
DATA[...]
DATA[N*2-1]	Write low byte of last register data
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

2. Response frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	Function code: 0x10
REGISTER_ADDRH	High byte of the start address of the written register
REGISTER_ADDRL	Low byte of the start address of the written register
DATA_NUMBERH	The number of registers to be written N (H), high byte
DATA_NUMBERL	The number of registers to be written N (L), low byte
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

◆ Note: The maximum number of registers that can be written at one time is 120.

3. Example

(1) Host sends request frame

0x01	0x10	0x00	0x64	0x00	0x02	0x04	0x12	0x00	0x00	0x52	CRCL	CRCH
------	------	------	------	------	------	------	------	------	------	------	------	------

The request frame indicates that 2 (0x0002) words long data (4 bytes) are written to the servo drive with the axis address of 0x01, the starting register address of 100 (0x0064), and the written data are 0x1200 and 0x0052.

(2) Slave response frame

0x01	0x10	0x00	0x64	0x00	0x02	CRCL	CRCH
------	------	------	------	------	------	------	------

This response frame means: the host successfully writes the data into the servo drive register.

8.2.4. Error Response Frame Format

1. Error response frame format

START	Idle time greater than or equal to 3.5 characters, indicating the start of a frame
ADDR	Servo axis address
CMD	0x80 + Function code
ERROR_CODE	Error code
CRCL	CRC check code, low byte
CRCH	CRC check code, high byte
END	Idle time greater than or equal to 3.5 characters, one frame ends

2. Error code

Error code	Coding description
0x01	Illegal function code
0x02	Illegal data address
0x03	Illegal data
0x04	Slave equipment failure

3. Example

(1) Host sends request frame

0x01	0x03	0x00	0x64	0x00	0x02	CRCL	CRCH
------	------	------	------	------	------	------	------

This request frame means: read 2 (0x0002) word length data from the servo drive whose axis address is 0x01 and the start register address is 100 (0x0064).

(2) Slave response frame

0x01	0x03	0x04	0x01	0x20	0x00	0x59	CRCL
------	------	------	------	------	------	------	------

The response frame means: the slave returns 4 bytes (2 words long) of data, and the data content is 0x0120, 0x0059.

If the slave response is:

0x01	0x83	0x02	CRCL	CRCH
------	------	------	------	------

The response frame means that 0x83 indicates an error occurred in communication, and the error coding is 0x02.

8.2.5.CRC Check

The upper computer and the servo must use the same CRC check algorithm for communication, otherwise CRC check error will occur, resulting in communication failure, and the servo drive will not report CRC check error. The servo drive adopts 16-bit CRC, with low byte first and high byte last. The CRC function is as follows:

```

unsigned short CalcCRCbyAlgorithm(unsigned char* pDataBuffer, unsigned long usDataLen)
{
const unsigned short POLYNOMIAL = 0xA001;
unsigned short wCrc;
int iByte, iBit;
wCrc = 0xFFFF;
For(iByte = 0; iByte < usDataLen; iByte++)
{
    wCrc ^= *(pDataBuffer + iByte);
    For(iBit = 0; iBit <= 7; iBit++)
    {
        If(wCrc & 0x0001)
        {
            wCrc >>= 1;
            wCrc ^= POLYNOMIAL;
        }
        else
        {
            wCrc >>= 1;
        }
    }
}
return wCrc;
}

```

9. Troubleshooting

When the servo fails, the servo drive LED will display the error code: AL.xxx, where xxx is a three digit decimal value:

Range of error code values	Description
100~199	The first type of non resettable fault can only be reset through power outage and restart.
200~299	The first type of resettable fault can be reset through IO or software.
300~399	The second type of resettable fault can be reset through IO or software.
400~499	Drive warning code, which does not affect the enabled operation of the drive when it appears, is only used as a warning prompt.

9.1. Error Code

Error code	Fault content
AL.000	Normal state
AL.100	<p>System parameter error</p> <p>Most cases occur after system firmware updates, when unsupported parameters are set on the drive. It is necessary to restore the factory settings and power off for 30 seconds before restarting the drive. If the drive still alarms, please contact the manufacturer's after-sales service to check the relevant abnormal parameters. If there is no alarm, please reset the parameters before continuing to use it again.</p>
AL.101	The drive failed or timed out reading parameters stored in EEPROM. Generally, due to abnormal communication of the EEPROM chip, please completely power off the drive for 30s before restarting it. If the alarm code still appears, please contact the manufacturer's after-sales service or replace it.
AL.102	Failure or timeout in writing drive parameters to EEPROM. Generally, due to abnormal communication of the EEPROM chip, please completely power off the drive for 30 seconds before restarting it. If the alarm code still appears after modifying the parameters, please contact the manufacturer's after-sales service or replace it.
AL.103	The drive parameters are abnormal or the parameter range is incorrect. It usually occurs after firmware update, and the parameter range of the new and old firmware is inconsistent. The abnormal parameter number can be determined by P13.51 (parameter abnormal group number) and P13.52 (parameter abnormal group offset).
AL.104	The parameter settings of the drive system are incorrect. Please contact the manufacturer's after-sales service or replace it.
AL.105	The parameter settings of the drive system are incorrect. Please contact the manufacturer's after-sales service or replace it.

<p>AL.110</p> <p>AL.111</p>	<p>AL.110: Drive IPM module overcurrent</p> <p>AL.111: Drive ADC overcurrent</p> <p>A. Whether the motor collides or not causes a blockage</p> <p>B. Motor P06.00,P06.01, P06.02, P06.28, P06.29 improper settings caused. Try to restore the drive parameters and restart to see if the warning still exists. If a warning still appears, please contact the manufacturer for after-sales service.</p> <p>C. By setting the P05.04 parameter, try to reduce the overload multiple of the drive to test whether there is an alarm.</p>
<p>AL.114</p>	<p>Undervoltage of the control power supply usually occurs in situations where the power is quickly turned on and off, and the fault can be cleared by restarting after 30s of power outage.</p>
<p>AL.115</p>	<p>Drive internal voltage error</p> <p>The internal voltage fault of the drive is usually caused by the internal hardware of the drive. If the error persists after restarting the power supply, please contact the manufacturer's after-sales service.</p>
<p>AL.119</p>	<p>The operation time of the control loop exceeds the control cycle time. Please contact the manufacturer for after-sales treatment.</p>
<p>AL.120</p>	<p>Drive Encoder Interference</p> <p>A. Please check whether the motor PE cable connection is reliable</p> <p>B. Check that the encoder plug is connected reliably</p> <p>C. Replace the drive to check whether the fault is caused by the motor encoder</p>
<p>AL.121</p>	<p>Encoder communication error</p> <p>A. The fault occurs when power-up, generally will alarm AL.170 at the same time, please check that the encoder extension cord connection is reliable.</p> <p>B. If the drive simply alarms AL.121, usually caused by a faulty encoder, replace the motor.</p>
<p>AL.123</p>	<p>Encoder CRC check failure</p>
<p>AL.124</p>	<p>Encoder Z-phase signal failure</p>
<p>AL.125</p>	<p>Encoder zero adjustment failed</p>
<p>AL.126</p>	<p>Encoder EEPROM read and write failure usually occurs during power on or operation of the encoder EEPROM. When power on occurs, try restarting the drive to confirm if the fault still exists. After restarting, the fault still occurred. Please check if the encoder extension cable contact is reliable, or replace the driver for comparison and confirmation.</p>
<p>AL.127</p>	<p>Encoder failure</p> <p>A. Appears during power-on initialization, the incremental encoder reads the Hall signal incorrectly when power-on, and the communication encoder shows that the drive cannot communicate with the encoder.</p> <p>B. Please check that the encoder cable connection is reliable</p>
<p>AL.128</p>	<p>The motor model setting is incorrect. Please restore the factory settings and restart to confirm if the fault is cleared. If the fault still exists, please contact after-sales and inform the P00.00 value.</p>

AL.130	Motor runaway fault, please check if the UVW cable sequence of the motor power cable is correct. If it is the Z-axis up and down mechanism, it may be caused by the drive's false alarm. You can set P01.56 to 0 to prohibit flying and reporting errors.
AL.133	The parameter value range is abnormal. Use P13.51 to check the abnormal group number, and P13.52 to check the intra group offset of the abnormality.
AL.134	Drive peripheral initialization, PHY initialization failed.
AL.135	Unsupported motor encoder type, please check if P00.00 motor model is set to 50000.
AL.137	The drive model is set incorrectly. Please check if the P00.02 parameter is set abnormally. Please contact the manufacturer's after-sales service and inform them of the parameter value.
AL.138	The drive and motor do not match, and the rated current of the drive is less than the rated current of the motor. Replace with a higher power drive or reduce the rated current of the motor.
AL.139	Drive rated voltage parameter setting error.
AL.141	The absolute value mode setting error is generally caused by P01.03 being set to absolute value mode, but the motor is not an absolute value motor. Please check if the motor is an absolute value motor. If so, please contact the manufacturer's after-sales service to change the motor encoder type.
AL.160	FPGA parameter initialization error It appears when the drive is powering on and initializing, power off the drive for 30s, then restart it to see if it still alarms, if it still alarms, please replace the drive.
AL.162	Encoder EEPROM read and write operation failure, power off and retry.
AL.164	Encoder data is incorrect It appears during power-on initialization, because the encoder has not been calibrated, please contact the manufacturer for after-sales service.
AL.171	FPGA initialization error A. It appears during power-on initialization and is caused by abnormal communication between DSP and FPGA. B. Check if P00.50, P00.52, and P00.56 are set incorrectly, such as 0.
AL.180	Drive Q-axis feedback overcurrent
AL.181	Drive U-phase feedback overcurrent
AL.182	Drive V-phase feedback overcurrent
AL.183	Drive W-phase feedback overcurrent
AL.185 AL.186	Drive output short circuit
AL.187	Abnormal phase sequence of motor power cable UVW
AL.189	Analog input overvoltage saturation
AL.200	Control mode setting error Please check the P01.00 parameter setting value, whether it meets the requirements of the manual, or contact the manufacturer.

AL.201	<p>Position command source setting error</p> <p>Please check whether the P03.00 parameter setting value meets the requirements of the manual, or contact the manufacturer.</p>
AL.202	<p>Speed command source setting error</p> <p>Please check the P04.00, P04.02, P04.03 parameter setting values, whether they meets the requirements of the manual, or contact the manufacturer.</p>
AL.203	<p>Torque command source setting error</p> <p>Please check whether the parameter setting values of P05.00, P05.01 and P05.02 meet the requirements of the manual or contact the manufacturer.</p>
AL.210	<p>Drive bus voltage is high</p> <p>A. Please plug in the brake resistance or check the quality of the brake resistance and whether the resistance value is appropriate.</p> <p>B. Please check if it is indeed caused by high AC input power supply; Please check if the parameter setting of P01.48 (overvoltage protection) is correct; Replace the drive with a new one to check if it is caused by damage to the drive.</p>
AL.211	<p>Drive bus voltage is low</p> <p>Please check if it is indeed caused by low AC input power supply; Please check if the parameter setting of P01.49 (undervoltage protection) is correct; Replace the drive with a new one to check if it is caused by damage to the drive.</p>
AL.212	<p>Drive bus voltage is high</p> <p>A. It occurs when the bus voltage of the drive is momentarily higher than the alarm threshold.</p> <p>B. Please plug in the brake resistance or check the quality of the brake resistance and whether the resistance value is appropriate.</p> <p>C. Please check whether the AC input power is too high and the drive input power requirement is below 260VAC.</p>
AL.221	<p>Encoder battery failure</p> <p>Encoder battery failure, this fault code is provided by the encoder, usually caused by low battery voltage. When this fault occurred, the encoder was no longer able to correctly remember the absolute position of multiple turns, so after replacing the battery, it was necessary to reset the zero point.</p> <p>It is necessary to manually set the P12.05 parameter to 1 to clear this fault.</p>
AL.222	<p>Encoder multi-turn data alarm</p> <p>Encoder multi-turn data alarm occurs during power on initialization, usually due to the disconnection of the encoder battery and encoder before. This alarm also appears when the battery voltage is too low or there is an abnormality in the battery connection cable. When this alarm occurs, the data of the drive's multi turn encoder is no longer correct and needs to be reset to zero.</p> <p>It is necessary to manually set the P12.05 parameter to 1 to clear this fault.</p>

AL.223	The multi-turn encoder counts overflow, which is caused by the number of rotations exceeding the resolution of the multi-turn motor. It can also be set to 1 through P01.51 to prevent multi-turn overflow from reporting errors.
AL.230 AL.232	Overspeed alarm
AL.240	Position is out of tolerance A. Check that the power cable is properly connected B. Check that the electronic gear ratio parameters are set correctly C. Check that the frequency of the pulse input exceeds the maximum speed of the motor
AL.241	The input frequency of the position command exceeds P01.54 (maximum input pulse frequency), which is caused. Please check if the setting value of P01.54 is correct.
AL.244	Drive overload fault
AL.245 AL.246	Motor overload fault
AL.247	Motor stall fault
AL.248	Drive over temperature fault
AL.270	Digital input port function parameter setting fault
AL.271	Digital output port function parameter setting fault
AL.284	EtherCAT synchronization deviation too large fault
AL.285	EtherCAT synchronization time setting error fault
AL.286	EtherCAT initialization error fault
AL.292	EtherCAT synchronization loss fault
AL.293 AL.299	EtherCAT bus error fault
AL.300	The servo enable input failure is usually caused by the input of an enable signal through the digital input port when the drive is internally enabled.
AL.302 AL.303 AL.304 AL.305	Power supply phase failure
AL.305	Frequency division output frequency too high fault
AL.310 AL.311 AL.312 AL.313	Electronic gear ratio setting error fault
AL.325	Soft limit setting abnormal fault
AL.326	Soft limit setting abnormal fault

AL.400	Warning of abnormal setting of electronic gear ratio in frequency division output, due to the number of pulses in frequency division output exceeding the encoder resolution.
AL.418	Absolute encoder battery warning. When this warning appears, the absolute encoder can still remember the position correctly, but the battery needs to be replaced in a timely manner to prevent position loss. When replacing the battery, please power on and operate the drive normally before replacing the encoder battery.
AL.420	Warning of abnormal origin homing, timeout of zero return, abnormal positive and negative limit positions, etc. can all cause this warning. Please check if the sensor is correct, etc.
AL.421	Origin homing mode setting error warning
AL.430	AI channel zero drift set value too large warning
AL.440	Emergency stop input warning
AL.450	The external braking resistance value is less than the minimum braking resistance value required by the drive.
AL.452	Brake resistor overload warning, check if the brake parameter settings are correct. If frequent braking causes significant heating of the braking resistor, it can be solved by extending the deceleration time or replacing it with a higher power braking resistor.
AL.460	Motor overload warning
AL.461	Motor power cable disconnection warning
AL.463	Power supply phase failure
AL.475	Encoder overheat warning
AL.480	Positive limit valid warning
AL.481	Negative limit valid warning
AL.482	Frequent parameter storage warning
AL.490	Performed an operation that requires a restart to take effect or modified parameters that require a restart to take effect.