# M5-P Series Servo System

## **User Manual**

Document Version: V2.0

Archive Date: 2025/04/03

Shenzhen Megmeet Electrical Co., Ltd. provides professional technical support for our customers. You can contact the local branch office or customer service center, or directly contact the company headquarters.

Shenzhen Megmeet Electrical Co., Ltd.

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## **Foreword**

Thank you for choosing the M5-P series servo system of Shenzhen Megmeet Electrical Co., Ltd.

M5-P servo system use a new hardware design platform and a new generation of control algorithms, this series of drive with excellent performance, perfect function, compact structure, convenient installation, simple debugging, easy maintenance, is the cost-effective products for drive generic and OEM markets. This series of servo supports Modbus/CANopen communication protocol, supports pulse reference, and can realize network operation of multiple sets of servo systems with the host computer. With the functions of rigid table setting, inertia identification and oscillation suppression, making the servo easy to use, it is applicable for machine tool, robot, semiconductor, glass manufacturing, lithium battery equipment, woodworking machinery, textile machinery, packaging machinery, spraying machinery and other industries, realizing rapid and accurate position, speed and torque control.

M5-P servo system can realize high mechanical time constant and stable operation together with medium inertia servo motor. This series of servo supports absolute encoder.

The relevant precautions during the installation, wiring, parameter setting, troubleshooting and daily maintenance will be detailed in this manual. To ensure the correct installation and operation of the M5-P series servo system as well as its high performance, please read carefully this user manual before installing the equipment. This manual shall be kept properly and delivered to the actual users of the drive.

## Precautions for unpacking inspection

Please check carefully when unpacking the product:

- Whether the product has the damage signs;
- Whether the rotating shaft of the servo motor rotates smoothly(except for motor with brake);
- Whether the rated value in the nameplate is consistent with your order requirement;
- Whether the wiring is damaged and whether the wiring can be used.

We have implemented strict inspection on the manufacturing, package and delivery of the product. If there is any error, please contact us or your distributor immediately.

We are engaged in the continuous improvement of drive. The relevant manuals provided by us are subject to change without prior notice.

## Safety Precautions

A DANGE

Operation without following instructions can cause death or severe personal injury.

/! WARNING

Operation without following instructions can cause medium or slight personal injury or damage to the product and other equipment.



- Please install the product on the incombustible materials (e.g., metal), otherwise, fire may be caused.
- Do not place any combustible material near the product, otherwise, fire may be caused.
- Do not install the product in the environment with explosive gas, otherwise, explosion may be caused.
- Only qualified personnel can wire the drive, otherwise, electric shock may be caused.
- Maintenance operation can not be conducted until 10 minutes has passed after disconnecting the power supply. Meanwhile, be sure to confirm that the charge LED is completely off and the DC bus voltage is below 36 V, otherwise, electric shock may be caused.
- The grounding terminal of the drive must be reliably grounded, otherwise, electric shock may be caused.
- The cover must be properly closed before power on, otherwise, electric shock and explosion may be caused.
- When powering up the drive that has been stored for over 2 years, the input voltage must be gradually
  increased with the voltage regulator, otherwise, electric shock and explosion may be caused.
- Do not touch the terminals when the product is powered up, otherwise, electric shock may be caused.
- Do not operate the drive with wet hands, otherwise, electric shock may be caused.
- Only qualified personnel can replace the components. Do not leave any wire or metal parts inside the
  drive, otherwise, fire may be caused.
- The bare parts of the terminal lugs in the main circuit must be wrapped with insulation tape, otherwise, electric shock may be caused.



- Please install the drive on the place that can withstand the weight of the drive, otherwise, the drive may
  drop and cause human injury or property damage.
- Do not install the drive in the environment with water splash (e.g., near the water pipe), otherwise, you
  may suffer the property loss.
- Take care not to drop any foreign objects, such as the screws, gaskets and metal bars, into the drive, otherwise, fire and property damage may be caused.
- Do not install and operate the drive if it is damaged or its components are not complete, otherwise, fire
  and human injury may be caused.
- Do not install the product in the place exposed to direct sunlight, otherwise, property damage may be caused.
- Cable lugs must be firmly connected to the terminals of main circuit, otherwise, property damage may be caused.
- When removing the servo motor, we can not just pull the cable or hold the rotating shaft to pull the motor, otherwise, the motor may drop and cause human injury or property damage.
- Do not directly strike the axis core, for example: tap or beat, this may cause the axis core and the
  encoder attached to the opposite side of the axis damaged, otherwise, property damage may be caused.
- Do not store the servo motor in the place that exceeds predetermined vibration, otherwise, property damage may be caused.

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# Chapter 1 M5 Servo System Selection

### 1.1 Servo motor and drive model

#### 1.1.1 Servo motor model



Fig.1-1 M5 servo motor model

# 1.1.2 Servo motor nameplate

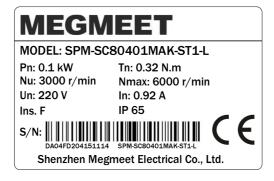


Fig.1-2 Servo motor nameplate

#### 1.1.3 Servo drive model

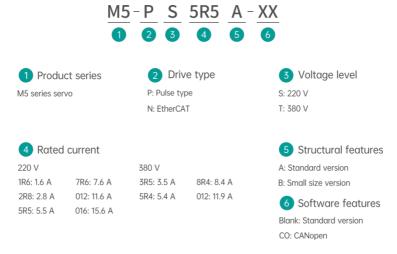


Fig.1-3 Servo drive model

## 1.1.4 Servo drive nameplate

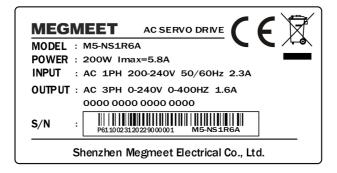


Fig.1-4 Servo drive nameplate

## 1.1.5 The name and introduction of each part of the servo drive

## 1.1.5.1 SIZE A drive (Rated power: 0.2 kW to 0.4 kW)

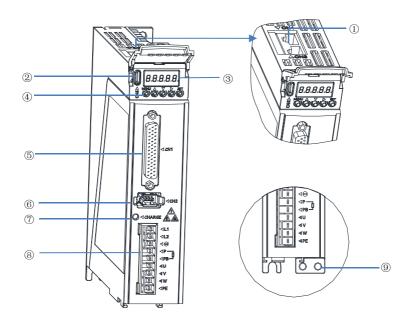


Fig.1-5 Schematic diagram of each part of M5-P servo drive (M5-PS1R6A, M5-PS2R8A)

Table 1-1 Description of each part of M5-P servo drive (M5-PS1R6A, M5-PS2R8A)

No.	Name		Description
1)	CN3, CN4 Communication interface		Two parallel RJ45 ports for CAN and RS485 communication
2	CN5 Type-C USB communication port		Connect the USB of the computer through this port, you can adjust the parameters of the drive and debug the performance
3	LED	digital tube	5-digit 8-segment digital tube for status monitoring, parameter display and setting
4	Operation keys		5 keys for parameter adjustment and display status switching, etc.
(5)	CN1 Control IO interface		DB44 female connector, control IO interface, used to connect with external IO and host controller
6	CN2 Encoder interface		1394 female connector for connecting motor encoder
7	CHARGE Bus power indicator		It is used to indicate the state of the bus power. The indicator light indicates that the capacitor of the bus is charged. Do not touch the power terminal even if the main power supply is cut off to avoid electric shock
8	Main L1, L2 circuit Main power terminal supply input		Main power supply input, single-phase 220V.

	⊖, P DC bus terminal	DC bus terminal for common bus connection
	P, PB Brake resistor wiring terminal	Braking resistor wiring terminals, connect between P and PB for external braking resistors.
	U, V, W Servo motor power terminals	Servo motor UVW power terminal
	PE	Motor ground terminal.
9	Ground terminal	Power ground terminal.

## 1.1.5.2 SIZE B drive (Rated power: 0.75 kW to 1 kW)

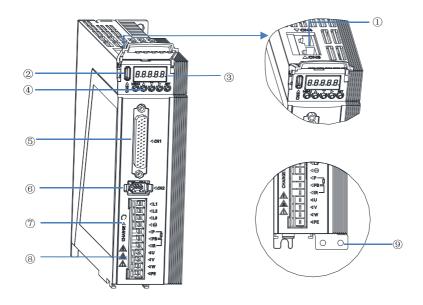


Fig.1-6 Schematic diagram of each part of M5-P servo drive (M5-PS5R5A, M5-PS7R6A)

Table 1-2 Description of each part of M5-P servo drive (M5-PS5R5A, M5-PS7R6A)

No.	Name	Description	
1)	CN3, CN4 Communication interface	Two parallel RJ45 ports for CAN and RS485 communication	
2	CN5 Type-C USB communication port	Connect the USB of the computer through this port, you can adjust the parameters of the drive and debug the performance	
3	LED digital tube	5-digit 8-segment digital tube for status monitoring, parameter display and setting	
4)	Operation keys	5 keys for parameter adjustment and display status switching, etc.	

(5)	CN1 Control IO interface		DB44 female connector, control IO interface, used to connect with external IO and host controller
6	CN2 Encoder interface		1394 female connector for connecting motor encoder
7	CHARGE Bus power indicator		It is used to indicate the state of the bus power. The indicator light indicates that the capacitor of the bus is charged. Do not touch the power terminal even if the main power supply is cut off to avoid electric shock
		L1, L2, L3 Main power supply input	Main power supply input, single/three-phase 220V.
	Main circuit terminal	⊖, P DC bus terminal	DC bus terminal for common bus connection
8		P, PB, IR Brake resistor wiring terminal	Braking resistor wiring terminals, please short-circuit PB and IR for internal braking resistors; connect between P and PB for external braking resistors.
	U, V, W Servo motor power terminals PE		Servo motor UVW power terminal
			Motor ground terminal.
9	Ground terminal		Power ground terminal.

## 1.1.5.3 SIZE D drive (Rated power: 1 kW to 3 kW)

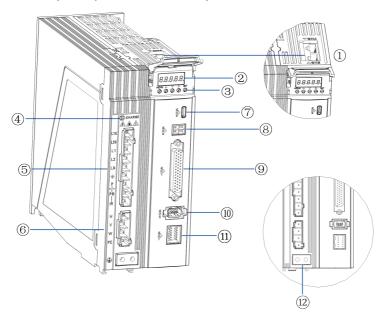


Fig.1-7 Schematic diagram of each part of M5-P servo drive (M5-PS012A, M5-PS016A, M5-PT3R5A, M5-PT5R4A, M5-PT8R4A, M5-PT012A)

Table 1-3 Description of each part of M5-P servo drive (M5-PS012A, M5-PS016A, M5-PT3R5A, M5-PT5R4A, M5-PT012A)

No.	N	ame	Description
1)	CN3, CN4 Communication interface		Two parallel RJ45 ports for CAN and RS485 communication
2	LED di	gital tube	5-digit 8-segment digital tube for status monitoring, parameter display and setting
3	Opera	tion keys	5 keys for parameter adjustment and display status switching, etc.
4		ARGE er indicator	It is used to indicate the state of the bus power. The indicator light indicates that the capacitor of the bus is charged. Do not touch the power terminal even if the main power supply is cut off to avoid electric shock.
		L1, L2, L3 Main power supply input	Main power supply input, three-phase 220 V or three-phase 380 V
		L1C, L2C	Control power input
(5)	Main circuit terminals	⊖, P DC bus terminals	DC bus terminal for common bus connection
		P, PB, IR Brake resistor wiring terminals	Braking resistor wiring terminals, please short-circuit PB and IR for internal braking resistors; connect between P and PB for external braking resistors.
6	Motor terminal  U, V, W Servo motor power terminals		Servo motor UVW power terminals
		PE	Motor ground terminal
7	CN5 Type-C USB communication port		Connect the USB of the computer through this port, then you can adjust the parameters of the drive and debug the performance.
8		CN6 unction interface	STO safety function interface, used for external safety function signal input
9	CN1 Control IO interface		DB44 female connector, control IO interface, used to connect with external IO and host controller
(10)	CN2 Encoder interface		1394 female connector for connecting motor encoder
11)	CN7 Second encoder interface		Connected to a second encoder
12	Grounding terminal		Power ground terminal

# 1.2 Servo system configuration specifications

Table 1-4 220 V servo motor configuration specification table

Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor model	Drive model
Amp plu	ıg standard motors 4	0/60/80 frame Me	dium inertia Vn = 3000 rpm Vmax	c = 6000/5000 rpm
3000	6000	50	SPM-SC*045AM*K-L	M5-PS1R6A
3000	6000	100	SPM-SC*0401M*K-L	M5-PS1R6A
3000	6000	200	SPM-SC*0602M*K-L	M5-PS1R6A
3000	5000	400	SPM-SC*0604M*K-L	M5-PS2R8A
3000	5000	750	SPM-SC*0807M*K-L	M5-PS5R5A
3000	5000	1000	SPM-SC*0810M*K-L	M5-PS7R6A
Straight p	lug standard motors	40/60/80 frame M	ledium inertia Vn = 3000 rpm Vma	ax = 6000/5000 rpm
3000	6000	50	SPM-SC*045AM*K-ST1-L	M5-PS1R6A
3000	6000	100	SPM-SC*0401M*K-ST1-L	M5-PS1R6A
3000	6500	200	SPM-SC*0602M*K-ST1-L	M5-PS1R6A
3000	5000	400	SPM-SC*0604M*K-ST1-L	M5-PS2R8A
3000	5000	750	SPM-SC*0807M*K-ST1-L	M5-PS5R5A
3000	5000	1000	SPM-SC*0810M*K-ST1-L	M5-PS7R6A
Straigh	nt plug economical mo	tors 60/80 frame	Medium inertia Vn = 3000 rpm V	max = 5000 rpm
3000	5000	400	SPM-SC*0604M*K-ST4-L	M5-PS2R8A
3000	5000	750	SPM-SC*0807M*K-ST4-L	M5-PS5R5A
Avia	tion plug standard mo	tors 130 frame N	Medium inertia Vn = 1500 rpm Vm	ax = 3000 rpm
1500	3000	850	SPM-SD*1308M*K-W	M5-PS7R6A
1500	3000	1300	SPM-SD*1313M*K-W	M5-PS012A
Avia	tion plug standard mo	tors 130 frame N	Medium inertia Vn = 2000 rpm Vm	ax = 4000 rpm
2000	4000	1100	SPM-SE*1311M*K-W	M5-PS7R6A
2000	4000	1700	SPM-SE*1317M*K-W	M5-PS016A
Avia	tion plug standard mo	tors 130 frame N	Medium inertia Vn = 3000 rpm Vm	ax = 5000 rpm
3000	5000	1700	SPM-SC*1317M*K-W	M5-PS012A
3000	5000	2600	SPM-SC*1326M*K-W	M5-PS016A

Table 1-5 380 V servo motor configuration specification table

Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor model	Drive model
Aviation plug standard motors 130 frame Medium inertia Vn = 1500 rpm Vmax = 3000 rpm				

Rated speed	Max. speed (rpm)	Power (W)	Motor model	Drive model
(rpm)	wax. speed (rpm)	1 OWEI (VV)	Wiotor Hioder	Drive model
1500	3000	850	SPM-TD*1308M*K-W	M5-PT5R4A
1500	3000	1300	SPM-TD*1313M*K-W	M5-PT8R4A
1500	3000	1800	SPM-TD*1318M*K-W	M5-PT012A
1500	3000	2200	SPM-TD*1322M*K-W	M5-PT012A
Avia	ation plug standard mo	tors 130 frame N	Medium inertia Vn = 2000 rpm Vm	ax = 4000 rpm
2000	4000	1100	SPM-TE*1311M*K-W	M5-PT5R4A
2000	4000	1700	SPM-TE*1317M*K-W	M5-PT8R4A
2000	4000	2400	SPM-TE*1324M*K-W	M5-PT012A
2000	4000	3000	SPM-TE*1330M*K-W	M5-PT012A
Avia	ation plug standard mo	tors 130 frame N	Medium inertia Vn = 3000 rpm Vm	ax = 5000 rpm
3000	5000	1700	SPM-TC*1317M*K-W	M5-PT8R4A
3000	5000	2600	SPM-TC*1326M*K-W	M5-PT012A
3000	5000	3600	SPM-TC*1336M*K-W	M5-PT012A
Avia	ation plug standard mo	tors 180 frame N	Medium inertia Vn = 1500 rpm Vm	ax = 3000 rpm
1500	3000	2900	SPM-TD*1829M*K-W	M5-PT012A

## 1.3 Applicative cables and models

The model descriptions of the servo system power cable and encoder cable are shown below.

$$\frac{\mathsf{SPL}}{1} - \frac{\mathsf{MC04}}{2} - \frac{\mathsf{M5}}{3} - \frac{\mathsf{XX}}{4} - \frac{\mathsf{X}}{5}$$

1 Product series

SPL series

2 Cable type

MA04: L series AMP plug motor power cable,

compatible with 40&60&80 frames, cross sectional area 0.75 mm<sup>2</sup>

MA05: L series straight plug motor power cable,

compatible with 40&60&80 frames, cross sectional area 0.75 mm<sup>2</sup>

MC04: W series aviation plug motor power cable,

compatible with 130 frame, cross sectional area 1.5 mm<sup>2</sup>

MD04: W series aviation plug motor power cable,

compatible with 180 frame, cross sectional area 1.5 mm<sup>2</sup>

3 Applicable drive

M5: M5 series

4 Cable length

03: 3 m 10: 10 m 5 Flexible cable or not

Blank: Normal cable

R2: 10 million times flexible cable

Fig.1-8 Power cable model description

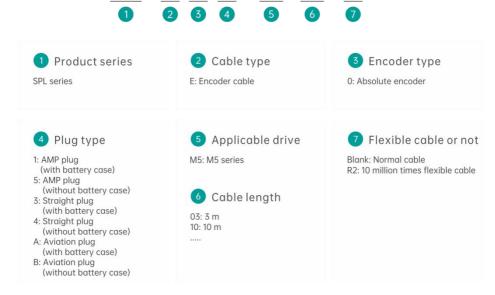


Fig.1-9 Encoder cable model description

The configuration for servo motor wiring is shown in the following table.

Table 1-6 Configuration of servo system cables

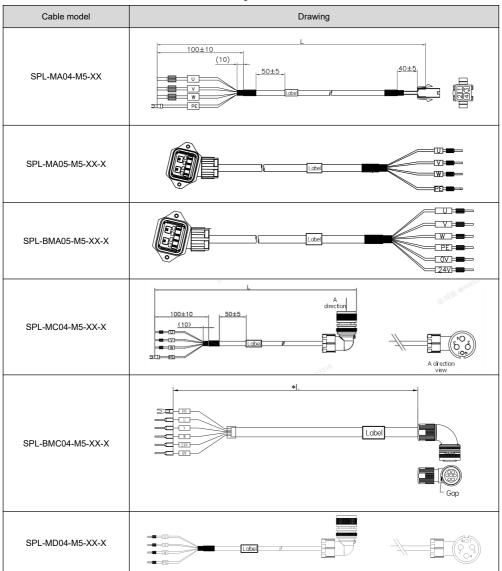
Motor model	Power cable (without brake)	Power cable (with brake)	Encoder cable (with battery case)	Encoder cable (without battery case)		
Amp plug standard	d motors 40/60/80 frame	e Medium inertia Vn =	3000 rpm Vmax = 60	00/5000 rpm		
SPM-SC*045AM*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
SPM-SC*0401M*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
SPM-SC*0602M*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
SPM-SC*0604M*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
SPM-SC*0807M*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
SPM-SC*0810M*K-L	SPL-MA04-M5-XX	SPL-BMA04-M5-XX	SPL-E01-M5-XX	SPL-E05-M5-XX		
Straight plug standa	Straight plug standard motors 40/60/80 frame Medium inertia Vn = 3000 rpm Vmax = 6000/5000 rpm					
SPM-SC*045AM*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX		
SPM-SC*0401M*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX		
SPM-SC*0602M*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX		

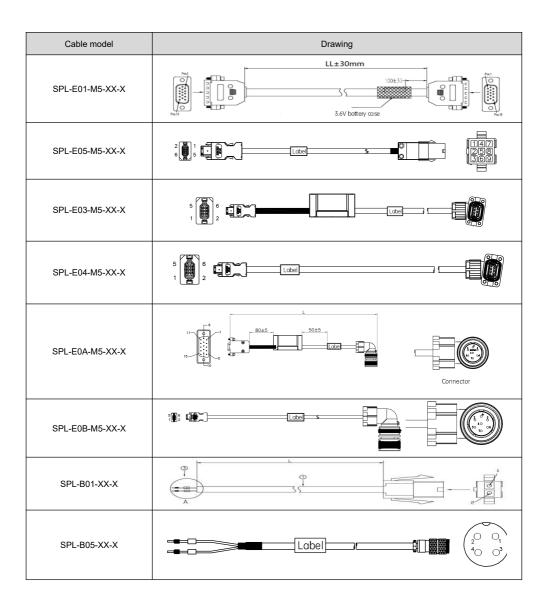
Motor model	Power cable (without brake)	Power cable (with brake)	Encoder cable (with battery case)	Encoder cable (without battery case)	
SPM-SC*0604M*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX	
SPM-SC*0807M*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX	
SPM-SC*0810M*K-ST1-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX	
Straight plug eco	nomical motors 60/80 f	rame Medium inertia \	/n = 3000 rpm Vmax	= 5000 rpm	
SPM-SC*0604M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX	
SPM-SC*0807M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX	
Aviation plug s	tandard motors 130 frai	me Medium inertia Vn	= 1500 rpm Vmax =	3000 rpm	
SPM-SD*1308M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-SD*1313M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TD*1308M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TD*1313M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TD*1318M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TD*1322M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
Aviation plug s	tandard motors 130 frai	me Medium inertia Vn	= 2000 rpm Vmax =	4000 rpm	
SPM-SE*1311M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-SE*1317M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TE*1311M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TE*1317M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TE*1324M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TE*1330M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
Aviation plug s	tandard motors 130 frai	me Medium inertia Vn	= 3000 rpm Vmax =	5000 rpm	
SPM-SC*1317M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-SC*1326M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TC*1317M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TC*1326M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
SPM-TC*1336M*K-W	SPL-MC04-M5-XX	SPL-BMC04-M5-XX	SPL-E0A-M5-XX	SPL-E0B-M5-XX	
Aviation plug s	tandard motors 180 frai	me Medium inertia Vn	= 1500 rpm Vmax =	3000 rpm	
SPM-TD*1829M*K-W	SPL-MD04-M5-XX	SPL-MD04-M5-XX +	SPL-E0A-M5-XX	SPL-E0B-M5-XX	

Motor model	Power cable (without brake)	Power cable (with brake)	Encoder cable (with battery case)	Encoder cable (without battery case)
		SPL-B05-XX		

Servo motor cables are shown in the following table.

Table 1-7 Drawing of servo motor cables





# Chapter 2 Servo System Specifications

# 2.1 Servo drive standard specifications

## 2.1.1 Servo drive electrical specifications

Table 2-1 220 V drive list and electrical specifications

				•			
Voltage class	220 V						
Model	M5-PS1R6A	M5-PS2R8A	M5-PS5R5A	M5-PS5R5A M5-PS7R6A		M5-PS016A	
Power rating	200 W	400 W	750 W	1 kW	1.5 kW	2 kW	
SIZE	SIZE A		SIZ	E B	SIZE D		
Phase	Single-phase		Single-phase	/Three-phase	Three-phase		
Rated input current (A)	2.3	4	7.6/3.7	9.6/5.1	8.0	11.0	
Rated output current (A)	1.6	2.8	5.5	7.6	11.6	15.6	
Max. output current (A)	5.8	9.3	16.9 20		30	40	
Main circuit power		2	200 to 240V, -10%	to +10%, 50/60 H	Z		
Control circuit	Single-phase 200 to 240 V,						
power			,		-10% to +10	0%, 50/60 Hz	
Braking resistor	No built-in braking resistor Built-in braking resistor Built-in braking resistor					king resistor	

Table 2-2 380 V drive list and electrical specifications

Voltage class	380 V							
Model	M5-PT3R5A	M5-PT5R4A	M5-PT8R4A	M5-PT012A				
Power rating	1 kW	1.5 kW	2 kW	3 kW				
SIZE	SIZE D							
Phase		Three-phase						
Rated input current (A)	2.4	3.6	5.5	8.0				
Rated output current (A)	3.5	5.4	8.4	11.9				
Max. output current (A)	11	14	22	28				
Main circuit power		380 to 440 V, -10	0% to +10%, 50/60 Hz					
Control circuit power		Single-phase 380 to 440V, -10% to +10%, 50/60 Hz						
Braking resistor		Built-in b	raking resistor					

# 2.1.2 Servo drive basic specifications



Only SIZE D models have analog input signals and related functions.

Table 2-3 Servo drive basic specifications

	Basic specifications							
Basic specifications	Control mode	IGBT, PWM contr	ol, sine wave current drive mode					
ations	Encoder	Absolute encoder	Absolute encoder					
		Different						
		functions	8 general inputs, optocoupler isolation, both NPN and PNP inputs					
	DI	configured	available					
		according	Input voltage range 20 to 30 V, input impedance 3.9 $k\Omega$					
		to parameters						
		Different	5 general outputs, optocoupler isolation, both NPN and PNP outputs					
		functions	available					
	DO	configured						
Cor	according		Maximum operating voltage 30 V, maximum current 100 mA					
Control IO		to parameters						
ō	Pulse reference	Support:	Optocoupler isolation, collector input: 200 Kpps, differential input: 300					
		Direction +	Kpps					
	High-speed pulse	pulse,						
	reference	AB orthogonal,	Differential input, 4 Mpps					
		CW+CCW						
	Pulse feedback	A/B quadrature di						
		2 analog single-e	nded inputs, +/-10V, Al1 supports 16 bit, Al2 supports 12 bit					
	AI (only for SIZE D)	· ' '	Al1 impedance 12 K, Al2 impedance 17 K					
		Signal delay: Al1	delay 70 uS, Al2 delay 80 uS					
င္ပ	RS485	Support MODBUS	S communication protocol					
func	CAN	Support CANoper	n communication protocol, follow CiA402 profile. Only applicable to					
Communication function		CANopen version						
ition	USB	Connect the comp	Connect the computer and the servo drive to debug and adjust the servo					
	Button	5 buttons						
Other ports	LED display	5 8-segment LED	display					
port	Power indicator	CHARGE lamp						
S	Safety function	None						

	Auto-adjust	The host computer issues an action command, drives the motor to run, estimates and determines the load rotational inertia ratio in real time, and automatically sets the rigidity						
	Auto-aujust	level	ad rotational incrite	a ratio in real time, and automatically sets the rigidity				
	Multi-control mode	Position mode, speed mode, torque mode, position/speed mode switching, speed/torque						
	switching	mode switching, p	position/torque mod	de switching				
	Pulse frequency division	Arbitrary frequenc	Arbitrary frequency division					
	Protection function	Overvoltage, undervoltage, overcurrent, overspeed, stall, overheat, overload, encoder abnormality, input phase loss, excessive position deviation						
General function	High frequency vibration suppression	4 sets of notch filters, suppressing the vibration from 0 to 4000 Hz; 1 set of speed reference notch filter from 0 to 1000 Hz						
nction	End vibration suppression	2 sets of filters su	2 sets of filters suppress the end low frequency vibration of 1~100Hz					
	Homing mode	Multiple homing n	nodes					
	Reverse clearance	Function to impro	ve the response de	elay that occurs when the direction of travel of the				
	compensation	machine is revers	machine is reversed					
	Mechanical analyzer	Analyze the frequ	Analyze the frequency characteristics of the mechanical system through the host computer					
	function	software						
	Inertia identification	Offline and online system inertia identification						
	Torque observer	Load torque observation and compensation						
	Friction compensation	Compensate syst	em friction					
	Control input	Deviation counter	clearing, comman	d pulse prohibition input, electronic gear switching, etc.				
	Control output	Positioning comp	leted					
		Pulse state	1. Pulse + direct	ion; 2. Quadrature A/B pulse; 3. CW/CCW pulse				
		Input state	1. Differential inp	out; 2. Open collector input				
			High-speed	Support differential input, high-speed maximum 4				
			pulse port	Mpps, pulse width cannot be less than 0.125 us.				
	Dulas issued	Pulse		Differential input, the maximum is 300 Kpps, and the				
Po	Pulse input	frequency	Low speed	pulse width cannot be less than 1.7 us.				
Position contro			pulse port	Collector input, the maximum is 200 Kpps, and the				
n co				pulse width cannot be less than 2.5 us.				
ntrol		Pulse filtering	First-order instru	ction smoothing filter or FIR filter				
		Electronic gear 4 sets of electronic gear ratio/on line						
	Analan innut	Torque limit	Electric and brak	ing torque limits can be performed separately				
	Analog input (only for SIZE D)	Torque feedforward	Torque feedforward can be input according to the analog voltage					
	Multi-segment position command selection	Configure function	ns of 4 DIs to realiz	ze the position selection of segment 1~16.				

			Load variation rate	0~100% load: below 0.5% (at rated speed)			
		Speed variation rate	Voltage variation rate	Rated voltage ±10%: 0.5% (at rated speed)			
	Performance		Temperature variation rate	25±25 °C: below 0.5% (at rated speed)			
	Periormance	Speed control range	1~6000				
(0)		Speed loop response characteristics	2.8 kHz				
Speed control		Soft start time	0~6000ms				
d cor	Control input	Internal speed co	mmand selection	1/2/3, zero speed clamp, etc.			
ntrol	Control output	Speed arrival etc.					
		Speed reference input	Input speed reference according to analog voltage				
	Analog input (only for SIZE D)	Torque limit reference input	put Electric, and braking torque limits available				
	(Gilly for SIZE D)	Torque feedforward input					
	Internal speed command	Switch the interna	al 16-segment spe	ed according to 4 DIs			
	Speed reference filter	First-order delay t	filter of analog inpu	ut speed reference (only for SIZE D)			
	Performance	Torque control accuracy	±1%				
	i enormance	Frequency characteristics	3kHz				
To	Control input	Torque reference	input, etc.				
que.	Control output	Speed arrival, etc					
Torque control	Analog input	Torque reference input	Analog torque reference input				
	(only for SIZE D)	Speed limit input	Via analog speed limit				
	Speed limit function	The speed limit va	alue can be set ac	cording to the parameters			
	Torque reference filter	First-order delay	filter of analog inpu	ut torque reference (only for SIZE D)			

# 2.2 Servo motor standard specifications

## 2.2.1 Servo motor basic specifications

Table 2-4 General basic specifications of servo motors

	Servo motor basic index items			
Protection degree	IP67 (excluding the shaft end)			
Excitation mode	Permanent magnet			
Ambient temperature	0°C to +40°C			
Ambient humidity	Relative humidity 20% to 80% (non-condensing)			
Storage temperature	-20℃ to 60℃			
Storage humidity	Storage humidity 20% to 80% RH (non-frosting)			
Installation method	Flange mounted			
Insulation resistance	50MΩ (500V)			
Insulation voltage	1500V (220V motor) 1800V (380V motor)			
Insulation class	F			
Shock resistance	150 m/s²			
Anti-vibration	50 m/s <sup>2</sup>			
Vibration level	V15			
Altitude	Used at a place below 1000 m. Derating is required above 1000 m.			
Installation site	<ul> <li>It is strictly forbidden to install in places with corrosive, flammable and explosive gases and liquids</li> <li>In places with metal powder, grinding fluid, oil mist, cutting, etc., please choose a motor with oil seal</li> <li>Do not use the motor in a high temperature closed environment that will greatly shorten the life of the motor</li> </ul>			

# 2.2.2 Servo motor electrical specifications

Table 2-5 Servo motor electrical specifications

	Rated	Rated	Rated	Max.	Rated	Peak	Rated	Peak	Rotor	
Motor model	voltage	power	speed	speed	torque	torque	current	current	inertia	
	(V)	(W)	(rpm)	(rpm)	(N·m)	(N·m)	(A)	(A)	(10 <sup>-4</sup> kg·m <sup>2</sup> )	
Amp plug s	Amp plug standard motors 40/60/80 frame Medium inertia Vn = 3000 rpm Vmax = 6000/5000 rpm									
SPM-SC*045AM*K-		50	3000	6000	0.16	0.40	0.93	0.00	0.036	
L	220	50	3000	6000	0.16	0.48	0.93	2.88	(0.046)	
SPM-SC*0401M*K-	220	400	2000	6000	0.32	4.44	0.92	2.20	0.062	
L		100 3000	3000	6000	0.32	1.11	0.92	3.36	(0.072)	
SPM-SC*0602M*K-		200	3000	6000	0.64	2.23	1.5	5.4	0.28(0.3)	

	Rated	Rated	Rated	Max.	Rated	Peak	Rated	Peak	Rotor
Motor model	voltage	power	speed	speed	torque	torque	current	current	inertia
	(V)	(W)	(rpm)	(rpm)	(N·m)	(N·m)	(A)	(A)	(10 <sup>-4</sup> kg·m <sup>2</sup> )
L									
SPM-SC*0604M*K-		400	3000	5000	1.27	3.81	2.1	6.5	0.56(0.58)
L		400	3000	3000	1.21	3.01	2.1	0.5	0.30(0.30)
SPM-SC*0807M*K-		750	3000	5000	2.39	7.17	4.1	13.4	1.5(1.65)
L									()
SPM-SC*0810M*K-		1000	3000	5000	3.19	9.56	5.7	17.7	2(2.15)
L									
	g standard m	otors 40/6	0/80 frame	Medium ii	nertia Vn :	= 3000 rpm	Vmax =	6000/5000 r	
SPM-SC*045AM*K-		50	3000	6000	0.16	0.48	0.93	2.88	0.036(0.04
ST1-L									6)
SPM-SC*0401M*K-		100	3000	6000	0.32	1.11	0.92	3.36	0.062(0.07
ST1-L	-								2)
SPM-SC*0602M*K- ST1-L		200	3000	6000	0.64	2.23	1.5	5.4	0.28(0.3)
	220								
SPM-SC*0604M*K- ST1-L		400	3000	5000	1.27	3.81	2.1	6.5	0.56(0.58)
SPM-SC*0807M*K-	-								
ST1-L		750	3000	5000	2.39	7.17	4.1	13.4	1.5(1.65)
SPM-SC*0810M*K-	_								
ST1-L		1000	3000	5000	3.19	9.56	5.7	17.7	2(2.15)
Straight	olug econom	ical motors	60/80 fram	me Medium inertia Vn = 3000 rpm Vmax = 5000 rpm					
SPM-SC*0604M*K-									
ST4-L	220	400	3000	5000	1.27	3.81	2.1	6.5	0.56(0.58)
SPM-SC*0807M*K-	220	750	3000	5000	2.39	7.17	4.1	13.4	1 5/1 65)
ST4-L		750	3000	5000	2.39	7.17	4.1	13.4	1.5(1.65)
Aviatio	n plug stand	ard motors	130 frame	Medium i	nertia Vn	= 1500 rpm	n Vmax =	3000 rpm	
SPM-SD*1308M*K-		950	1500	2000	F 20	16 17	6.0	20.7	10.0(12.2)
W	220	850	1500	3000	5.39	16.17	6.9	20.7	10.9(12.3)
SPM-SD*1313M*K-	220	1300	1500	3000	8.34	25.2	10.7	32.1	16.9(18.3)
W		1500	1500	5500	0.04	20.2	10.7	02.1	10.5(10.5)
SPM-TD*1308M*K-	- 380	850	1500	3000	5.39	16.17	4	12	10.9(12.3)
W									
SPM-TD*1313M*K-		1300	1500	3000	8.34	25.2	6	18	16.9(18.3)
W									, ,
SPM-TD*1318M*K-		1800	1500	3000	11.5	34.5	8.5	34.5	21.4(22.6)
W ODM TRY 1000MIN									
SPM-TD*1322M*K- W		2200	1500	3000	14.3	40	10.5	29.4	27.1(28.4)
VV									

Motor model	Rated voltage (V)	Rated power (W)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (N·m)	Peak torque (N·m)	Rated current (A)	Peak current (A)	Rotor inertia (10 <sup>-4</sup> kg·m²)
Aviatio	n plug stand	ard motors	130 frame	Medium i	nertia Vn	= 2000 rpm	Vmax =	4000 rpm	
SPM-SE*1311M*K- W	220	1100	2000	4000	5.39	16.17	7.5	22.5	10.9(12.3)
SPM-SE*1317M*K- W	220	1700	2000	4000	8.34	25.2	12	36	16.9(18.3)
SPM-TE*1311M*K- W		1100	2000	4000	5.39	16.17	4.5	13.5	10.9(12.3)
SPM-TE*1317M*K- W	380	1700	2000	4000	8.34	25.2	6.6	19.8	16.9(18.3)
SPM-TE*1324M*K- W	380	2400	2000	4000	11.5	34.5	9.5	28.5	21.4(22.6)
SPM-TE*1330M*K- W		3000	2000	4000	14.3	40	11.5	32.2	27.1(28.4)
Aviatio	n plug stand	ard motors	130 frame	130 frame Medium inertia Vn = 3000 rpm Vmax = 5000 rpm					
SPM-SC*1317M*K- W	220	1700	3000	5000	5.399	10.78	9.5	19	10.9(12.3)
SPM-SC*1326M*K- W	220	2600	3000	5000	8.34	16.7	14.5	29	16.9(18.3)
SPM-TC*1317M*K- W		1700	3000	5000	5.399	10.78	6	12	10.9(12.3)
SPM-TC*1326M*K- W	380	2600	3000	5000	8.34	16.7	9.5	19	16.9(18.3)
SPM-TC*1336M*K- W		3600	3000	5000	11.5	23	12	24	21.4(22.6)
Aviatio	n plug stand	ard motors	180 frame	Medium i	nertia Vn	= 1500 rpm	Vmax =	3000 rpm	
SPM-TD*1829M*K- W	380	2900	1500	3000	18.6	55.8	11.9	35.7	63.5(69.5)

Note: Parameters in parenthesis is the parameter of the motor with brake.

# 2.3 Servo drive dimensions

1. SIZE A (corresponding drives: M5-PS1R6A, M5-PS2R8A)

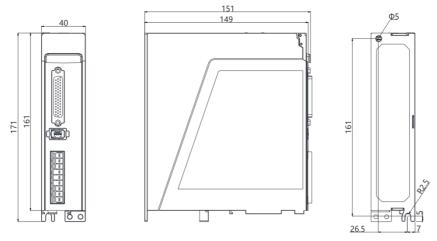
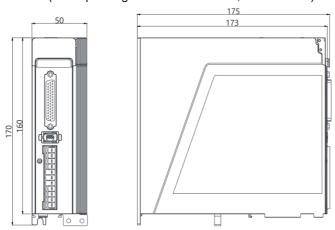


Fig.2-1 Dimensions for servo drive of SIZE A

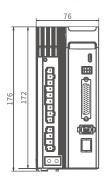
## 2. SIZE B (corresponding drives: M5-PS5R5A, M5-PS7R6A)

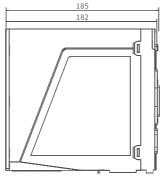






3. SIZE D (corresponding drives: M5-PS012A, M5-PS016A, M5-PT3R5A, M5-PT5R4A, M5-PT012A)





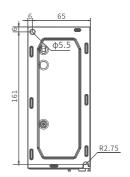


Fig.2-3 Dimensions for servo drive of SIZE D

## 2.4 Servo motor dimensions and interface definition

## 2.4.1 L series motors: 40/60/80 frame, medium inertia, amp plug, standard type

#### 2.4.1.1 Dimensions

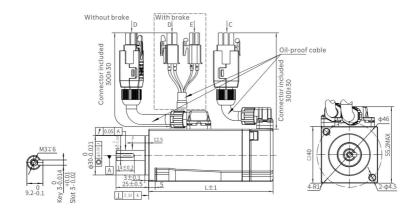


Fig.2-4 Dimensions for 40 frame medium inertia servo motor (L series)

Table 2-6 Dimensions for 40 frame medium inertia servo motor (L series)

Model	L (mm)
SPM-SC*045AM*K-L	56 (84)
SPM-SC*0401M*K-L	67.7 (95)

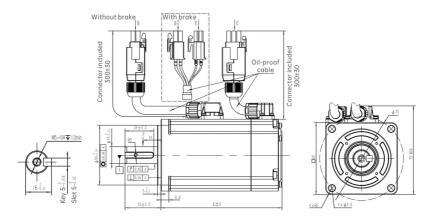


Fig.2-5 Dimensions for 60 frame medium inertia servo motor (L series)

Table 2-7 Dimensions for 60 frame medium inertia servo motor (L series)

Model	L (mm)
SPM-SC*0602M*K-L	71.8 (101.2)
SPM-SC*0604M*K-L	88.8 (118.2)

Note: Dimensions in parentheses are dimensions for motors with brakes.

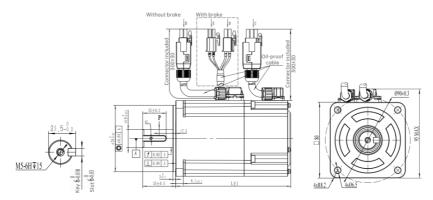


Fig.2-6 Dimensions for 80 frame medium inertia servo motor (L series)

Table 2-8 Dimensions for 80 frame medium inertia servo motor (L series)

Model	L (mm)
SPM-SC*0807M*K-L	90 (121.9)
SPM-SC*0810M*K-L	103.9 (134.9)

Note: Dimensions in parentheses are dimensions for motors with brakes.

#### 2.4.1.2 Interface definition



Motor power terminal definition	
Signal	Pin
U	1
V	3
W	2
PE	4

Motor brake terminal definition	
Signal	Pin
24V	1

Motor brake terminal definition	
Signal	Pin
GND	2



Absolute encoder terminal definition	
Signal	Pin
E- (Battery-)	7
E+ (Battery+)	6
SD+	4
SD-	5
GND	3
5V	2
PE	1

# 2.4.2 ST1-L series motors: 40/60/80 frame, medium inertia, straight plug, standard type

#### 2.4.2.1 Dimensions

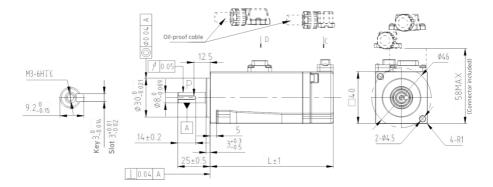


Fig.2-7 Dimensions for 40 frame medium inertia servo motor (ST1-L series)

Table 2-9 Dimensions for 40 frame medium inertia servo motor (ST1-L series)

Model	L (mm)
SPM-SC*045AM*K-ST1-L	56 (84)
SPM-SC*0401M*K-ST1-L	67.7 (95)

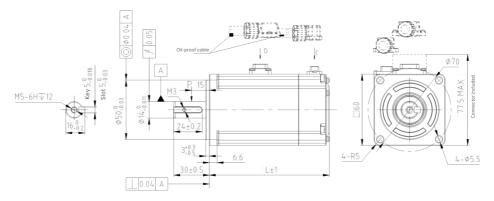


Fig.2-8 Dimensions for 60 frame medium inertia servo motor (ST1-L series)

Table 2-10 Dimensions for 60 frame medium inertia servo motor (ST1-L series)

Model	L (mm)
SPM-SC*0602M*K-ST1-L	71.8 (101.2)
SPM-SC*0604M*K-ST1-L	88.8 (118.2)

Note: Dimensions in parentheses are dimensions for motors with brakes.

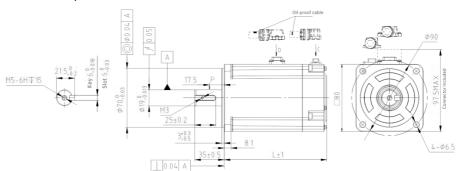
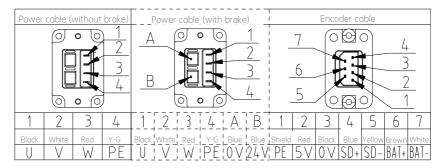


Fig.2-9 Dimensions for 80 frame medium inertia servo motor (ST1-L series)

Table 2-11 Dimensions for 80 frame medium inertia servo motor (ST1-L series)

Model	L (mm)
SPM-SC*0807M*K-ST1-L	90 (121.9)
SPM-SC*0810M*K-ST1-L	103.9 (134.9)

#### 2.4.2.2 Interface definition



Note: Y-G in the figure means the yellow-green color. The cable color is only for reference. Use the corresponding cable according to its actual definition.

# 2.4.3 ST4-L series motors: 60/80 frame, medium inertia, straight plug, economical type

#### 2.4.3.1 Dimensions

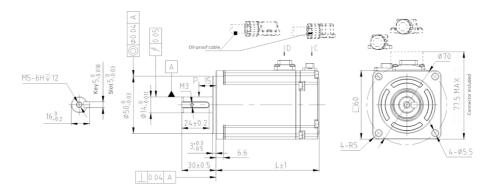


Fig.2-10 Dimensions for 60 frame medium inertia servo motor (ST4-L series)

Table 2-12 Dimensions for 60 frame medium inertia servo motor (ST4-L series)

Model	L (mm)
SPM-SC*0604M*K-ST4-L	90.1 (119.5)

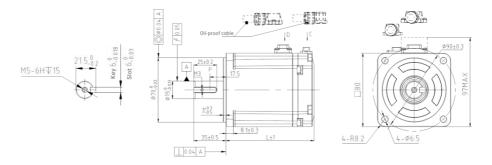


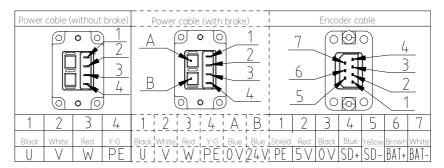
Fig.2-11 Dimensions for 80 frame medium inertia servo motor (ST4-L series)

Table 2-13 Dimensions for 80 frame medium inertia servo motor (ST4-L series)

Model	L (mm)
SPM-SC*0807M*K-ST4-L	95.7 (126.7)

Note: Dimensions in parentheses are dimensions for motors with brakes.

### 2.4.3.2 Interface definition



Note: Y-G in the figure means the yellow-green color. The cable color is only for reference. Use the corresponding cable according to its actual definition.

## 2.4.4 W series motors: 130 frame, medium inertia, aviation plug, standard type

## 2.4.4.1 Dimensions

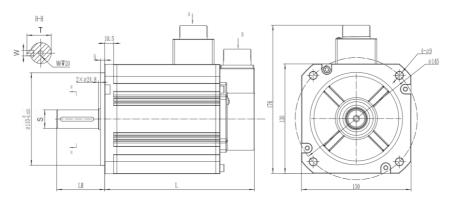


Fig.2-12 Dimensions for 130 frame medium inertia servo motor (W series)

Table 2-14 Dimensions for 130 frame medium inertia servo motor (W series)

Model	L (mm)
SPM-SD*1308M*K-W	135 (187)
SPM-SD*1313M*K-W	152.5 (204)
SPM-TD*1308M*K-W	135 (187)
SPM-TD*1313M*K-W	152.5 (204)
SPM-TD*1318M*K-W	170 (222)
SPM-TD*1322M*K-W	200 (252)
SPM-SE*1311M*K-W	135 (187)
SPM-SE*1317M*K-W	152.5 (204)
SPM-TE*1311M*K-W	135 (187)
SPM-TE*1317M*K-W	152.5 (204)
SPM-TE*1324M*K-W	170 (222)
SPM-TE*1330M*K-W	200 (252)
SPM-SC*1317M*K-W	135 (187)
SPM-SC*1326M*K-W	152.5 (204)
SPM-TC*1317M*K-W	135 (187)
SPM-TC*1326M*K-W	152.5 (204)
SPM-TC*1336M*K-W	170 (222)

## 2.4.4.2 Interface definition

Power cable



Plug model	YD28J4Z-E				
Pin	1	2	3	4	
Definition	PE	Ū	V	W	

Encoder cable



Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	E-	E+	SD-	0V	SD+	+5v

Motor power terminal definition (without brake)				
Signal	Pin			
PE	1			
U	2			
V	3			
W	4			

Power cable



Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	U	V	W	Brk+	Brk-	/

Encoder cable



Plug model	YD28J7Z-E						
Pin	1	2	3	4	5	6	7
Definition	PE	E-	E+	SD-	OV	SD+	+5v

Motor power terminal definition (with brake)				
Signal	Pin			
PE	1			
U	2			
V	3			
W	4			
24V	5			
0V	6			

Absolute encoder terminal definition			
Signal	Pin		
E- (Battery-)	2		
E+ (Battery+)	3		
SD+	6		
SD-	4		
0V	5		
+5V	7		
PE	1		

# 2.4.5 W series motors: 180 frame, medium inertia, aviation plug, standard type

### 2.4.5.1 Dimensions

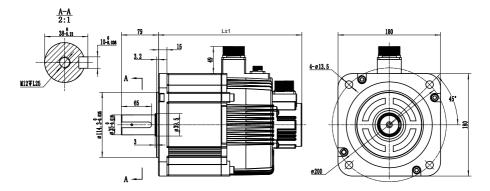


Fig.2-13 Dimensions for 180 frame medium inertia servo motor (W series)

Table 2-15 Dimensions for 180 frame medium inertia servo motor (W series)

Model	L (mm)
SPM-TD*1829M*K-W	205 (252)

Note: Dimensions in parentheses are dimensions for motors with brakes.

### 2.4.5.2 Interface definition

Power cable



Plug mod el	Plug:YD32K4Z			
Pin	1	2	3	4
Definition	PE	U	V	W

Encoder cable



Plug model	Plug:YD28KJ7Z						
Pin	1	2	3	4	5	6	7
Definition	PE	E-	E+	SD-	0.0	SD+	5 V

Brake cable



Plug model	Plug: XS16J4Z				
Pin	1 2 3 4				
Definition	Brk+	Brk-	空	空	

Motor power terminal definition (without brake)				
Signal Pin				
PE	1			
U	2			
V	3			
W	4			

Absolute encoder terminal definition			
Signal	Pin		
PE	1		
E-	2		
E+	3		
SD-	4		
0V	5		
SD+	6		
5V	7		

Motor power terminal definition (with brake)				
Signal Pin				
+24V	1			
0V	2			

Motor power terminal definition (with brake)			
Signal Pin			
SD+	6		
SD-	4		
0V	5		
+5V	7		
PE	1		

# **Chapter 3 Installation Description**

### 3.1 Servo drive installation

#### 3.1.1 Installation site

- Installed in a cabinet free from direct sunlight or water droplets and rain
- Avoid installing in dusty, metal powder, high temperature or humid places
- It is strictly forbidden to install in places with corrosive or flammable and explosive gases
- No vibration place

#### 3.1.2 Installation environment requirements

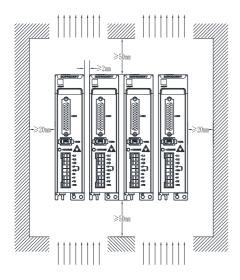
Table 3-1 M5 servo drive installation environment requirements

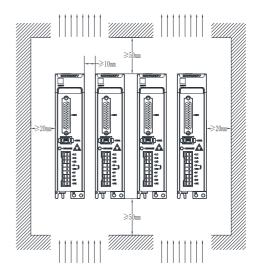
	Item	Requirements
	Installation site	Install it vertically on a solid base indoors, with at least 5cm of space for inlet and outlet, and at least 2cm of space for left and right sides of the case. The cooling medium is air.
	Ambient	0 ~+45°C, the air temperature change is less than 0.5°C/min;
	temperature	Derating is required above $45^{\circ}$ C, and the maximum temperature is $55^{\circ}$ C in good ventilation (can run at 25% normal load)
	Relative humidity	Relative humidity <90% (no condensation)
Operati	Other climatic conditions	No condensation, icing, rain, snow, hail, etc., the solar radiation is lower than 700W/m². and the air pressure is 70~106kPa.
Operating conditions	Salt spray and corrosive gas content	Pollution degree 2
tions	Dust and solid particle content	Pollution degree 2
	Protection degree	IP20
	Altitude	Used at the place lower than 1000m (derated at the place above 1000m, derated 6% for every increase of 1000m)
	Anti-vibration	Below 4.9m/s <sup>2</sup>
	Impact resistance	Below 19.6m/s <sup>2</sup>

### 3.1.3 Servo drive installation precautions

Installed in an indoor, well-ventilated place, generally installed in a cabinet, and installed vertically, and securely fixed on the mounting surface through the two fixing holes of the drive.

When SIZE A, SIZE B and SIZE D are installed in compact sizes, consider the installation error. The spacing between them must be at least 2 mm. In this case, the actual load ratio needs to be derated. (SIZE A: Actual load ratio  $\leq$ 70%. SIZE B and SIZE D: Actual load ratio  $\leq$ 80%). When installing multiple servo drives side by side, it is recommended to leave a spacing of more than 20 mm on both sides of the horizontal installation (required for heat dissipation) and a spacing of more than 50 mm on both sides of the vertical installation.

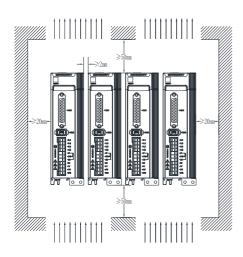


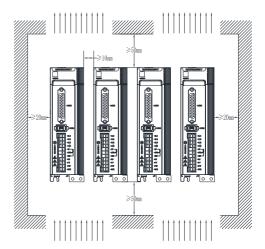


Clearance for compact installation

Clearance for side-by-side installation

Fig.3-1 SIZE A servo installation diagram

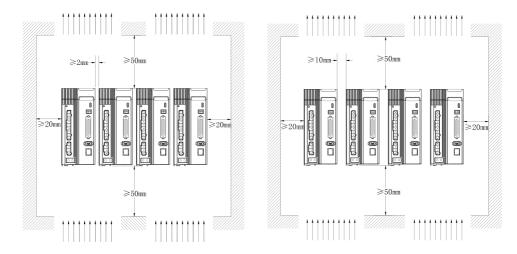




Clearance for compact installation

Clearance for side-by-side installation

Fig.3-2 SIZE B servo installation diagram



Clearance for compact installation

Clearance for side-by-side installation

Fig.3-3 SIZE D servo installation diagram

# 3.2 System wiring diagram

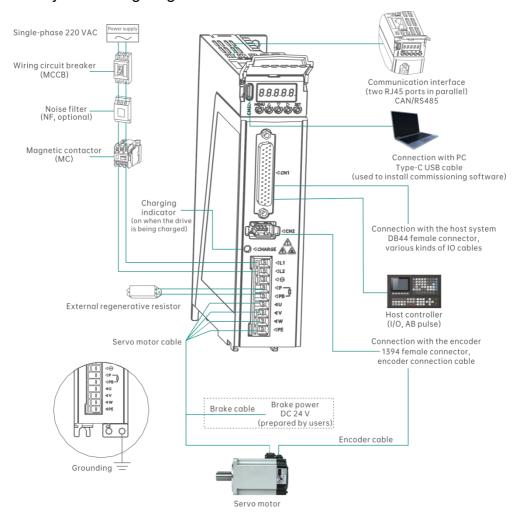


Fig.3-4 SIZE A single-phase 220 V servo system wiring diagram

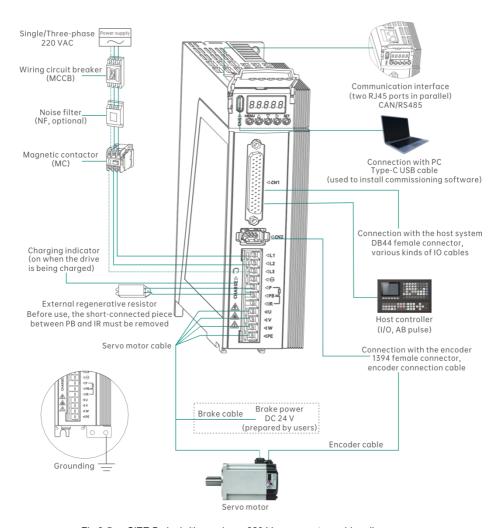


Fig.3-5 SIZE B single/three-phase 220 V servo system wiring diagram

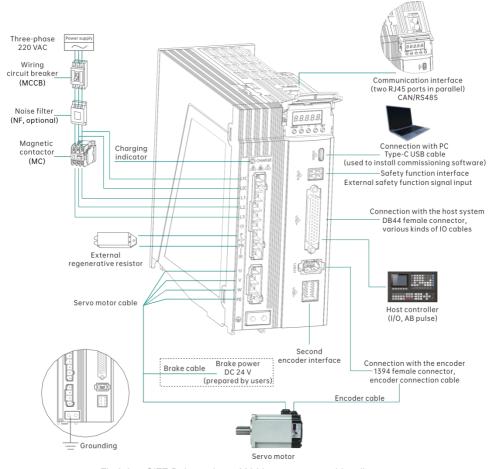


Fig.3-6 SIZE D three-phase 220 V servo system wiring diagram

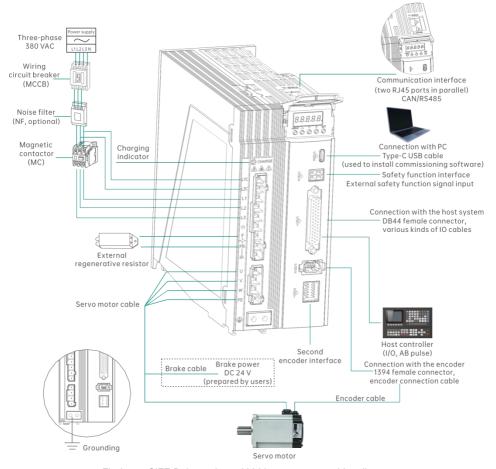


Fig.3-7 SIZE D three-phase 380 V servo system wiring diagram

Follow the below instructions for system wiring:

- Make sure the power specifications and wiring of L1, L2, L3 are correct to avoid damage and danger to the
  drive.
- Make sure the motor output U, V, W phase sequence wiring is correct, otherwise it may cause abnormal motor rotation.
- When using an external braking resistor, you need to disconnect the shorting piece between PB and IR, and connect the resistor between P and PB; if you use an internal braking resistor, you can directly short-circuit PB and IR.
- To protect the drive system and prevent cross-electric shock, please use a circuit breaker or fuse for the input power supply. The specifications of the circuit breaker and fuse are shown in the following table.

- The drive does not have a built-in grounding protection circuit, please use a leakage circuit breaker for both overload and short circuit protection or a special leakage circuit breaker with grounding protection.
- It is strictly forbidden to directly use the electromagnetic contactor for the operation and shutdown of the motor.
  The motor is a large inductance device, and the instantaneous high voltage generated may break down the contactor and other components.
- To ensure reliable operation of the system and reduce interference to the power grid system, it is recommended to add a filter on the input side.

## 3.3 Recommended specifications for circuit breakers and fuses

Table 3-2 Recommended specifications for circuit breakers and fuses

Drive model	Circuit breaker	Fuse
M5-PS1R6A	4 A	10 A
M5-PS2R8A	10 A	15 A
M5-PS5R5A	16 A/6 A	20 A/10 A
M5-PS7R6A	20 A / 10 A	35 A / 20 A
M5-PS012A	16 A	35 A
M5-PS016A	20 A	50 A
M5-PT3R5A	4 A	15 A
M5-PT5R4A	6 A	20 A
M5-PT8R4A	10 A	20 A
M5-PT012A	16 A	35 A

## 3.4 Related specifications of braking resistor

The related specifications of braking resistor are shown in the table below.

Table 3-3 Related specifications of braking resistor

Servo drive model		Built-in braking resistor specification  Resistance (Ω) Capacity(W)		Minimum allowable resistance of external braking	Max. braking energy absorbed by capacitor(J)
	ME DOADGA			resistor (Ω)	7
Single-phase 220 V	M5-PS1R6A	_	_	45	1
0 1	M5-PS2R8A	_	_	45	14
	M5-PS5R5A	50	50	45	19
Single/Three-phase	M5-PS7R6A	50	50	20	23
220 V	M5-PS012A	50	80	25	34
	M5-PS016A	25	80	20	40
	M5-PT3R5A	100	80	60	34
Three-phase 380 V	M5-PT5R4A	100	80	60	34
	M5-PT8R4A	50	80	35	41

	ME DECAGA			0.5	
	M5-P1012A	50	80	35	50
			1		

#### Note:

- 1. PB-IR are short-circuited upon delivery, and the internal braking resistor is used by default.
- 2. When braking capacity of internal braking resistor is insufficient, disconnect the PB-IR, connect external braking resistor between PB and P.
- 3. For external braking resistor, please contact our technical support.
- 4. "-" in the table indicates that this model has no built-in braking resistor.

# Chapter 4 Wiring of Servo System

This chapter introduces the wiring and cable connection of servo drive, as well as the issues needing attention.

# / DANGER

- Do not open the cover until the power supply of the servo drive is completely disconnected for at least 10 minutes.
- Even if the power is off, high voltage may remain inside the servo drive. To prevent electric shock, do not
  touch the power terminals. After discharge is completed, charge LED will turn off. Make sure that the
  internal wiring be conducted only when the charge LED inside the drive is off.
- Only the well-trained and authorized personnel are allowed to perform the internal wiring of the servo drive.
- Check the wiring carefully when connecting the emergency stop or safety circuit.
- Check the voltage level of the drive before power-on, otherwise, human injury and death or equipment damage may be caused.

# /! WARNING

- Check carefully whether the rated input voltage of the servo drive is consistent with the AC power voltage before power-on.
- The servo drive has passed the dielectric strength test before delivery. Do not conduct this test again.
- Do not connect the AC supply cables to the output terminals U, V and W.
- The diameter of copper cable used as grounding wire should be bigger than 3.5mm and the grounding resistance should be less than 10Ω.
- There is leakage current inside the servo drive and the value of the leakage current depends on the
  operating conditions. To ensure the safety, the drive and the motor must be grounded and a Residual
  Current Detector (i.e. RCD) is required. The type B RCD is recommended. The set value of the leakage
  current is 300mA.
- To provide the over-current protection for the input side and facilitate the power-off maintenance, the servo drive should be connected to the AC supply through a circuit breaker or a fuse.

### 4.1 Servo drive main circuit connection

### 4.1.1 Main circuit specifications

Name and function of servo drive main circuit terminals are as shown in Table 4-1, the cable specification is as shown in Table 4-2.

Table 4-1 Name and function of M5-P series drive main circuit terminals

Terminal name	Terminal symbol	Drive model	Terminal function	
	L1, L2	M5-PS1R6A M5-PS2R8A	Main circuit single-phase 220 V power input	
	L1, L2, L3	M5-PS5R5A M5-PS7R6A	Main circuit single/three-phase 220 V power input	
Main circuit power input terminals	L1, L2, L3	M5-PS012A M5-PS016A	Main circuit power input, three-phase 220 V or three-phase 380 V	
	L1C, L2C	M5-PT3R5A M5-PT5R4A M5-PT8R4A M5-PT012A	Control power input	
DC bus terminal	P, ⊙	Servo DC bus terminal, can be used for multi-machine common bus connection		
	P, PB	M5-PS1R6A M5-PS2R8A	When the braking capacity is insufficient, please connect an external braking resistor between P-PB. Please refer to the recommended value for specific specifications.	
Braking resistor  connection terminals  M5-PS  M5-PS  M5-PS  M5-PS  M5-PS  M5-PT  M5-PT  M5-PT		M5-PS5R5A M5-PS7R6A M5-PS012A M5-PS016A M5-PT3R5A M5-PT5R4A M5-PT8R4A M5-PT012A	By default, PB-IR is short-circuited, and the built-in braking resistor is used; when the braking capacity is insufficient, disconnect PB-IR and connect an external braking resistor between P-PB.  Please refer to the recommended value for specific specifications.	
Servo motor connection terminals	U, V, W	Connect to U, V and W phases of the servo motor.		
Grounding terminal	PE	Connect to the power supply grounding terminal and the servo me grounding terminal for grounding.		

Note: PB and IR are short-circuited upon delivery for the drive with built-in resistance.

### 4.1.2 Main circuit cable dimensions

Recommended main circuit cable dimensions of servo drive are shown in the table below.

Table 4-2 Recommended main circuit cable of M5-P series drive

Drive model		Power supply input L1, L2, L3	Power output U, V, W	Grounding PE	Braking resistor PB, P
	M5-PS1R6A	20AWG	20AWG	20AWG	20AWG
SIZE A	WIS-1 STROA	(0.5mm <sup>2</sup> )	(0.5mm <sup>2</sup> )	(0.5mm <sup>2</sup> )	(0.5mm <sup>2</sup> )
SIZE A	M5-PS2R8A	20AWG	20AWG	20AWG	20AWG
	IVID-POZROA	(0.5mm²)	(0.5mm²)	(0.5mm²)	(0.5mm²)
	ME DOEDEA	18AWG	18AWG	18AWG	PB, P  20AWG (0.5mm²)  20AWG (0.5mm²)  18AWG (0.75mm²)  18AWG (0.75mm²)
SIZE B	M5-PS5R5A	(0.75mm²)	(0.75mm²)	(0.75mm <sup>2</sup> )	
SIZE B	M5-PS7R6A	18AWG	18AWG	18AWG	18AWG
		(0.75mm²)	(0.75mm²)	(0.75mm <sup>2</sup> )	(0.75mm²)
	M5-PS012A	18AWG	18AWG	18AWG	18AWG
	WI3-1 3012A	(0.75mm <sup>2</sup> )	(0.75mm <sup>2</sup> )	(0.75mm <sup>2</sup> )	PB, P  20AWG (0.5mm²)  20AWG (0.5mm²)  18AWG (0.75mm²)  18AWG (0.75mm²)  18AWG (0.75mm²)  18AWG (0.75mm²)  18AWG (1.5mm²)  18AWG (0.75mm²)  18AWG (0.75mm²)
	M5-PS016A	15AWG (1.5mm²)	15AWG (1.5mm²)	15AWG (1.5mm²)	
0175 5	M5-PT3R5A	18AWG (0.75mm²)	18AWG (0.75mm²)	18AWG (0.75mm²)	
SIZE D	M5-PT5R4A	18AWG (0.75mm²)	18AWG (0.75mm²)	18AWG (0.75mm²)	
	M5-PT8R4A	18AWG (0.75mm²)	18AWG (0.75mm²)	18AWG (0.75mm²)	
	M5-PT012A	18AWG (0.75mm²)	18AWG (0.75mm²)	18AWG (0.75mm²)	

# 4.2 Servo motor encoder signal connection (CN2)

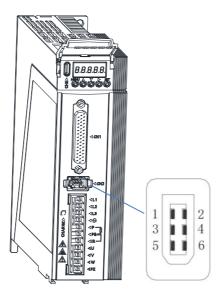


Fig.4-1 Servo motor encoder signal connection diagram

The motor encoder interface of the M5 servo drive supports absolute encoder, and the interface signals are defined in the table 4-3.

Table 4-3 Encoder port definition

Connection port: CN2, 1394 interface					
Pin	Signal name	Signal description			
1	+5V	Power +5V			
2	GND	Power ground			
3	Reserved				
4	Reserved	-			
5	SD+	Carial data simual			
6	SD-	Serial data signal			
Shell PE		Shield			

# 4.3 Control signal interface definition

The control signal includes digital input, digital output, analog input, pulse reference, pulse feedback and other signals. The signal connection mode is DB44, and the drive end is a DB44 female seat.

Only SIZE D models have analog input signals Al1 (pin: 20), Al2 (pin: 18) and corresponding GND (pin: 19).

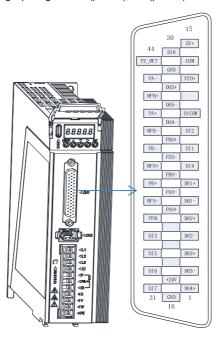


Fig.4-2 Control signal terminal definition diagram (SIZE A&B)

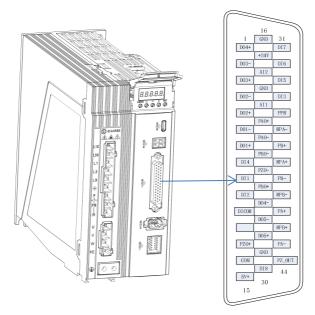


Fig.4-3 Control signal terminal definition diagram (SIZE D)

The control signal definitions are shown in the following table.

Table 4-4 Control signal definition table

Pin	Signal name	Pin	Signal name	Pin	Signal name
1	DO4+	16	GND	31	DI7
2	DO3-	17	+24V	32	DI6
3	DO3+	18	Al2 (only for SIZE D)	33	DI5
4	DO2-	19	GND (only for SIZE D)	34	DI3
5	DO2+	20	Al1 (only for SIZE D)	35	PPH
6	DO1-	21	PAO+	36	HPULS-
7	DO1+	22	PAO-	37	SIGN+
8	DI4	23	PBO-	38	HPULS+
9	DI1	24	PZO-	39	SIGN-
10	DI2	25	PBO+	40	HSIGN-
11	DICOM	26	DO4-	41	PULS+
12	NC	27	DO5-	42	HSIGN+
13	PZO+	28	DO5+	43	PULS-

Pin	Signal name	Pin	Signal name	Pin	Signal name
14	СОМ	29	GND	44	PZ_OUT
15	5V+	30	DI8		

# 4.3.1 Digital input and output signals

Digital input and output signals are as shown in the following table.

Table 4-5 Digital input and output signals

Signal	name	Default function	Pin No.	Function description
	DI1	/SON	9	Servo enable
	DI2	/ARST	10	Fault reset
	DI3	/GSEL	34	Gain switching
	DI4	/P-OT	8	Positive limit switch
	DI5	/N-OT	33	Negative limit switch
	DI6	/MSEL1	32	Operating mode switching 1
	DI7	/MSEL2	31	Operating mode switching 2
	DI8	/STOP	30	Emergency shutdown
	/+24V		17	Internal 24V power output, 20~28V, Imax=200mA
	/COM		14	internal 24v power output, 20°28v, imax=200mA
Common	DICOM	DI common terminal	11	DI common terminal (connect power or power ground)
	DO1+	(CDDV	7	Comic months
	DO1-	/SRDY	6	Servo ready
	DO2+	/ALM	5	Drive fault
	DO2-	ALIVI	4	Drive fault
	DO3+	/BRK	3	Proko outnut
	DO3-	/DIXIX	2	Brake output
	DO4+	/RUN	1	Servo drive running signal (RUN)
	DO4-	/NOIN	26	Servo univerunning signal (RON)
	DO5+	/COIN	28	Positioning completed
	DO5-	/COIN	27	Fositioning completed

#### 4.3.1.1 Digital input circuit

M5-P series servo has 8 DI terminals in total. The DI common terminal can be connected to power supply or ground, and supports dry contact input, NPN input and PNP input.

Take DI1 as an example, interface circuits of DI1-DI8 are the same.

#### (1) Dry contact mode

The dry contact wiring method is as shown in Fig. 4-3 and Fig. 4-4.

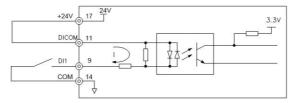


Fig.4-4 DI terminal dry contact connection mode (using the internal 24 V power of servo drive)

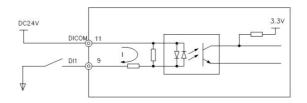


Fig.4-5 DI terminal dry contact connection mode (using the external power)

#### (2) NPN (drain) mode

The external controller is the NPN common emitter output, the wiring mode is as shown in Fig. 4-5 and Fig. 4-6.

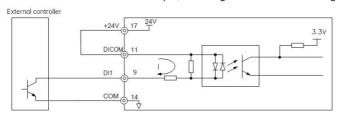


Fig.4-6 DI terminal NPN connection mode (using the internal 24 V power of servo drive)

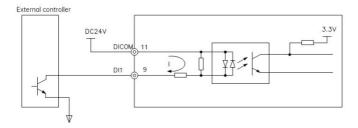


Fig.4-7 DI terminal NPN connection mode (using the external power)

#### (3) PNP (source) mode

The external controller is the PNP common emitter output, the wiring mode is as shown in Fig. 4-7 and Fig. 4-8.

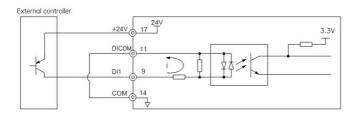


Fig.4-8 DI terminal PNP connection mode (using the internal 24V power of servo drive)

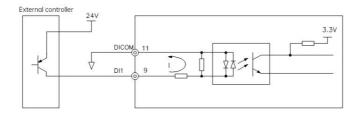


Fig.4-9 DI terminal PNP connection mode (using the external power)

Note: The NPN and PNP modes of multiple DI terminals of the same drive cannot be mixed.

#### 4.3.1.2 Digital output circuit

The DO terminal is a double-ended output, which can have various output modes. Taking DO1 as an example, the interface circuits of DO1-DO5 are the same.

#### (1) The host device is relay input

When the external device is a relay input, the wiring mode is as shown in Fig.4-9.

Warning: The inductive load (such as relay) shall be anti-parallel with the fly-wheel diode!

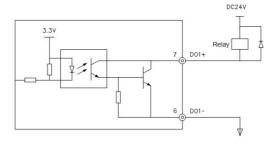


Fig.4-10 DO terminal connection relay wiring mode

#### (2) Drain (NPN) output

When the controller input is a drain input, the wiring mode is as shown in Fig.4-7.

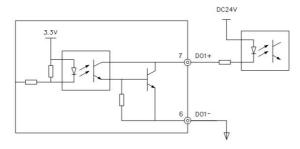


Fig.4-11 DO terminal drain (NPN) output wiring mode

#### (3) Source (PNP) output

When the controller input is a source input, the wiring mode is as shown in Fig.4-8.

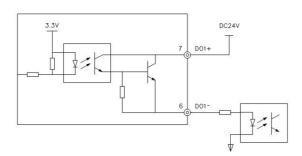


Fig.4-12 DO terminal source (PNP) output wiring mode

### 4.3.2 Analog input signals (only for SIZE D)

Table 4-6 Analog input signals

Signal		Pin	Function
	Al1	20	
Analog	Al2	18	Analog single-end input, Input voltage range: -10 V to +10 V
	GND	19	,,gg

The Al1/Al2 single-end voltage input wiring is shown below.

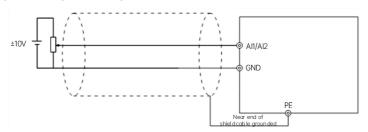


Fig.4-13 Al1/Al2 single-end voltage input wiring

### 4.3.3 Position command input signal

Table 4-7 Position command input signal

Signa	I name	Pin No.	Fu	unction
	PULS+	41	Low speed pulse command	Pulse input mode:
	PULS-	43	Open collector input	PULSE+SIGN
	SIGN+	37	Push-pull input	cw/ccw
	SIGN-	39	Differential input	A / B phase quadrature
Position	HPULS+	38		Pulse input mode:
command	HPULS-	36	High-speed pulse command	PULSE+SIGN
	HSIGN+	42	Differential input	cw/ccw
	HSIGN-	40		A / B phase quadrature
PPH ;		35	External power input interface of co	ommand pulse
	GND	29	Differential input pulse signal ground	

There are two channels for pulse command input: low-speed pulse command input and high-speed pulse command input. The former supports differential input and open-collector input, while the latter only supports differential input. Its input maximum frequency and minimum pulse width are shown in the table below.

Table 4-8 Pulse input specification requirements

Pulse channel	Supported input Maximum input mode frequency		Minimum pulse width	Voltage specification	Current consumption
Low-speed pulse	Open-collector input	200Kpps	2.5us	24V	<10mA
input	Differential	300Kpps	1.7us	5V	<10mA

Pulse channel	Supported input mode	Maximum input frequency	Minimum pulse width	Voltage specification	Current consumption
	input				
High-speed pulse	Differential	4Mpps	0.125us	5V	<10mA
input	input	* *			

### 4.3.3.1 Low-speed pulse command input

### a) The host device is 5V differential mode output

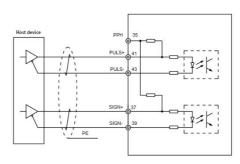


Fig.4-14 Low-speed pulse command differential input wiring diagram

### b)The host device is open collector NPN output

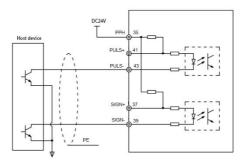


Fig.4-15 Low-speed pulse command NPN input wiring diagram

#### c)The host device is open collector PNP output

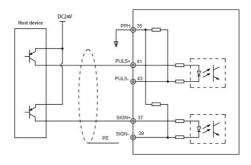


Fig.4-16 Low-speed pulse command PNP input wiring diagram

### 4.3.3.2 High-speed pulse input

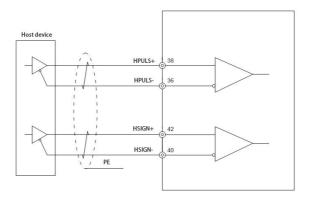


Fig.4-17 High-speed pulse input wiring diagram

# 4.3.4 Encoder frequency dividing output circuit

Table 4-9 Encoder frequency dividing output signal

Signal name		Pin No.	Function		
	PAO+	21	Dhoos A sutput signal		
	PAO-	22	Phase A output signal	A, B quadrature	
	PBO+ 25	Dhoop B output signal	pulse output		
C	PBO-	23	Phase B output signal		
Common	PZO+	13	Dhoos 7 sutnut signal	Origin signal	
	PZO-	24	Phase Z output signal	Origin signal	
	PZ-OUT	44	Origin pulse open-collect	tor output	
	GND	29	Pulse signal ground		

Encoder frequency dividing output wiring is as shown in Fig.4-16 to Fig.4-18.

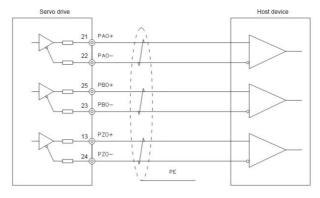


Fig.4-18 Encoder frequency division output wiring 1

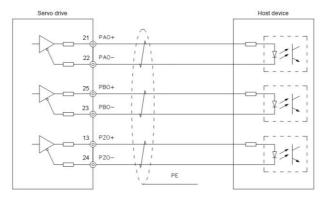


Fig.4-19 Encoder frequency division output wiring 2

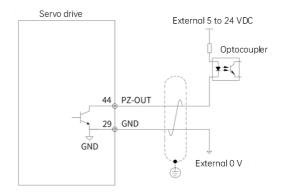


Fig.4-20 Encoder frequency division output wiring 3

# 4.4 Communication port wiring

M5 series servo supports RS485 communication and CANopen communication (only supported by the CANopen type). The communication ports are CN3 and CN4, which are two RJ45 ports connected in parallel, which is convenient for multi-site cascading, the two ports go from top to bottom.

Among them, CAN supports CANopen protocol and implements CiA 402 sub-protocol; RS485 supports standard MODBUS-RTU protocol.

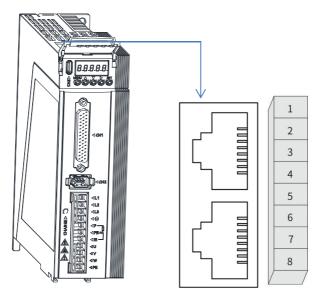


Fig.4-21 Communication interface connection diagram

Table 4-10 Communication port signal definition table

Pin No.	Definition	Description	
1	CANH	CAN	
2	CANL	- CAN	
3	485+	RS485	
6	485-	K3465	
7/8	GND	Communication ground	
4/5	Undefined		

# Chapter 5 Operation Panel

### 5.1 Interface introduction

M5 servo drive operating interface consists of five LED digital tube and 5 keys, it can be used for working status display and parameter settings.

Interface appearance as shown in the figure below.

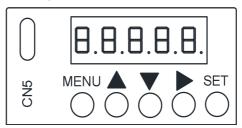


Fig.5-1 Interface appearance

Interface key functions as shown in the table below.

Table 5-1 Interface key functions

Key	Key name	Function
MENU	Menu / exit key	In the working status display or monitor parameters menu, press this key to switch between the working status display or monitor parameters menu and level 1 menu of the parameter settings.
		In level 2 menu of the parameter setting, press this key to return to the previous menu.
	0	In the working status display menu, press this key to switch between the working status display and monitor parameters menu.
•	Switch/shift/page key	In the parameter setting interface, press this key to left shift the selected blinking digits.  When the parameter value is greater than 5 digits and can not be modified,
		pressing this key, you can scroll the display parameter values.
•	Increase key	In the monitoring parameter menu, press this key to select the monitoring parameters.  In the parameter setting interface, press this key to increase the current blinking digits setting value, long press to increase rapidly.
		In the monitoring parameter menu, press this key to select the monitoring parameters.
▼	Decrease key	In the parameter setting interface, press this key to decrease the current blinking digits setting value, long press to decrease rapidly.
SET	Enter/confirm/reset	In the parameter setting interface, press this key to enter the next menu, or

Key	Key name	Function	
	key	confirm the current parameter value and return to the previous menu.	
		Under the fault status display, press this key to reset the fault.	

# 5.2 Working status display

M5 servo drive can display the following several working status.

Table 5-2 Servo drive function status and display

LED display graphics	Symbol	Status description	
I-SE	"rst"	Power on initialization state, indicate that the system is at start or reset state.	
nrd	"nrd"	Start or reset is completed, the servo is not yet ready.	
	"rdy"	Servo system self-detection normal, wait for the host to give a command signal.	
run	"run"	Servo running status.	
E - X X X	"Er.xxx"	Servo fault status.	
ALXXX	"ALxxx"	Servo alarm status.	

# 5.3 Working status display and parameter setting flowchart

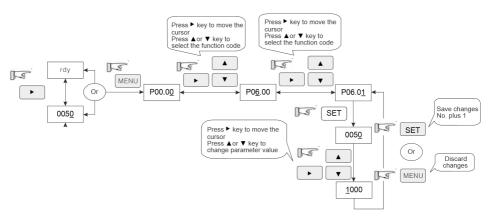


Fig.5-2 Working status display and parameter setting flowchart

- 1. After the servo drive power on initialization is completed, enter the working status display menu, if the servo system self-detection is normal, it will display "rdy".
- 2. In the working status display menu, press ► key to switch between the working status display and monitor parameters menu.
- 3. In the monitoring parameter menu, press ▼/▲ key to select the monitoring parameters.

- 4. In the working status display or monitor parameters menu, press the MENU key to switch between the working status display or monitor parameters menu and level 1 menu of the parameter settings.
- 5. In the parameter setting level 1 menu, press ► key to move the cursor to the parameter group or parameter serial number.
- 6. In the parameter setting level 1 menu, press ▼/▲ key to select the required parameter group and parameter serial number.
- 7. In the parameter setting level 1 menu, press the SET key to enter parameter setting level 2 menu to display the current value of the parameters. If at this time, the parameter values can be modified, its lowest digit will flash.
- 8. In the parameter setting level 2 menu, press ► key to select the number of digits to be modified, press ▼/▲ key to increase or decrease the value.
- 9. After the parameter are modified, if press the SET key to save the changes and return to the previous menu, if press the MENU key to discard the changes, and return to the previous menu.

### 5.4 Parameter value display

#### 1. Five-digit and below parameter values display

When the parameter value is in the [-9999 to 99999], it can be displayed and edited in one page.

#### 2. Above five-digit parameter values display

When the parameter value exceeds [-9999 to 99999], the parameter value need to turn the page to display and edit. The drive can display up to three page parameters, the following illustrates the page display logic. For example, to display -21474836.48, can be divided into [-21], [4748], [36.48] three pages, as shown in the figure below.

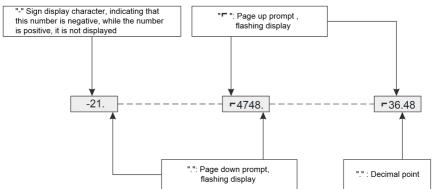


Fig.5-3 Parameter page display logic

If the parameter value can be modified currently, press ▶ key to select the number of digits to be modified. If the parameter value can not be modified currently, at this time can only press ▶ key to scrolling display.

# Chapter 6 Running Mode and Commissioning Instructions

## 6.1 Check before running

Disconnect the servo motor from the load, the coupling connected to the motor shaft, and other related components. To prevent potential risks, check that the servo motor can work properly without load, and then connect the load.

Before running, check that the following requirements are met:

- 1. There is no obvious damage on the appearance of the servo drive.
- 2. The wiring terminals have been insulated.
- 3. There are no conductive objects such as screw or metal sheet or combustible objects inside the servo drive, and there are no conductive objects around the wiring terminals.
- 4. The servo drive or external braking resistor is not placed on combustible objects.
- 5. The wiring is completed and correct:
- · Power cables, auxiliary power cables and grounding cable of the servo drive
- · All control signal cables
- · Limit switches and protection signals
- 6. The servo drive enable switch is in OFF state.
- 7. The power circuit is cut off, and the emergency stop circuit is ON.
- 8. The external voltage reference of the servo drive is correct.

When the host controller does not send the running reference, power on the servo drive. Then, check that:

- 1. The servo motor can rotate properly without vibration or loud noise.
- 2. All parameter settings are correct. Unexpected actions may occur due to different mechanical characteristics. Thus, do not set the parameters too large or small.
- 3. The bus voltage indicator and digital display are normal.

### 6.2 Commissioning

After the wiring is completed, perform jog commissioning, confirm whether the servo motor can rotate normally and whether there is abnormal vibration or noise when rotating. The jog running can be set through the panel, or by configuring two external DI terminals. The motor jog running speed is set by function code P06.05.

a. Panel jog

Enter the control mode selection through the panel operation function code P02.00 and set it to 0, then set the jog running speed through the panel operation function code P06.05, then operate the function code P06.06 and press SET to display the current jog speed. Adjust jog running forward and reverse through the ▼/▲ keys. Press SET/ MENU key to exit the jog mode.

b. DI terminal jog

Configure two external DI terminals, set FunIN.17, FunIN.18 function, after set P06.05 jog speed, control jog running forward and reverse through DI state.

### 6.3 Position control mode instructions

### 6.3.1 Position control mode wiring

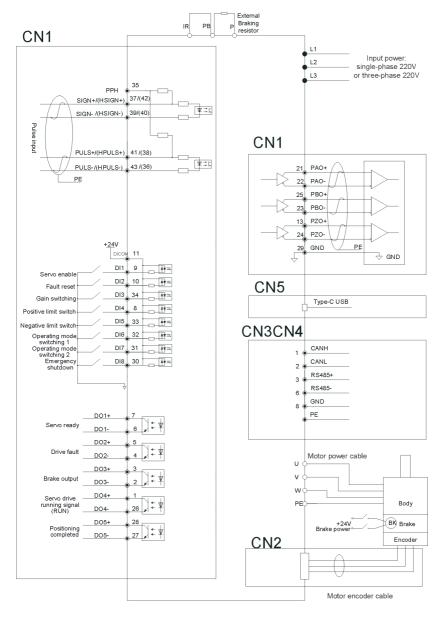


Fig.6-1 Position control mode wiring

### 6.3.2 Position control mode function code setting

Position control is selected by P02.00

Function code	Name	Setting range/value	Effective time	Property	Default value
P02.00	Control mode selection	1: Position mode	Immediate	At stop	0

### 6.3.2.1 Position command input setting

Pulse input source, pulse command input mode and logical form are set by P05.01, P05.02 and P05.03 respectively.

#### (1) Pulse input source

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.01	Pulse command input terminal selection	0: Low-speed terminal 1: High-speed terminal	Immediate	At stop	0

#### (2) Pulse command input mode setting

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.02	Pulse command mode	0: A/B phase pulse 1: PULSE+SIGN 2: CW/CCW pulse	Immediate	At stop	1

Pulse command input mode	Forward command	Reverse command	
A / B phase pulse	→ ↓ 90 ° A phase	A phase B phase	
PULSE+SIGN pulse	PULS SIGN	PULS TOTAL	
CW/CCW pulse	cw	cw L	

#### (3) Pulse command logic

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.03	Pulse command logic	0: Positive logic 1: Inverse logic	Immediate	At stop	0

#### (4) Command pulse disable

Set the function FunIN.12 by DI to disable command pulse input.

Туре	Function No.	Function name	Description	Remarks
Input (DI)	FunIN.12	Command pulse disable (INHIBIT)	ON: Closed OFF: Disconnected	ON: Stop command pulse count OFF: Start command pulse count

#### 6.3.2.2 Position command filter

The command pulse input is filtered to make rotation of the servo motor smoother.

This function has obvious effects in the following occasions:

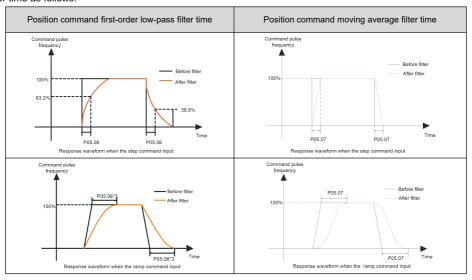
- Acceleration/deceleration processing is not performed on the command pulses output by the host controller
- The command pulse frequency is too low.

Position command smoothing function parameters are set as follows. Do not input the command pulse when changing the setting value. Modify the parameters when the motor stops.

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.06	Position command first-order low-pass filter time	0.0 to 2000.0 ms	Immediate	At stop	0.0
P05.07	Position command moving average filter time	0.0 to 12.8 ms	Immediate	At stop	0.0

NOTE: When set to 0, the function is disabled.

The difference between the position command first-order low-pass filter time and the position command average filter time as follows:



#### 6.3.2.3 Positioning close to and positioning completed signal output

Туре	Function No.	Function name	Description	Remarks
Output	/NEAR	Positioning close to	ON: Closed OFF: Disconnected	Output when arriving the point of positioning close to
(DO)	/COIN	Positioning completed	ON: Closed OFF: Disconnected	Output when arriving the point of positioning completed

Positioning close to and positioning completed are set by the following parameters, positioning close to is valid only in the internal position.

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.18	Positioning complete	0: Position deviation	Immediate	At stop	0

	output condition	absolute value smaller than amplitude of positioning completed  1: Position deviation absolute value smaller than amplitude of positioning completed and position reference after filter being 0  2: Position deviation absolute value smaller than amplitude of positioning completed and position reference being 0			
P05.19	Position positioning completed range	0 to 10000	Immediate	During running	10
P05.20	Position close to signal width	1 to 32767	Immediate	During running	100

Note: This parameter has no effect on final positioning accuracy.

Signal is output when the difference between the host device command pulses and the the amount of movement of the servo motor encoder (position pulse deviation) is lower than the set value.

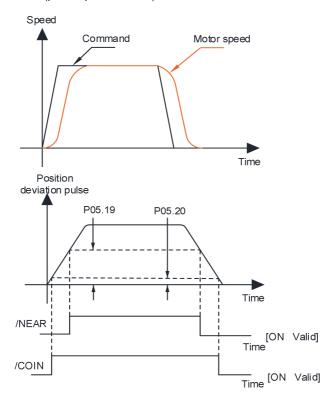


Fig.6-2 Positioning close to and positioning completed signal logic

### 6.3.2.4 Clearing position deviation

#### (1) Setting clear input signal

Туре	Function No.	Function name	Description	Remarks
Input (DI)	FunIN.29	Position deviation clear	ON: Position deviation clear OFF: Position deviation not cleared	Edge valid

#### (2) Setting clear input signal form

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.14	Position deviation clearing method selection	O: Clear position deviation when servo enable is OFF or stopped 1: Clear position deviation when the servo enable is OFF or a fault/alarm occurs 2: Clear position deviation when the servo enable is OFF or the external position deviation clear DI is valid	Immediate	At stop	0

Command form	Clearing time		
Clear position deviation when servo enable is OFF or stop	Servo RUN  Servo OFF  Deviation clear		
Clear position deviation when servo fails/alarm	Servo RUN  Servo fault  Deviation clear		
The position deviation is cleared when the servo enable is OFF or the external deviation clear DI is valid.	P05.15=0 DI is invalid Deviation clear DI is valid DI is invalid		

# 6.3.3 Electronic gear

The use of "electronic gear" function, movement of the workpiece corresponding to the unit command pulse can be set to any value. In the system control, you can need not consider the mechanical reduction ratio and the number of encoder pulse.

1)Electronic gear ratio setting method is as follows:

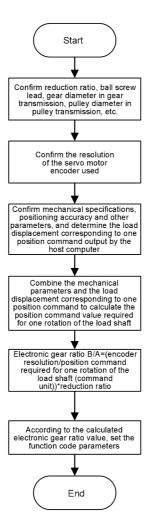


Fig.6-3 Electronic gear ratio setting process

The electronic gear ratio parameter function is shown as follows:

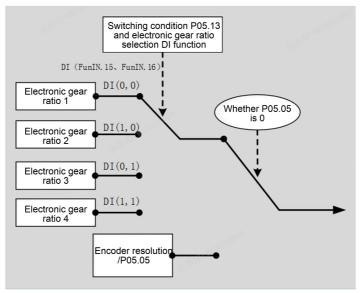


Fig.6-4 Electronic gear ratio function diagram

When P05.05 is not 0, the electronic gear ratio  $\frac{B}{A} = \frac{Encoder resolution}{P05.05}$ , at this time, electronic gear ratio 1, electronic gear ratio 2, electronic gear ratio 3, and electronic gear ratio 4 are invalid.

#### 2) Related function codes

a. Electronic gear ratio parameter value setting:

Function code	Name	Setting range/value	Effective time	Property	Default value
P05.05	Number of command pulses per motor revolution	0~8388608 P/r	Immediate	At stop	2097152
P05.08	Electronic gear numerator	1~1073741824	Immediate	At stop	8388608
P05.09	P05.09 Electronic gear denominator 1 P05.10 Electronic gear denominator 2 P05.11 Electronic gear denominator 3 P05.12 Electronic gear denominator 4		Immediate	At stop	10000
P05.10			Immediate	At stop	10000
P05.11			Immediate	At stop	10000
P05.12			Immediate	At stop	10000

#### Note:

- 1. The setting range of electronic gear ratio is:  $0.001 < \frac{B}{A} < 30000$ , otherwise, fault Er.061 (electronic gear ratio setting error) will occur.
- 2.For the serial absolute encoder, the encoder resolution  $=2^n$ , n is the number of bits of the encoder, and the standard absolute encoder number of M5 is 23 bits, so the resolution of the encoder is  $2^{23}$ =8388608.

For an incremental encoder, encoder resolution = encoder lines \* 4, for example, the resolution of a 2500-line incremental encoder is 2500\*4=10000.

b. Electronic gear ratio switching setting

When P05.05 is 0, the electronic gear ratio switching function can be used. It should be determined whether it is necessary to switch among 4 sets of electronic gear ratios according to the mechanical operation, and the electronic gear ratio switching conditions should be set. There is one and only one set of electronic gear ratios active at any one time.

#### Associated function code

Function code	Name	Setting range	Effective time	Property	Default value
P05.13	Electronic gear ratio switching conditions	O: Position command is 0, switch after 3ms duration     1: Real-time switching	Immediate	At stop	0

At the same time, please configure the 2 DI terminals of the servo drive as functions 15 and 16 (FunIN.15 and FunIN.16), and determine the valid logic of the DI terminals. Refer to the table below for electronic gear ratio selection. When no DI is configured as FunIN.15 or FunIN.16, FunIN.15 and FunIN.16 are invalid by default.

P05.05	P05.13	DI level of FunIN.15	DI level of FunIN.16	Electronic gear ratio B/A
	0 or 1	Invalid	Invalid	P05.08/P05.09
		Valid	Invalid	P05.08/P05.10
0		Invalid	Valid	P05.08/P05.11
		Valid	Valid	P05.08/P05.12
1~8388608			Encoder resolution/P05.05	

### 3) Calculation method of electronic gear ratio:

When the machine reduction ratio between the motor shaft and the load side is m/n (when the motor rotates m circle, the load shaft rotates n circle), the set value of the electronic gear ratio can be obtained by the following formula.

$$\text{Electronic gear ratio} \frac{B}{A} = \frac{\text{Encoder resolution}}{\text{the displacement for load shaft rotate a circle (command unit)}} \times \frac{m}{n}$$

a. Confirm the mechanical parameters and servo motor encoder resolution

Confirm mechanical parameters, such as reduction ratio, ball screw lead, belt transmission ratio, confirm the servo motor encoder resolution.

b. Confirm the positioning accuracy (i.e. pulse equivalent)

Pulse equivalent refers to the load minimum movement unit corresponding to each pulse command signal. Pulse equivalent can be 0.001mm, 0.1 °, 0.01 inches, a pulse is entered, moving a pulse equivalent of the distance or angle.

For example, pulse equivalent is 0.001mm, when the input command pulse is 50000, the amount of the load movement is (50000 \* 0.001mm) = 50mm.

c. Calculate the number of position command required by load shaft rotate a circle

Use mechanical parameters, pulse equivalent, calculate the number of position command required by load shaft rotate a circle.

For example, the ball screw pitch is 5mm, pulse equivalent is 0.001mm, then:

The displacement for load shaft rotate a circle (command bits) = 5mm / 0.001mm = 5000

d. Calculate the electronic gear ratio

If the reduction ratio of the motor shaft and load shaft is m/n (i.e. the motor rotate m circle, load rotate n circle), then:

$$\text{Electronic gear ratio} = \frac{P05.08}{P05.09} = \frac{\text{Encoder resolution}}{\text{the displacement for load shaft rotate a circle (command unit)}} \times \frac{m}{n}$$

### 4) The setting example is as follows

			Mechanical mechanism				
		Ball screw	Round table	Belt pulley			
Step	Content	Load shaft  P: Pitch  I turn - Pulse equivalent	Load shaft  1 turn = 360° Command unit	Load shaft  1 hurn-Command unit			
1	Mechanical mechanism	Screw lead: 5mm Reduction ratio: 1/1	1 turn rotation angle: 360 Reduction ratio: 100/1	Pulley diameter 100mm (pulley circumference 314mm) Reduction ratio: 50/1			
2	Encoder resolution	8388608(23 bits)	8388608(23 bits)	8388608(23 bits)			
3	1 command unit corresponds to load displacement	0.001mm	0.01°	0.005mm			
4	The number of position commands required for one rotation of the load	5mm/0.001mm=5000	360°/0.01° =36000	314mm/0.005mm=62800mm			
5	Electronic gear ratio	$\frac{B}{A} = \frac{8388608}{5000} \times \frac{1}{1}$	$\frac{B}{A} = \frac{8388608}{36000} \times \frac{100}{1}$	$\frac{B}{A} = \frac{8388608}{62800} \times \frac{50}{1}$			
6	Parameter	P05.08= 8388608 P05.09 = 5000	P05.08= 838860800 P05.09 = 36000	P05.08= 419430400 P05.09 = 62800			

## 6.3.4 Homing function

#### 6.3.4.1 Function overview

The homing function means that in the position control mode, the servo motor will search for the zero point according to the homing mode, homing speed and other commands to complete the positioning function, and use this position as the reference point for each subsequent operation.

Electrical homing refers to the process of running from the current position to the zero point after finding the position reference zero point.

Homing operation and pulse input operation, single-point operation and multi-segment operation are mutually exclusive, and other methods of position control can be performed only after one segment is executed.

### 6.3.4.2 Parameter settings

Function code	Name	Setting range	Effective time	Property	Default value
P12.00	Homing selection	0: Disabled	Immediate	During	0

Function code	Name	Setting range	Effective time	Property	Default value
		1: Homing enabled by the HomingStart signal input from DI 2: Electrical homing enabled by the HomingStart signal input from DI 3: Homing enabled immediately upon power-on 4: Homing performed immediately 5: Electrical homing started 6: Current position as the home		running	
P12.01 Homing mode		O: Forward, home switch as deceleration point and home  1: Reverse, home switch as deceleration point and home  2: Forward, motor Z signal as deceleration point and home  3: Reverse, motor Z signal as deceleration point and home  4: Forward, home switch as deceleration point and Z signal as home  5: Reverse, home switch as deceleration point and Z signal as home  6: Forward, positive limit switch as deceleration point and home  7: Reverse, negative limit switch as deceleration point and home  8: Forward, positive limit switch as deceleration point and Z signal as home  9: Reverse, negative limit switch as deceleration point and Z signal as home  101-134: CANopen CiA402 homing mode 1-34 (only supported by the CANopen version)	Immediate	At stop	9
P12.02	Homing command terminal mode	0: Level mode 1: Pulse mode	Immediate	At stop	0
P12.04	Positioning acceleration and deceleration curve selection	0: T-shaped curve 1: S-shaped curve	Immediate	At stop	0
P12.05	High speed home searching speed	0.0 to 1000.0 rpm	Immediate	At stop	100.0
P12.06	Low speed home searching speed	0.0 to 1000.0 rpm	Immediate	At stop	10.0
P12.07	Home position offset	-1073741824 to 1073741824	Immediate	At stop	0
P12.08	Home searching acceleration/decel eration time	0 to 65535 ms	Immediate	At stop	200
P12.09	Homing time limit	0 to 65535 ms	Immediate	At stop	10000

In the process of various homing control, the effective stroke of each switch should be fully considered to avoid the logic error Er.066 of the homing process caused by the long deceleration time of the home searching or the excessive speed of the home searching, and set the homing parameters carefully.

If the time of homing exceeds the homing time limit, the drive will generate the time-out fault Er.037 for homing. After the drive starts to find the origin according to the homing mode, the homing DO (FunOUT.14) signal outputs a high level, and the origin will be found, and the origin position offset will be run. After the position is reached, the

homing complete signal DO (FunOUT.15) will be output, and clear the homing DO (FunOUT.14).

After the drive starts to find the origin according to the electrical homing mode, the electrical homing DO (FunOUT.16) signal outputs a high level, and will run from the current position to the zero point. After the position is reached, the electrical homing complete signal DO (FunOUT.17) is output, and clear the homing DO (FunOUT.16).

There are six types of homing control modes:

1. Homing enabled by the HomingStart signal input from DI

Set DI to FunIN.33, which is the HomingStart signal. First enable the drive, and then enable the HomingStart signal to perform the homing. If the homing command terminal mode is set to the level mode, when the HomingStart is low level, the homing process will be stopped, re-enable the function to perform the homing again. If the terminal mode of the homing command is set to pulse mode, the HomingStart level is low level will not affect the homing process, and the servo off enable will stop the homing process.

2. Electrical homing enabled by the HomingStart signal input from DI

Set DI to FunIN.33, which is the HomingStart signal. After the zero point is found in the homing, enable the drive first, and then enable the HomingStart signal for electrical homing. If the homing command terminal mode is set to the level mode, when the HomingStart is low level, the electrical homing process will be stopped and re-enabling will perform the electrical homing again. If the terminal mode of the homing command is set to pulse mode, the HomingStart level is low level will not affect the electrical homing process, and the drive off enable will stop the electrical homing process.

3. Homing enabled immediately upon power-on

The first servo enable after power-on will trigger the homing process according to the homing mode, and the servo enable again will not trigger the homing again until the drive is powered on again.

4. Homing performed immediately

After the servo is enabled, the homing process will be triggered according to the homing mode. After the homing is completed, P12.00 will be cleared. To trigger again, you need to set P12.00=4 and then enable the drive.

5. Electrical homing started

After the zero point is found by the homing, the servo enable will trigger the electrical homing process. After the electrical homing is completed, P12.00 will be cleared. To trigger again, you need to set P12.00=5 and then enable the drive

6. Current position as the home

After the drive is enabled, the current position is taken as the home. When the home position offset P12.07 is 0, the position feedback=0. When the home position offset P12.07 is not 0, the position feedback is related to the home offset mode P12.11: when P12.11=0, the position feedback=P12.07; when P12.11=1, the position feedback=current position+P12.07. After the homing is completed, P12.00 will be cleared. To trigger again, you need to set P12.00=6 and then enable the drive.

## 6.3.4.3 Homing mode

For the CANopen bus version products, the homing mode P12.01 also supports CANopen CiA402 homing mode 1-34.

1) P12.01 = 0, homing mode 0

Forward, home switch as deceleration point and home

The current position of the motor is between the negative limit switch and the home switch. When the homing is started, the home switch is at a low level, and the forward high-speed returns to zero. After encountering the rising edge of the home switch, the reverse high-speed deceleration runs, and encountering the falling edge of the home switch, and then run at low speed in the forward direction, and stop when encountering the rising edge of the home switch.

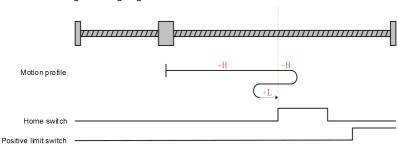


Fig.6-5 Homing mode 0 motion profile Figure 1

The current position of the motor is where the home switch is valid. When the homing is started, the home switch is at a high level, and reverse high-speed returns to zero. After encountering the falling edge of the home switch, it runs at a low speed in the forward direction, and stops when it encounters the rising edge of the home switch.



Fig.6-6 Homing mode 0 motion profile Figure 2

The current position of the motor is between the home switch and the positive limit switch. When the homing is started, the home switch is at a low level, and the forward high-speed returns to zero. After encountering the positive limit switch, the reverse high-speed runs, and encountering the falling edge of the home switch, and then run at low speed in the forward direction, and stop when encountering the rising edge of the home switch.



Fig.6-7 Homing mode 0 motion profile Figure 3

### 2) P12.01 = 1, homing mode 1

Reverse, home switch as deceleration point and home

The current position of the motor is between the negative limit switch and the home switch. When the homing is started, the home switch is at a low level, and the reverse high-speed returns to zero. After encountering the negative limit switch, the forward high-speed runs, and encountering the falling edge of the home switch, and then run at low speed in the reverse direction, and stop when encountering the rising edge of the home switch.

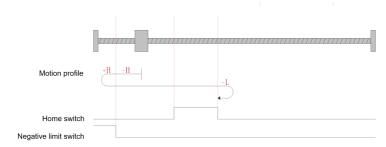
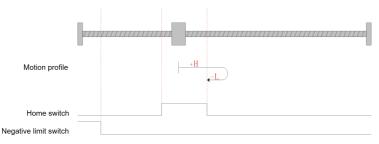


Fig.6-8 Homing mode 1 motion profile Figure 1

The current position of the motor is where the home switch is valid. When the homing is started, the home switch is at a high level, and forward high-speed returns to zero. After encountering the falling edge of the home switch, it runs at a low speed in the reverse direction, and stops when it encounters the rising edge of the home switch.



### Fig.6-9 Homing mode 1 motion profile Figure 2

The current position of the motor is between the home switch and the positive limit switch. When the homing is started, the home switch is at a low level, and the reverse high-speed returns to zero. After encountering the rising edge of the home switch, the forward high-speed deceleration runs, and encountering the falling edge of the home switch, and then run at low speed in the reverse direction, and stop when encountering the rising edge of the home switch.

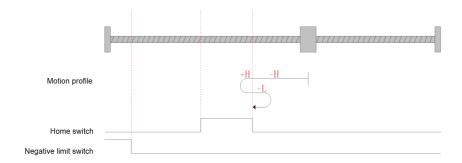


Fig.6-10 Homing mode 1 motion profile Figure 3

## 3) P12.01 = 2, homing mode 2

Forward, motor Z signal as deceleration point and home

When there is at least one Z signal in the distance between the current position of the motor and the positive limit switch, it will return to zero at low speed in the forward direction and stop at the rising edge of the Z signal.

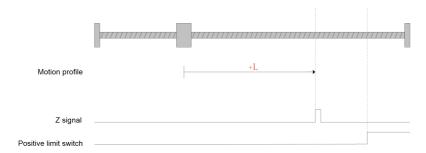


Fig.6-11 Homing mode 2 motion profile Figure 1

When the current position of the motor is at the Z signal, the homing enable is triggered, and the current position is immediately remembered as the origin position to stop.

When there is no Z signal between the current position of the motor and the positive limit switch, the forward low speed returns to zero, encounters the rising edge of the positive limit switch, and the reverse runs at a low speed. After encountering the falling edge of the Z signal, the forward low speed finds the Z

signal to stop.

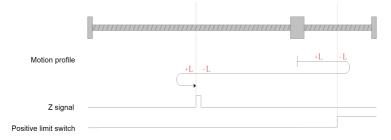


Fig.6-12 Homing mode 2 motion profile Figure 2

### 4) P12.01 = 3, homing mode 3

Reverse, motor Z signal as deceleration point and home

When there is at least one Z signal in the distance between the current position of the motor and the negative limit switch, it will return to zero at low speed in the reverse direction and stop at the rising edge of the Z signal.

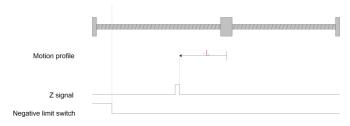


Fig.6-13 Homing mode 3 motion profile Figure 1

When the current position of the motor is at the Z signal, the homing enable is triggered, and the current position is immediately remembered as the origin position to stop.

When there is no Z signal between the current position of the motor and the negative limit switch, the reverse low speed returns to zero, encounters the rising edge of the negative limit switch, and the forward runs at a low speed. After encountering the falling edge of the Z signal, the reverse low speed finds the Z signal to stop.

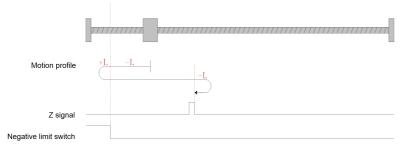


Fig.6-14 Homing mode 3 motion profile Figure 2

#### 5) P12.01 = 4, homing mode 4

Forward, home switch as deceleration point and Z signal as home

The current position of the motor is between the negative limit switch and the home switch. When the homing is started, the home switch is at a low level, and the forward high-speed returns to zero. After encountering the rising edge of the home switch, and then run at low speed in the forward direction, and stop at the rising edge of the Z signal.

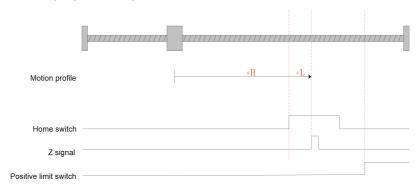


Fig.6-15 Homing mode 4 motion profile Figure 1

The current position of the motor is where the home switch is valid. When the homing is started, the home switch is at a high level, and reverse high-speed returns to zero. After encountering the falling edge of the home switch, it runs at a high-speed in the forward direction, after encountering the rising edge of the home switch, it will find the rising edge of the Z signal at a forward low speed and stop.

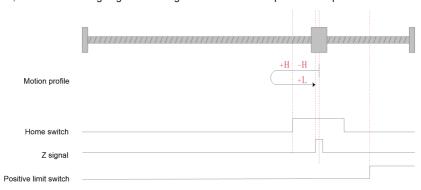


Fig.6-16 Homing mode 4 motion profile Figure 2

The current position of the motor is between the positive limit switch and the home switch. When the homing is started, the home switch is at a low level, and the forward high-speed returns to zero. After encountering the rising edge of the positive limit switch, and then run at high speed in the reverse direction.

After encountering the falling edge of the home switch, it will run forward at high speed, and when it encounters the rising edge of the home switch, it will find the rising edge of the Z signal at a forward low speed and stop.

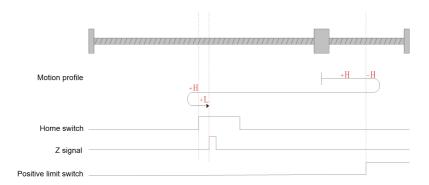


Fig.6-17 Homing mode 4 motion profile Figure 3

### 6) P12.01 = 5, homing mode 5

Reverse, home switch as deceleration point and Z signal as home

The current position of the motor is between the negative limit switch and the home switch. When the homing is started, the home switch is at a low level, and the reverse high-speed returns to zero. After encountering the rising edge of the negative limit switch, and then run at high speed in the forward direction. After encountering the falling edge of the home switch, it will run reverse at high speed, and when it encounters the rising edge of the home switch, it will find the rising edge of the Z signal at a low speed and stop.

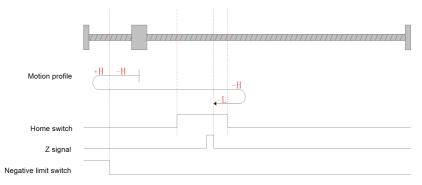


Fig.6-18 Homing mode 5 motion profile Figure 1

The current position of the motor is where the home switch is valid. When the homing is started, the home switch is at a high level, and forward high-speed returns to zero. After encountering the falling edge of the home switch, it runs at a high-speed in the reverse direction, after encountering the rising edge of the home

switch, it will find the rising edge of the Z signal at a reverse low speed and stop.

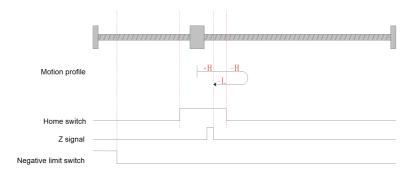


Fig.6-19 Homing mode 5 motion profile Figure 2

The current position of the motor is between the positive limit switch and the home switch. When the homing is started, the home switch is at a low level, and the reverse high-speed returns to zero. After encountering the rising edge of the home switch, and then forward high speed deceleration operation. After encountering the rising edge of the home switch, it will run reverse at low speed, and stop when encountering the rising edge of Z signal.

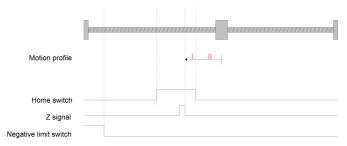


Fig.6-20 Homing mode 5 motion profile Figure 3

## 7) P12.01 = 6, homing mode 6

Forward, positive limit switch as deceleration point and home

The current position of the motor is where the positive limit switch is invalid. When the homing is started, the positive limit switch is at a low level, and forward high-speed returns to zero. After encountering the rising edge of the positive limit switch, it runs at a high-speed in the reverse direction, after encountering the falling edge of the positive limit switch, it will run forward at low speed, and stop when encountering the rising edge of the positive limit switch.

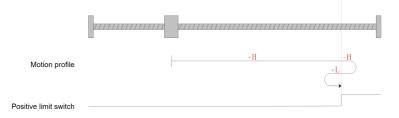


Fig.6-21 Homing mode 6 motion profile Figure 1

The current position of the motor is at the positive limit switch. When the homing is started, the positive limit switch is at a high level, and reverse high-speed returns to zero. After encountering the falling edge of the positive limit switch, it runs at a low speed in the forward direction, and stop when encountering the rising edge of the positive limit switch.

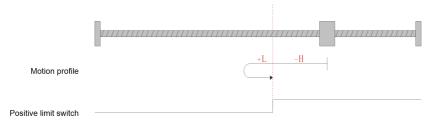


Fig.6-22 Homing mode 6 motion profile Figure 2

#### 8) P12.01 = 7, homing mode 7

Reverse, negative limit switch as deceleration point and home

The current position of the motor is where the negative limit switch is invalid. When the homing is started, the negative limit switch is at a low level, and reverse high-speed returns to zero. After encountering the rising edge of the negative limit switch, it runs at a high-speed in the forward direction, after encountering the falling edge of the negative limit switch, it will run reverse at low speed, and stop when encountering the rising edge of the negative limit switch.

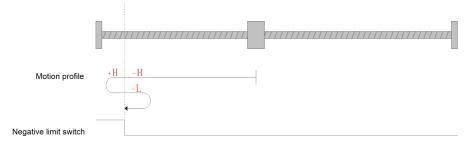


Fig.6-23 Homing mode 7 motion profile Figure 1

The current position of the motor is at the negative limit switch. When the homing is started, the negative

limit switch is at a high level, and forward high-speed returns to zero. After encountering the falling edge of the negative limit switch, it runs at a low speed in the reverse direction, and stop when encountering the rising edge of the negative limit switch.

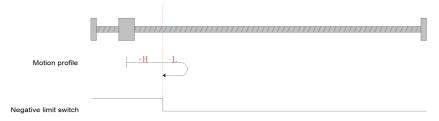


Fig.6-24 Homing mode 7 motion profile Figure 2

### 9) P12.01 = 8, homing mode 8

Forward, positive limit switch as deceleration point and Z signal as home

The current position of the motor is where the positive limit switch is invalid. When the homing is started, the positive limit switch is at a low level, and forward high-speed returns to zero. After encountering the rising edge of the positive limit switch, it runs at a high-speed in the reverse direction, after encountering the falling edge of the positive limit switch, it will run reverse at low speed, and stop when encountering the rising edge of the Z signal.

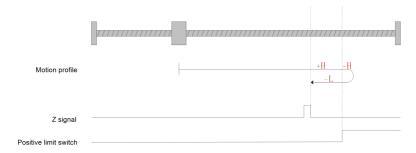


Fig.6-25 Homing mode 8 motion profile Figure 1

The current position of the motor is at the positive limit switch. When the homing is started, the positive limit switch is at a high level, and reverse high-speed returns to zero. After encountering the falling edge of the positive limit switch, it runs at a low speed in the reverse direction, and stop when encountering the rising edge of the Z signal.

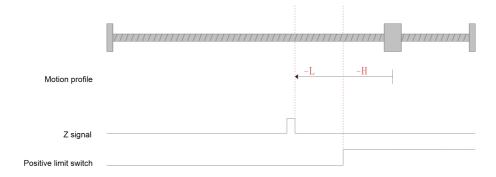


Fig.6-26 Homing mode 8 motion profile Figure 2

### 10) P12.01 = 9, homing mode 9

Reverse, positive limit switch as deceleration point and Z signal as home

The current position of the motor is where the negative limit switch is invalid. When the homing is started, the negative limit switch is at a low level, and reverse high-speed returns to zero. After encountering the rising edge of the negative limit switch, it runs at a high-speed in the forward direction, after encountering the falling edge of the negative limit switch, it will run forward at low speed, and stop when encountering the rising edge of the Z signal.

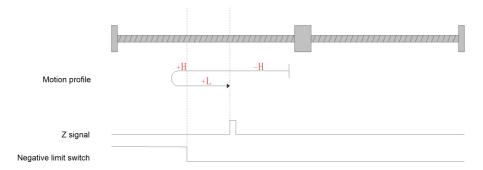


Fig.6-27 Homing mode 9 motion profile Figure 1

The current position of the motor is at the positive limit switch. When the homing is started, the negative limit switch is at a high level, and forward high-speed returns to zero. After encountering the falling edge of the negative limit switch, it runs at a low speed in the forward direction, and stop when encountering the rising edge of the Z signal.

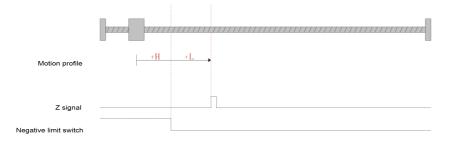


Fig.6-28 Homing mode 9 motion profile Figure 2

## 6.3.5 Interrupt positioning

#### 6.3.5.1 Function overview

In the position control mode, if interrupt positioning is triggered, the servo drive aborts current non-zero speed operation and turns to executing the preset position reference. When the servo receives the external trigger signal, it will shield the external position command signal and run according to the internal preset length, speed and other commands. When the operation is completed, the interrupt positioning completion signal is output, and then the next command action will be performed according to the external trigger signal.

When the interrupt positioning function is valid, DI10 is forced to be the interrupt positioning enable signal terminal. In the process of pulse reference, single point and multi-point operation, the interrupt positioning function is enabled at non-zero speed, and the enable is valid. If the speed is zero, alarm AL.062 is generated, and the alarm will be cleared when the DI10 interrupt positioning enable signal is disabled.

### 6.3.5.2 Parameter settings

When the DI terminal function selects 31 interrupt positioning prohibition function, its priority is higher than the parameter setting of P12.86.

Function code	ction code Name Setting range/valu		Effective time	Property	Default value
P03.00-P03.07	DI terminal function selection	30: Interrupt positioning cancel 31: Interrupt positioning inhibit	Immediate	At stop	-
P03.15-P03.19	DO terminal function selection	27: Interrupt positioning completed	Immediate	At stop	-
P12.86	Interrupt positioning selection	0: Disable 1: Enabled	Immediate	At stop	0
P12.87	Displacement of interrupt positioning	0 to 1073741824	Immediate	At stop	10000
P12.88	Constant operating speed in interrupt positioning	0.0 to 6000.0 rpm	Immediate	At stop	200.0
P12.89	Acceleration/ deceleration time of interrupt positioning	0 to 1000 ms	Immediate	At stop	10
P12.90	Interrupt	0: Disable	Immediate	At stop	1

Function code	Name	Setting range/value	Effective time	Property	Default value
	positioning cancel signal enable	1: Enable			

When P12.90 positioning lock contact signal enable is enabled, after interrupt positioning completion signal output, it is necessary to enable the interrupt positioning function again after the function of DI terminal 30 is released. If P12.90 is in the non-enable state, then the next interrupt positioning can be performed without the terminal to cancel the state.

## 6.3.5.3 Sequence diagram

When the interrupt positioning is triggered during position control, it will run to the maximum constant speed P12.88 according to the current running speed direction, and then decelerate until the set interrupt positioning displacement is completed.

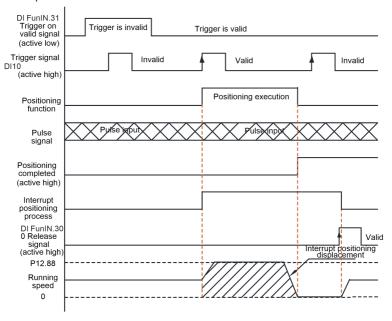


Fig.6-29 Interrupt positioning sequence diagram

## 6.3.6 Function block diagram of position control mode

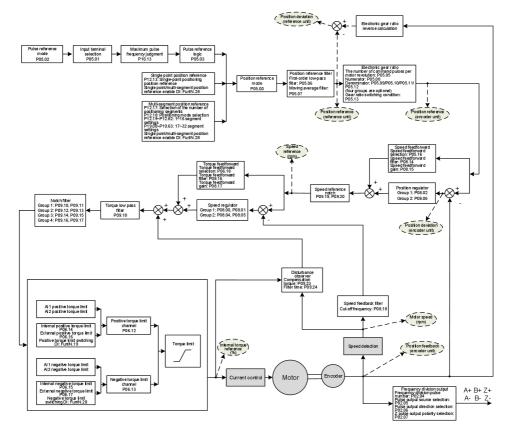


Fig.6-30 Function block diagram of position control mode

## 6.4 Speed control mode instructions

## 6.4.1 Speed control mode function code setting

## 6.4.1.1 Speed command input setting

#### (1) Speed control selection

Function code	Name	Setting range/value	Effective time	Property	Default value
P02.00	Control mode selection	0: Speed mode	Immediate	At stop	0

### (2) Speed reference source

Function code	Name	Setting range/value	Effective time	Property	Default value
P06.00	Main reference source selection	0: Digital setting (P06.01) 1: Al1 (only for SIZE D) 2: Al2 (only for SIZE D) 3: Serial port communication reference 4: Multi-segment speed reference (auxiliary reference is not supported)	Immediate	At stop	0
P06.01	Main reference speed setting	-6000.0~6000.0rpm	Immediate	During running	0.0
P06.02	Auxiliary speed source selection 0: N reference 1: D 2: Al 3: Al 4: S com	0: No auxiliary reference 1: Digital setting 2: Al1 (only for SIZE D) 3: Al2 (only for SIZE D) 4: Serial port communication reference	Immediate	At stop	0
P06.03	Auxiliary reference speed setting	-6000.0~6000.0rpm	Immediate	During running	0.0
P06.05	Jog speed	0.0~6000.0rpm	Immediate	During running	100.0

## (3) Speed reference direction switching

Туре	Function No.	Function name	Description	Remarks
Input (DI)	FunIN.26	Speed command direction switching	ON: Switch OFF: Do not switch	Level valid

## 6.4.1.2 Command ramp function settings

The ramp control function converts the stepped speed references to smooth speed references with constant acceleration/deceleration, you can set the acceleration and deceleration times. In speed control (including internal set speed control), you can use this function to achieve smooth speed control.

Function code	Name	Setting range/value	Effective time	Property	Default value
P06.07	Speed command	0 to 65535 ms	Immediate	During running	1000

	oction ode	Name	Setting range/value	Effective time	Property	Default value
		acceleration time 1				
P06	6.08	Speed command deceleration time 1	0 to 65535 ms	Immediate	During running	1000

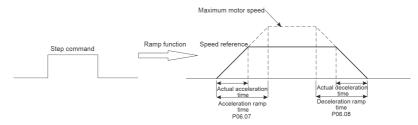


Fig.6-31 Command ramp function operating logic

The actual acceleration and deceleration time is calculated as follows:

Actual acceleration time = (speed reference / P06.09) \* P06.07

Actual deceleration time = (speed reference /P06.09) \* P06.08

## 6.4.1.3 Zero clamp

Zero clamp refers to that at zero clamp signal (/ P-CON) ON state, when the speed reference is below the speed set by zero clamp starting speed (P06.21), the servo motor enters servo lock. At this point in the inner of the servo drive position loop is constituted, speed command will be ignored.

The servo motor is fixed within ± 1 pulse of zero clamp effective position, even if the rotation occurs due to an external force, it will return to the zero clamp position.

Zero clamp function is used for the system that host device does not constitute position closed loop in speed control.

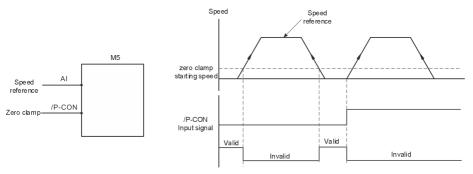


Fig.6-32 Zero clamp logic

### DI function selection:

Type Function No.		Function name	Description	Remarks
Input (DI)	FunIN.11	Zero clamp (/P-CON)	ON: Perform zero clamp function	Level valid

Туре	Function No.	Function name	Description	Remarks
			OFF: Do not perform zero clamp function	

## Related function codes:

Function code	Name	Setting range/value	Effective time	Property	Default value
P06.19	Zero clamp function	0: Disabled 1: Always enabled 2: Enabled under conditions (terminal enabled)	Immediate	At stop	0
P06.20	Zero clamp gain	0 to 6.000	Immediate	During running	1.000
P06.21	Zero clamp starting speed	0.0 to 1000.0 rpm	Immediate	During running	2

If the servo motor oscillation occurs at zero clamp control status, you can adjust zero clamp gain.

## 6.4.2 Function block diagram of speed control mode

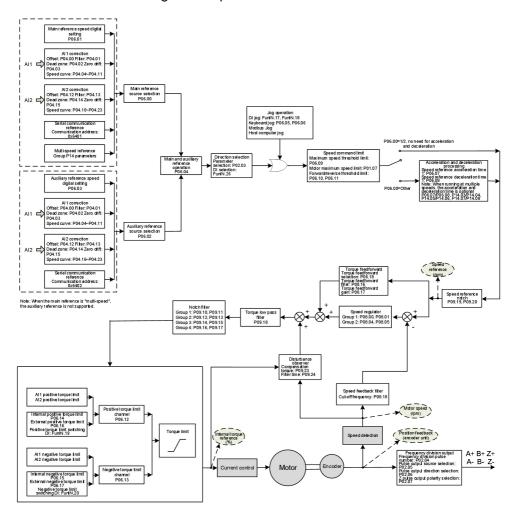


Fig.6-33 Function block diagram of speed control mode

## 6.5 Torque control mode instructions

## 6.5.1 Torque control mode function code setting

## 6.5.1.1 Torque command input setting

#### (1) Torque control selection

Function code	Name	Setting range/value	Effective time	Property	Default value
P02.00	Control mode selection	2: Torque mode	Immediate	At stop	0

#### (2) Torque reference source

Function code	Name	Setting range/value	Effective time	Property	Default value
P07.00	Torque reference selection	0: Digital setting 1: Al1 (only for SIZE D) 2: Al2 (only for SIZE D) 3: Serial port communication reference	Immediate	At stop	0
P07.03	Torque digital reference value	-400.0%~400.0%	Immediate	At stop	0.0%

### (3) Torque reference direction switching

Туре	Function No.	Function name	Description	Remarks
Input (DI)	FunIN.27	Torque reference direction switching	ON: Switch OFF: Do not switch	Level valid

## 6.5.1.2 Speed limiter in torque control

This function is to limit servo motor speed to protect the mechanical.

In the torque control mode, only the output torque command of the servo motor is limited, and the speed is not controlled. Therefore, if the set torque reference is larger than the load torque on the mechanical side, the motor will keep acceleration. This may cause overload. In this case, the speed limit needs to be set.

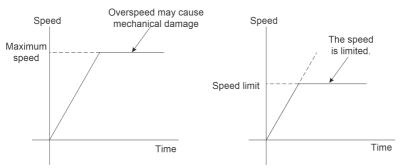


Fig.6-34 Speed limiter in torque control

## (1) Output signal in motor speed limit

Туре	Function No.	Function name	Output status	Description
Output (DO)	FunOUT.9	Speed limit(VLT)	ON (closed) OFF (disconnected)	Motor speed limited Motor speed not limited

## (2) Speed limit value selection

Function code	Name Setting range/va		Effective time	Property	Default value
P07.09	FWD speed limit channel	0: FWD speed limit value 1: Bus speed limit value 2: MIN (FWD speed limit value, bus speed limit value) 3: Al1 (only for SIZE D) 4: Al2 (only for SIZE D)		At stop	0
P07.10	FWD speed limit value	0.0% to +100.0%	Immediate	During running	100.0%
P07.11	REV speed limit channel	0: REV speed limit value 1: Bus speed limit value 2: MIN (REV speed limit value, bus speed limit value) 3: Al1 (only for SIZE D) 4: Al2 (only for SIZE D)	Immediate	At stop	0
P07.12	REV speed limit value	0.0% to +100.0%	Immediate	During running	100.0%

## 6.5.2 Function block diagram of torque control mode

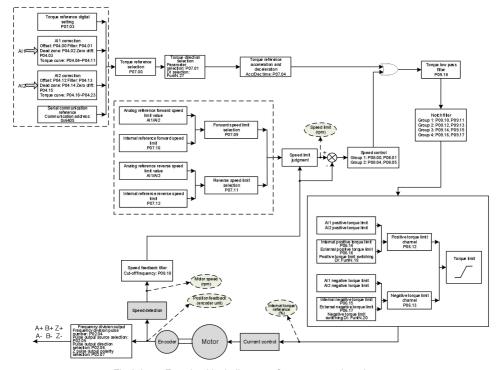


Fig.6-35 Function block diagram of torque control mode

## 6.6 Brake settings

## 6.6.1 Servo motor brake wiring diagram

The brake signal connection has no polarity. The customer needs to prepare a 24V power supply. The standard connection of the brake signal BK and the brake power supply is as follows:

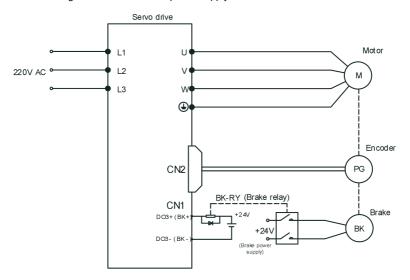


Fig.6-36 Brake wiring diagram

Note: It is best not to share the power supply with other electrical appliances to prevent the brake from malfunctioning due to voltage or current reduction due to the work of other electrical appliances.

## 6.6.2 Brake timing

For servo motor with brake, a DO terminal of servo drive shall be configured to function 18 (brake output signal) and determine the valid logic of DO terminal.

According to the current state of the servo drive, the operation timing of the brake mechanism can be divided into servo drive "normal state" brake timing and servo drive "fault state" brake timing.

The brake timing of the normal state is divided into "motor stationary" and "motor rotation" two cases:

- a. Stationary: Motor actual speed is lower than P02.12;
- b. Rotation: Motor actual speed is higher than the P02.12 and above.

## 6.6.3 The brake timing when the servo motor is stationary

When the servo enable changes from ON to OFF, if the current motor speed is lower than P02.12, the drive operates in accordance with stationary timing.

#### Note:

- After the brake output is set from OFF to ON, within the time set by P02.10, do not enter the speed / position / torque command, which will cause the command loss or operational errors;
- When used in the vertical axis, the gravity or external force of the mechanical moving parts may cause slight mechanical movement. When the servo motor is stationary, servo enable OFF, brake output immediately turn OFF, but within the time set by P02.11, the motor is still powered on to prevent mechanical parts from moving due to gravity or external force.

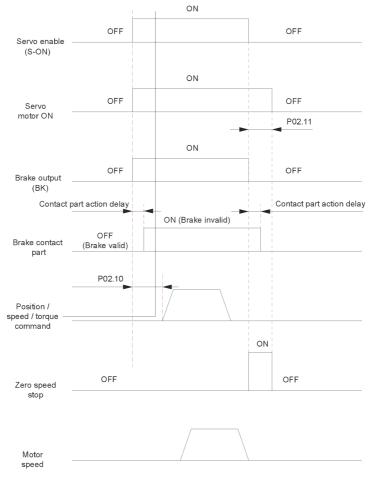


Fig.6-37 The brake timing when the servo motor is stationary

As shown in Fig.6-37, the brake function when the servo motor is stationary as follows:

- a. Servo enable is ON, the brake output is set to ON, meanwhile the motor enter into the power-on state;
- b. Brake contact part delay time, please refer to the motor related specifications;

- c. From the brake output is set to ON to input command, the time interval should be more than the value set by P02.10;
- d. When the servo motor is stationary (motor speed is lower than P02.12), servo enable OFF, meanwhile brake output is set to OFF, you can set delay by P02.11 for the motor into a non-conducting state after the brake output is set to OFF

Function code	Name	Setting range/value	Effective time	Property	Default value
P02.10	Delay from brake outputting ON signal to command received	20 to 500 ms	Immediate	During running	250
P02.11	Delay from brake outputting OFF signal to motor power-off in the standstill state	1 to 1000ms	Immediate	During running	150

## 6.6.4 The brake timing when the servo motor is rotating

When the servo motor is rotating, should pay attention to matters:

- After the brake output is set from OFF to ON, within the time set by P02.10, do not enter the speed / position / torque command, which will cause the command loss or operational errors;
- When the servo motor rotates, servo enable OFF, the motor enter zero speed shutdown, but the brake output must meet one of the conditions then it can be set OFF:
- a. P02.13 time has not come, but the motor has decelerated to P02.12;
- b. P02.13 the time has come, but the motor speed is still higher than the P02.12.
- After the brake output change from ON to OFF, within 40ms, the motor is still powered on to prevent mechanical parts from moving due to gravity or external force.

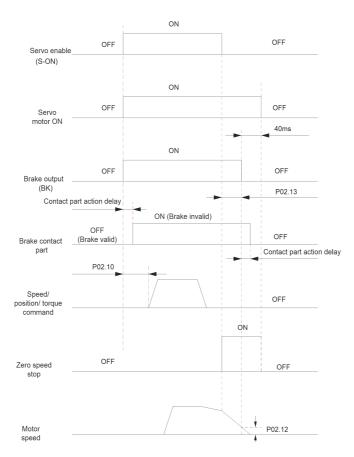


Fig.6-38 The brake timing when the servo motor is rotating

As shown in Fig. 6-38, the brake function when the servo motor is rotating as follows:

- a. Servo enable is ON, the brake output is set to ON, meanwhile the motor enter into the power-on state;
- b. Brake contact part delay time, please refer to the motor related specifications;
- c. From the brake output is set to ON to input command, the time interval should be more than the value set by P02.10;
- d. When the servo motor is rotating, servo enable OFF, P02.12 and P02.13 can be used to set the delay of the brake output after the servo enable is OFF, after the brake output OFF, then delay 50ms, the motor enter non-conducting state.

Function code	Name	Setting range/value	Effective time	Property	Default value
P02.12	Brake command output speed limit value	0 to 3000.0 rpm	Immediate	During running	10.0
P02.13	Servo OFF brake	1 to 30000 ms	Immediate	During running	500

Function code	Name	Setting range/value	Effective time	Property	Default value
	command waiting time				

## 6.6.5 Servo drive fault status brake timing

When a drive failure occurs, the motor immediately enter into the non-conductive state, meanwhile the brake output change from ON to OFF, the brake close.

# Chapter 7 Parameter List

## Explanation to the terms in the function code parameter table

Table field	Explanation
Function code number	Representing the number of the function code, e.g. P00.00
Function code name	Name of the function code, explaining it
Setting range	The minimum and maximum values of the function code allowed to set
Unit	V: Voltage; A: Current; °C: temperature; Ω: resistance; mH: inductance; r: number of revolutions; rpm: rotate speed; %: percentage; bps: baud rate; Hz, kHz: frequency; ms, s, min, h, kh: time; kW: power; ⁄: no unit  Command unit: The value of the input command processed by the electronic gear ratio.  Encoder unit: The minimum distinguishable value input to the servo drive from the host device.
Default value	The value of the function code after restoring the default settings
Effective time	Function code parameter settings valid condition
Property	Function code change condition
Mode	Function code effective control mode P: Position control; S: Speed control; T: Torque control.

## Function code parameter group description

Function code group	Parameter group description	Function code group	Parameter group description
P00	Drive parameters	P12	Servo positioning parameters
P01	Servo motor parameters	P14	Multi-stage speed parameters
P02	Basic control parameters	P15	Modbus communication parameters
P03	Digital input and output parameters	P16	CANopen communication parameters
1 03			(only supported by the CANopen bus version)
P04	Analog input parameters	P18	Advanced parameters
P05	Position control parameters	P19	Internal positioning parameter 2
P06	Speed control parameters	P23	Special function parameters
P07	Torque control parameters		
P08	Gain parameters		
P09	Adjustment parameters		
P10	Fault and protection parameters		
P11	Display parameters		

## Function code parameter table

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P00: Drive parameters							
P00.00	Serial No.	0~FFFF	1	Manufactur er setting	-	At display	PST
P00.01	DSP software version No.	0.00~99.99	0.01	Manufactur er setting	-	At display	PST
P00.02	User-customized version No.	0~9999	1	Manufactur er setting	-	At display	PST
P00.03	FPGA software version No.	0.00~99.99	0.01	Manufactur er setting	-	At display	PST
P00.04	Voltage class of servo drive	0: 220V 1: 380V	1	Manufactur er setting	-	At display	PST
P00.05	Rated current of servo drive	0~999.9A	0.1A	Manufactur er setting	-	At display	PST
P00.06	Maximum current of servo drive	0~999.9A	0.1A	Manufactur er setting	-	At display	PST
		P01: Servo	motor parame	eters			
P01.00	Motor SN	0: Motor parameters can be manually set 0x111: Motor parameters are automatically read Other: Reserved	1	0	Immediate	At stop	PST
P01.01	Rated power	0.04~99.99kW	0.01kW	Depending on model	Power-on again	At stop	PST
P01.02	Rated voltage	0~ rated voltage of servo drive	1V	0	Power-on again	At stop	PST
P01.03	Rated current	0.1~999.9A	0.1A	Depending on model	Power-on again	At stop	PST
P01.04	Rated torque	0.1~655.35Nm	0.01Nm	Depending on model	Power-on again	At stop	PST
P01.05	Maximum torque	0.1~655.35Nm	0.01Nm	Depending on model	Power-on again	At stop	PST
P01.06	Rated speed	0.1~6000.0rpm	0.1rpm	Depending on model	Power-on again	At stop	PST
P01.07	Maximum speed	0.1~6000.0rpm	0.1rpm	Depending on model	Power-on again	At stop	PST
P01.08	Rotor inertia Jm	0.00~655.35kg*cm²	0.01kg*c m <sup>2</sup>	Depending on model	Power-on again	At stop	PST
P01.09	Number of pole pairs	2~72 pairs of poles	1 pair of poles	Depending on model	Power-on again	At stop	PST
P01.10	Stator resistance R1	0.000~65.000Ω	0.001Ω	Depending on model	Power-on again	At stop	PST
P01.11	Direct axis inductance Ld	0.00~200.00mH	0.01mH	Depending on model	Power-on again	At stop	PST
P01.12	Q-axis inductance Lq	0.00~200.00mH	0.01mH	Depending on model	Power-on again	At stop	PST
P01.13	Back-EMF constant	1~600.0V/krpm	0.1V/krp m	Depending on model	Power-on again	At stop	PST
P01.14	Torque coefficient Kt	0.001~65.000N·M/A	0.01 N·M/A	Depending on model	Power-on again	At stop	PST
P01.15	Electrical	0.01~650.00ms	0.01ms	Depending	Power-on	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	constant Te			on model	again		
P01.16	Mechanical constant Tm	0.01~650.00ms	0.01ms	Depending on model	Power-on again	At stop	PST
P01.17	Brake function	0: Without brake 1: With brake	1	Depending on model	Immediate	At stop	PST
P01.18	Encoder selection	1: 23-bit absolute encoder 5: 17-bit absolute encoder Other: Reserved	1	1	Immediate	At stop	PST
P01.19	Number of encoder lines	1~4194304	1	2097152	Immediate	At stop	PST
P01.20	Encoder installation initial angle tuning	0: Disabled 1: Enabled	1	0	Immediate	At stop	PST
P01.21	Rotation direction	0: A before B 1: B before A	1	0	Immediate	At stop	PST
P01.22	Encoder installation initial angle	0.0~359.9°	0.1°	180.0	Immediate	At stop	PST
P01.23	Absolute encoder type	Nulti-turn absolute     encoder     Single-turn absolute     encoder	1	0	Immediate	At stop	PST
		P02: Basic	control parame	eters			
P02.00	Control mode selection	O: Speed mode (actually effective, combined with P06.00)  1: Position mode 2: Torque mode 3: Speed mode ← → position mode (9th function switching) 4: Torque mode ← → position mode (9th function switching) 5: Speed mode ← → torque mode (9th function switching) 6: Speed mode ← → torque mode (9th function switching) 6: Speed mode ← → position mode (9th function switching torque, 10th function switching torque, 10th function switching torque, 10th function switching torque, 10th function switching position, It does not switch when it is valid at the same time or invalid at the same time, and it remains in the speed mode) 7: CANopen mode (only supported by the CANopen bus version)	1	0	Immediate	At stop	PST
P02.01	Internal servo enable	0~1	1	0	Immediate	During running	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P02.02	Absolute value system mode selection	O: Absolute position linear mode     1: Absolute position rotation mode	1	0	Immediate	At stop	PST
P02.03	Rotation direction selection	0: Take the CCW direction as the forward direction (A before B) 1: Take the CW direction as the forward direction (reverse mode, B before A)	1	0	Immediate	During running	PST
P02.04	Encoder frequency dividing output pulses	1~32768 P/r	1	2500 P/r	Immediate	During running	PST
P02.05	Pulse output source selection	O: Motor encoder frequency dividing output  1: Pulse command synchronous output  2: Frequency dividing or synchronous output disabled	1	2	Immediate	During running	PST
P02.06	Output pulse direction selection	0: A before B 1: B before A	1	0	Immediate	During running	PST
P02.07	Z pulse output polarity selection	0: Positive output (Z pulse is high level) 1: Negative output (Z pulse is low level)	1	0	Immediate	During running	PST
P02.08	Stop mode	0: Decelerate to stop 1: Coast to stop	1	0	Immediate	During running	PST
P02.09	Emergency stop enable	0: No operation, keep the current running state 1: Enable emergency stop, stop according to the set stop mode (P02.08), and alarm AL.038	1	0	Immediate	During running	PST
P02.10	Delay from brake outputting ON signal to command received	20~500ms	1ms	250	Immediate	During running	PS
P02.11	Delay from brake outputting OFF signal to motor power-off in the standstill state	1~1000ms	1ms	150	Immediate	During running	PS
P02.12	Brake command output speed limit value	0~3000.0rpm	1rpm	10.0	Immediate	During running	PS
P02.13	Servo OFF brake command waiting time	1~30000ms	1ms	500	Immediate	During running	PS
P02.14	Regenerative resistor derating factor	0.5 to 1.0	0.1	0.8	Immediate	At stop	PST
P02.15	Power of built-in	-	1	Model-depe	-	At	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	regenerative resistor			ndent		display	
P02.16	Resistance of built-in regenerative resistor	-	1	Model-depe ndent	-	At display	PST
P02.17	Resistor heat dissipation coefficient	0: 0% 1: 25% 2: 50% 3: 75% 4: 100%	1	2	Immediate	During running	PST
P02.18	Regenerative resistor type	O: Use the built-in regenerative resistor  1: Use the external regenerative resistor  2: Do not use the regenerative resistor	1	0	Immediate	At stop	PST
P02.19	Power of external regenerative resistor	1 to 65535 W	1 W	Model-depe ndent	Immediate	At stop	PST
P02.20	Resistance of external regenerative resistor	1 to 65535 Ω	1 Ω	Model-depe ndent	Immediate	At stop	PST
P02.21	Parameter protection setting	O: All the data can be changed; 1: Only P06.01 and this function code can be changed 2: Only this function code can be changed	1	0	Immediate	During running	PST
P02.22	Parameter initialization	O: Parameter changing status 1: Clear fault memory information 2: Restore to leave-factory value 3: Clear motor model	1	0	Immediate	At stop	PST
P02.23	LED display parameter selection	0: Switching display P11.00 1: Switching display P11.01 2: Switching display P11.02 3: Switching display P11.03 4: Switching display P11.04 5: Switching display P11.05	1	0	Immediate	During running	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P02.24	Enable terminal valid type selection	0: Level valid 1: Transition edge valid	1	1	Immediate	During running	PST
		P03: Digital input	t and output pa	arameters			
P03.00	DI1 terminal function selection	0: No function 1: Servo enable	1	1	Immediate	At stop	PST
P03.01	DI2 terminal function selection	2: External reset (RESET) input	1	2	Immediate	At stop	PST
P03.02	DI3 terminal function selection	3: Gain switching 4: Multi-speed DI switching running	1	3	Immediate	At stop	PST
P03.03	DI4 terminal function selection	direction 5: Multi-segment	1	35	Immediate	At stop	PST
P03.04	DI5 terminal function selection	operation reference switching 1	1	36	Immediate	At stop	PST
P03.05	DI6 terminal function selection	6: Multi-segment operation reference switching 2	1	9	Immediate	At stop	PST
P03.06	DI7 terminal function selection	7: Multi-segment operation reference	1	10	Immediate	At stop	PST
P03.07	DI8 terminal function selection	switching 3 8: Multi-segment operation reference switching 4 9: Control mode switching 1 10: Control mode switching 2 11: Zero servo enable terminal 12: Pulse input disable 13: FWD disabled 14: REV disabled 15: Electronic gear ratio switching 1 16: Electronic gear ratio switching 1 16: Electronic gear ratio switching 2 17: Forward jog 18: Reverse jog 19: Forward external torque limit 20: Reverse external torque limit 21: Multi-segment position reference 1 22: Multi-segment position reference 3 24: Multi-segment position reference 4 25: Multi-segment position reference 5 26: Speed command direction switching 27: Torque command direction switching 28: Multi-segment/ single-point position	1	34	Immediate	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		command enable 29: Position deviation counter is cleared 30: Interrupt positioning state release 31: Interrupt positioning prohibition 32: Home switch 33: Homing enable 34: Emergency stop 35: Positive limit switch 36: Negative limit switch 37: Speed main/auxiliary reference switching 38: External fault input					
P03.08 to P03.11	Reserved						
P03.12	DI terminal filtering time	1~500ms	1ms	10	Immediate	During running	PST
P03.13	Input terminal enabled status	Binary setting 0: Normal logical, enabled upon connection 1: Inverted logical, enabled upon disconnection Unit place of LED: BIT0~BIT3: DI1~DI4 Tens place of LED: BIT0~BIT3: DI5~DI8 Hundreds place of LED: BIT0~BIT3: DI9~DI12	1	000	Immediate	During running	PST
P03.14	Virtual input terminal setting	Binary setting 0: Disabled 1: Enabled Unit place of LED: BIT0~BIT3: DI1~DI4 Tens place of LED: BIT0~BIT5: DI5~DI8 Hundreds place of LED: BIT0~BIT3: DI9~DI12	1	000	Immediate	During running	PST
P03.15	DO1 function selection	0: Servo drive ready (RDY)	1	0	Immediate	At stop	PST
P03.16	DO2 function selection	1: Servo drive running signal (RUN)	1	5	Immediate	At stop	PST
P03.17	DO3 function selection	2: The speed is consistent 3: Speed arrival signal	1	18	Immediate	At stop	PST
P03.18	DO4 function selection	4: Zero speed operation 5: Drive fault	1	1	Immediate	At stop	PST
P03.19	DO5 function selection	6: Drive alarm 7: Host device switch signal 8: Torque limit 9: Speed limit	1	11	Immediate	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
Code		10: Zero servo completed 11: Positioning completed 12: Positioning close to 13: Position tolerance alarm 14: Homing 15: Homing completed 16: Electrical homing 17: Electrical homing 18: Brake output (brake output signal) 19: Torque arrival signal 20: FWD/REV indication terminal 21: Reserved 22: Positioning position arrival 1 23: Positioning position arrival 2 24: Positioning position arrival 3 25: Positioning position arrival 4 26: Positioning position arrival 5 27: Interrupt positioning completed	unit	value	une		THOUG
P03.20 to P03.22	Reserved	·					
P03.23	Output terminal enabled status setting	Binary setting 0: Enabled upon connection 1: Enabled upon disconnection Unit place of LED: BIT0~BIT3: DO1~DO4 Tens place of LED: BIT0~BIT3: DO5~DO8	1	00	Immediate	During running	PST
		P04: Analog input pa	arameters (onl	y for SIZE D)			
P04.00	Al1 offset	-5000~5000mV	1mV	0	Immediate	During running	PST
P04.01	Al1 filter	0.0~6000.0ms	0.1ms	20.0	Immediate	During running	PST
P04.02	Al1 dead zone	0~1000.0mV	0.1mV	10.0	Immediate	During running	PST
P04.03	Al1 zero drift	-1000.0~1000.0mV	0.1mV	0	Immediate	During running	PST
P04.04	Al1 maximum reference	P04.10~100.00%	0.01%	100.00	Immediate	During running	PST
P04.05	Actual value corresponds to Al1 maximum reference	Speed reference: 0.00~100.00% Smax Torque: 0.00~400.00%Te	0.01%	100.00	Immediate	During running	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		Speed feedforward: 0.00~100.00%					
P04.06	Al1 inflection point 2 reference	P04.08~ P04.04	0.01%	100.00	Immediate	During running	PST
P04.07	Actual value corresponds to Al1 inflection point 2	The same as P04.05	0.01%	100.00	Immediate	During running	PST
P04.08	Al1 inflection point 1 reference	P04.10~ P04.06	0.01%	0.0	Immediate	During running	PST
P04.09	Actual value corresponds to Al1 inflection point 1	The same as P04.05	0.01%	0.00	Immediate	During running	PST
P04.10	Al1 minimum reference	0.00%~P04.04	0.01%	0.00	Immediate	During running	PST
P04.11	Actual value corresponds to Al1 minimum reference	The same as P04.05	0.01%	0.00	Immediate	During running	PST
P04.12	Al2 offset	-5000~5000mV	1mV	0	Immediate	During running	PST
P04.13	Al2 filter	0.0~6000.0ms	0.1ms	20.0	Immediate	During running	PST
P04.14	Al2 dead zone	0~1000.0mV	0.1mV	10.0	Immediate	During running	PST
P04.15	Al2 zero drift	-1000.0~1000.0mV	0.1mV	0	Immediate	During running	PST
P04.16	Al2 maximum reference	P04.22~100.00%	0.01%	100.00	Immediate	During running	PST
P04.17	Actual value corresponds to Al2 maximum reference	Speed reference: 0.00~100.00% Smax Torque: 0.00~400.00%Te Speed feedforward: 0.00~100.00%	0.01%	100.00	Immediate	During running	PST
P04.18	Al2 inflection point 2 reference	P04.20~ P04.16	0.01%	100.00	Immediate	During running	PST
P04.19	Actual value corresponds to Al2 inflection point 2	The same as P04.17	0.01%	100.00	Immediate	During running	PST
P04.20	Al2 inflection point 1 reference	P04.22~ P04.18	0.01%	0.00	Immediate	During running	PST
P04.21	Actual value corresponds to Al2 inflection point 1	The same as P04.17	0.01%	0.00	Immediate	During running	PST
P04.22	Al2 minimum reference	0.00%~P04.16	0.01%	0.00	Immediate	During running	PST
P04.23	Actual value corresponds to Al2 minimum reference	The same as P04.17	0.01%	0.00	Immediate	During running	PST
P04.24~ P04.29	Reserved						

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P04.30	Al automatic zero drift correction	0: No correction 1: Al1 automatic zero drift correction 2: Al2 automatic zero drift correction	1	0	Immediate	During running	PST
		P05: Position	control paran	neters			
P05.00	Position reference mode	Pulse reference     Single point position reference     Multi-segment position reference	1	0	Immediate	At stop	Р
P05.01	Pulse command input terminal selection	0: Low-speed terminal 1: High-speed terminal	1	0	Immediate	At stop	Р
P05.02	Pulse command mode	0: A/B phase pulse 1: PULSE+SIGN 2: CW/CCW pulse	1	1	Immediate	At stop	Р
P05.03	Pulse command logic	0: Positive logic 1: Inverse logic	1	0	Immediate	At stop	Р
P05.04	Reserved						
P05.05	Pulses for one motor revolution	0~8388608 P/r	1 P/r	2097152	Immediate	At stop	Р
P05.06	Position command first-order low-pass filter time	0.0~2000.0ms	0.1ms	0.0	Immediate	At stop	Р
P05.07	Position command moving average filter time	0.0~12.8ms	0.1ms	0.0	Immediate	At stop	Р
P05.08	Electronic gear ratio numerator	1~1073741824	1	8388608	Immediate	At stop	Р
P05.09	Electronic gear ratio denominator 1	1~1073741824	1	10000	Immediate	At stop	Р
P05.10	Electronic gear ratio denominator 2	1~1073741824	1	10000	Immediate	At stop	Р
P05.11	Electronic gear ratio denominator 3	1~1073741824	1	10000	Immediate	At stop	Р
P05.12	Electronic gear ratio denominator 4	1~1073741824	1	10000	Immediate	At stop	Р
P05.13	Electronic gear ratio switching conditions	O: Position command is     O, switch after 3ms     duration     1: Real-time switching	1	0	Immediate	At stop	Р
P05.14	Position deviation clearing method selection	O: Clear position deviation when servo enable is OFF or stopped  1: Clear position deviation when the servo	1	00	Immediate	At stop	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		enable is OFF or a fault/alarm occurs 2: Clear position deviation when the servo enable is OFF or the external position deviation clear DI is valid					
P05.15	Position deviation clear DI signal type	0: Pulse mode 1: Level mode	0	0	Immediate	At stop	Р
P05.16	Speed feedforward control selection	0: No speed feedforward 1: Internal speed feedforward (take the speed information corresponding to the position reference of the encoder unit as the source of the speed feedforward signal) 2: Al1 (only for SIZE D) 3: Al2 (only for SIZE D)	1	1	Immediate	At stop	Р
P05.17	Position controller output limiter	0~maximum speed	0.1rpm	3000.0	Immediate	During running	Р
P05.18	Positioning complete output condition	0: Position deviation absolute value smaller than amplitude of positioning completed 1: Position deviation absolute value smaller than amplitude of positioning completed and position reference after filter being 0 2: Position deviation absolute value smaller than amplitude of positioning completed and position reference being 0	1	0	Immediate	At stop	Р
P05.19	Position positioning completed range	0~10000	1 command unit	10	Immediate	During running	Р
P05.20	Position close to signal width	1~32767	1 command unit	100	Immediate	During running	Р
P05.21	Position error detection range	0~32767	1 encoder unit	20000	Immediate	During running	Р
P05.22	Position error alarm selection	0: Valid 1: Invalid	1	0	Immediate	During running	Р
P05.23	Servo shutdown mode	Switch to servo speed control according to the downtime     Switch to the speed control deceleration stop	1	1	Immediate	During running	Р
P05.24	Servo downtime	0~3000ms When the PL (CCWL), NL (CWL) occurs, according to the time to slow down	1	0	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P05.25	Absolute position rotation mode mechanical gear ratio numerator	1~65535	1	1	Immediate	At stop	Р
P05.26	Absolute position rotation mode mechanical gear ratio denominator	1~65535	1	1	Immediate	At stop	Р
P05.27	Absolute position linear mode position offset (lower 32 bits)	0~ 4294967295	1 encoder unit	0	Immediate	At stop	Р
P05.28	Absolute position linear mode position offset (upper 32 bits)	0~ 4294967295	1 encoder unit	0	Immediate	At stop	Р
P05.29	The number of pulses for one revolution of the load in absolute position rotation mode (lower 32 bits)	0~ 4294967295	1 encoder unit	0	Immediate	At stop	Р
P05.30	The number of pulses for one revolution of the load in absolute position rotation mode (upper 32 bits)	0~127	1 encoder unit	0	Immediate	At stop	Р
P05.31	Soft limit function setting	O: Disable soft limit  1: Enable software limit immediately after power-on  2: Enable soft limit after homing	1	0	Immediate	At stop	Р
P05.32	Software limit maximum point	-2147483647~21474836 47	1 command unit	214748364 7	Immediate	At stop	Р
P05.33	Software limit minimum point	-2147483647~21474836 47	1 command unit	-214748364 8	Immediate	At stop	Р
		P06: Speed	control param	eters			
P06.00	Main reference source selection	0: Digital setting (P06.01) 1: Al1 (only for SIZE D) 2: Al2 (only for SIZE D) 3: Serial port communication reference 4: Multi-step speed reference (auxiliary reference is not supported)	1	0	Immediate	At stop	s
P06.01	Main reference speed setting	-6000.0~6000.0rpm	0.1rpm	0.0	Immediate	During running	S
P06.02	Auxiliary speed source selection	0: No auxiliary reference 1: Digital setting	1	0	Immediate	At stop	s

		2: Al1 (only for SIZE D) 3: Al2 (only for SIZE D)					
		4: Serial port communication reference					
P06.03	Auxiliary reference speed setting	-6000.0~6000.0rpm	0.1rpm	0	Immediate	During running	S
P06.04	Main/auxiliary reference calculation	0: + 1: - 2: Terminal switching main and auxiliary reference 3: MAX (main reference, auxiliary reference) 4: MIN (main reference, auxiliary reference)	1	0	Immediate	At stop	S
P06.05	Jog speed	0.0~6000.0rpm	0.1rpm	100.0	Immediate	During running	S
P06.06	Jog operation						
P06.07	Speed command acceleration time	0~65535ms	1ms	1000	Immediate	During running	S
P06.08	Speed command deceleration time	0~65535ms	1ms	1000	Immediate	During running	S
P06.09	Maximum speed threshold	0.0~6000.0rpm	0.1rpm	6000.0	Immediate	During running	S
P06.10	Forward speed threshold	0.0~6000.0rpm	0.1rpm	6000.0	Immediate	During running	S
P06.11	Reverse speed threshold	0.0~6000.0rpm	0.1rpm	6000.0	Immediate	During running	S
P06.12	Positive torque limit channel	O: Internal positive torque limit value  1: Bus positive torque limit value  2: MIN (internal positive torque limit value, bus positive torque limit value)  3: External positive torque limit value  4: Al1 (only for SIZE D)  5: Al2 (only for SIZE D)	1	0	Immediate	At stop	PST
P06.13	Negative torque limit channel	0: Internal negative torque limit value 1: Bus negative torque limit value 2: MIN (internal negative torque limit value, bus negative torque limit value) 3: External negative torque limit value 4: Al1 (only for SIZE D) 5: Al2 (only for SIZE D) 0.0%~+400.0%	1 0.1%	0  Depending	Immediate	At stop  During	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	torque limit value			on model		running	
P06.15	Internal negative torque limit value	0.0%~+400.0%	0.1%	Depending on model	Immediate	During running	PST
P06.16	External positive torque limit value	0.0%~+400.0%	0.1%	100.0	Immediate	During running	PST
P06.17	External negative torque limit value	0.0%~+400.0%	0.1%	100.0	Immediate	During running	PST
P06.18	Torque feedforward control selection	0: No torque feedforward 1: Internal torque feedforward (Use the speed command as the source of the torque feedforward signal.In position control mode, the speed command comes from the output of the position controller.)	1	1	Immediate	At stop	PST
P06.19	Zero clamp function	0: Disabled 1: Always enabled 2: Enabled under conditions (terminal enabled)	1	0	Immediate	At stop	S
P06.20	Zero clamp gain	0~6.000	0.001	1.000	Immediate	During running	s
P06.21	Zero clamp starting speed	0.0~1000.0rpm	0.1 rpm	2.0	Immediate	During running	s
P06.22	Speed arrival detection width	0.0~6000.0rpm	0.1 rpm	1000.0	Immediate	During running	PST
P06.23	Zero speed threshold	0.0~200.0rpm	0.1rpm	20.0	Immediate	During running	S
P06.24	Speed consistency threshold	0.0~100.0rpm	0.1rpm	10.0	Immediate	During running	S
		P07: Torque	control param	neters			
P07.00	Torque reference selection	0: Digital setting 1: Al1 (only for SIZE D) 2: Al2 (only for SIZE D) 3: Serial communication reference	1	0	Immediate	At stop	Т
P07.01	Torque positive direction selection	0: Forward drive is positive 1: Reverse drive is positive	1	0	Immediate	At stop	Т
P07.02	Speed/torque switching mode selection	0: Switching directly 1: Switching once over the torque switching point	1	0	Immediate	At stop	Т
P07.03	Torque digital reference value	-400.0%~+400.0%	0.1%	0.0	Immediate	During running	Т
P07.04	Torque reference acceleration/dece leration time	0~65535ms	1ms	0	Immediate	At stop	Т
P07.05	Torque command filter time constant	0~30.0ms	0.1ms	1.0	Immediate	At stop	Т

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P07.06	Second torque command filter time constant	0~30.0ms	0.1ms	1.0	Immediate	At stop	Т
P07.07	Speed/torque switching point	0.0%~400.0% initial torque	0.1%	100.0	Immediate	At stop	ST
P07.08	Speed/torque switching delay	0~1000 ms	1ms	0	Immediate	At stop	ST
P07.09	FWD speed limit channel	0: FWD speed limit value 1: Bus speed limit value 2: MIN (FWD speed limit value, bus speed limit value) 3: Al1 (only for SIZE D) 4: Al2 (only for SIZE D)	1	0	Immediate	At stop	Т
P07.10	FWD speed limit value	0.0%~100.0%	0.1%	100.0	Immediate	During running	Т
P07.11	REV speed limit channel	O: REV speed limit value 1: Bus speed limit value 2: MIN (REV speed limit value, bus speed limit value) 3: Al1 (only for SIZE D) 4: Al2 (only for SIZE D)	1	0	Immediate	At stop	Т
P07.12	REV speed limit value	0.0%~100.0%	0.1%	100.0	Immediate	During running	Т
P07.13	Torque reached reference value	0.0~400.0%	0.1%	0.0	Immediate	During running	Т
P07.14	Torque reached valid value	0.0~400.0%	0.1%	20.0	Immediate	During running	Т
P07.15	Torque reached invalid value	0.0~400.0%	0.1%	10.0	Immediate	During running	Т
		P08: Ga	in parameters	3			
P08.00	Speed loop proportional gain 1	0.1~5000.0Hz	0.1Hz	20.0	Immediate	During running	PS
P08.01	Speed loop integral time 1	0.00~100.00ms	0.01ms	5.00	Immediate	During running	PS
P08.02	Position loop gain 1	1~8000rad/s	1rad/s	100	Immediate	During running	Р
P08.03	Speed regulator output filter time 1	0~32.0ms	0.1ms	0.8	Immediate	During running	PS
P08.04	Speed loop proportional gain 2	0.1~5000.0Hz	0.1Hz	20.0	Immediate	During running	PS
P08.05	Speed loop integral time 2	0.00~10.000ms	0.01ms	1.00	Immediate	During running	PS
P08.06	Position loop gain 2	1~8000rad/s	1rad/s	100	Immediate	During running	Р
P08.07	Speed regulator output filter time 2	0~32.0ms	0.1ms	0.8	Immediate	During running	PS
P08.08	Gain selection mode	0: The first gain is fixed, use external DI for P/PI switching 1: Use gain switching	0	0	Immediate	During running	PS

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		according to the condition of P08.09					
P08.09	Gain switching condition selection	O: Gain 1 is not switched 1: Use external DI terminal switching 2: Torque command 3: Speed command 4: Feedback speed 5: Speed command change rate 6: Position deviation 7: Speed command high and low speed threshold 8: Position command 9: Positioning uncompleted 10: Position command + actual speed	1	0	Immediate	During running	PS
P08.10	Gain switching delay time	0~1000ms	1ms	5	Immediate	During running	PS
P08.11	Gain switching level	0~20000	Switch according to condition s	50	Immediate	During running	PS
P08.12	Gain switching hysteresis	0~20000	Switch according to condition s	30	Immediate	During running	PS
P08.13	Position gain switching time	0~1000ms	1ms	5	Immediate	During running	Р
P08.14	Speed feedforward filter time	0.00~64.00ms	0.01ms	0.05	Immediate	During running	Р
P08.15	Speed feedforward gain	0.0~100.0%	0.01%	0.0	Immediate	During running	Р
P08.16	Torque feedforward filter time	0.00~64.00ms	0.01	0.05	Immediate	During running	PS
P08.17	Torque feedforward gain	0.0~200.0%	0.1%	0.0	Immediate	During running	PS
P08.18	Feedback speed low-pass filter cutoff frequency (currently encoder filter time)	100~4000Hz (0.0~40.0)	0.0	40.0	Immediate	During running	PS
P08.19	PDFF (pseudo-differenti al feedforward) control coefficient (in non-torque control mode, reserved)	0.0~100.0%	0.1%	100.0	Immediate	During running	PS

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		P09: Adjus	tment parame	ters			
P09.00	Offline inertia identification function	-	0.01	0.00	Immediate	At stop	PST
P09.01	Inertia identification maximum speed	200~2000rpm	1rpm	800	Immediate	At stop	PST
P09.02	Inertia identification acceleration time	10~1000ms	1ms	60	Immediate	At stop	PST
P09.03	Motor revolutions for inertia identification	0.00~2.00r	0.01r	0.00	Immediate	At stop	PST
P09.04	Waiting time after single inertia identification	50~10000	1ms	800	Immediate	At stop	PST
P09.05	Online inertia identification mode	0: Disabled 1: Enabled, change slowly 2: Enabled, change generally 3: Enabled, change quickly	1	0	Immediate	At stop	PST
P09.06	Gain adjustment mode	O: The parameter self-adjustment is invalid, and the parameter is adjusted manually  1: Parameter self-adjustment mode, use the rigidity table to automatically adjust the gain parameters  2: Positioning mode, use the rigidity table to automatically adjust the gain parameters	1	0	Immediate	At stop	PST
P09.07	Rigidity level	0 to 41	1	14	Immediate	At stop	PST
P09.08	Adaptive notch filter mode	0: The 3rd and 4th notch filter parameters are not updated 1: 3rd notch filter parameter adaptive result update 2: 3rd and 4th notch filter parameter adaptive results update 3: Automatically detect the mechanical resonance frequency, but do not set the relevant parameters of the notch filter 4: All 4 notch filter parameters return to default values	1	0	Immediate	At stop	PST
P09.09	Automatic suppression vibration	1~100	1	1	Immediate	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	sensitivity setting						
P09.10	Notch filter 1 frequency	0~4000Hz	1Hz	0	Immediate	At stop	PS
P09.11	Notch filter 1 width	10~1000Hz	1Hz	100	Immediate	At stop	PS
P09.12	Notch filter 2 frequency	0~4000Hz	1Hz	0	Immediate	At stop	PS
P09.13	Notch filter 2 width	10~1000Hz	1Hz	100	Immediate	At stop	PS
P09.14	Notch filter 3 frequency	0~4000Hz	1Hz	0	Immediate	At stop	PS
P09.15	Notch filter 3 width	10~1000Hz	1Hz	100	Immediate	At stop	PS
P09.16	Notch filter 4 frequency	0~4000Hz	1Hz	0	Immediate	At stop	PS
P09.17	Notch filter 4 width	10~1000Hz	1Hz	100	Immediate	At stop	PS
P09.18	Torque low-pass filter time constant	0~65536us	1us	0	Immediate	At stop	PS
P09.19	Speed reference notch filter frequency	0~1000Hz	1Hz	0	Immediate	At stop	PS
P09.20	Speed reference notch filter width	10~500Hz	1Hz	100	Immediate	At stop	PS
P09.21	Reserved						
P09.22	Resonance frequency identification result	0~2000Hz	1Hz	-	Immediate	At stop	PS
P09.23	Disturbance torque compensation gain	0.0%~100.0%	0.1%	0	Immediate	At stop	PS
P09.24	Disturbance observer filter time	0.0~25.0ms	0.1ms	0	Immediate	At stop	PS
P09.25	Low frequency resonance suppression mode selection	O: Manually set vibration suppression parameters     1: Automatically set vibration suppression parameters	1	0	Immediate	During running	Р
P09.26	Low frequency resonance frequency	0.0~100.0Hz	0.1Hz	0.0	Immediate	During running	Р
P09.27	Low frequency resonance frequency filter setting	0~20	1	0	Immediate	During running	Р
P09.28	Low frequency resonance position deviation judgment threshold	0~100P	1P	10	Immediate	At stop	Р
P09.29	Torque command offset (vertical	-300.00% ~ 300.00%	0.01%	0.00	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	axis mode)						
P09.30	Gravity compensation value	-100.0%~100.0%	0.1%	0.0	Immediate	At stop	PST
P09.31	Positive friction compensation	0.0%~100.0%	0.1%	0.0	Immediate	At stop	Р
P09.32	Negative friction compensation	0.0%~100.0%	0.1%	0.0	Immediate	At stop	Р
P09.33	Friction compensation speed threshold	0.1 to 30.0 rpm	0.1 rpm	0.0	Immediate	At stop	Р
P09.34	Friction compensation speed selection	0: Speed reference 1: Speed feedback	1	0	Immediate	At stop	Р
P09.35 to P09.37	Reserved						
P09.38	Load moment of inertia ratio	0.00~120.00	0.01	1.00	Immediate	At stop	PST
		P10: Fault and	protection par	ameters	'		'
P10.00	Action upon phase loss	O: Activate protection upon input and output phase loss  1: No protection upon input phase loss  2: No protection upon output phase loss  3: No protection upon input and output phase loss  is No protection upon input and output	1	0	Immediate	During running	PST
P10.01	Action upon Modbus communication timeout	O: Activate protection     and coast to stop     1: Alarm and keep     running	1	0	Immediate	During running	PST
P10.02	Action upon temperature sampling disconnection	O: Activate protection     and coast to stop     1: Alarm and keep     running	1	0	Immediate	During running	PST
P10.03	Reserved						
P10.04	Overtravel stop mode selection	O: Activate protection and coast to stop  1: Alarm, decelerate to zero, keep position locked	1	0	Immediate	During running	Р
P10.05	Action upon output disconnection	0: No action 1: Activate protection	1	0	Immediate	During running	PST
P10.06	Overload protection setting for motor	O: Activate protection     and coast to stop     1: Alarm and keep     running	1	1	Immediate	At stop	PST
P10.07	Motor overload protection gain	20.0%~300.0%	0.1%	100.0	Immediate	During running	PST
P10.08	Drive fan control	0: Temperature control (if module temperature > 35°C, the fan runs; if < 30°C, the fan stops.)	1	0	Immediate	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		1: Always runs 2: Control based on drive status (when the drive is enabled, the fan runs. when the drive is stopped: if the module temperature > 35℃, the fan runs; if < 30℃, the fan stops.) 3: Does not run					
P10.09	Stall over temperature protection enable	O: Shielded motor stall over-temperature protection detection  1: Enable motor stall over-temperature protection detection	1	0	Immediate	At stop	PST
P10.10	Stall over temperature protection time window	10 to 800 ms	1 ms	200	Immediate	At stop	PST
P10.11	Encoder multi-turn overflow fault selection	0: Not shielded 1: Shielded	1	1	Immediate	At stop	PST
P10.12	Overspeed fault threshold	0.0 to 10000.0 rpm	0.1 rpm	6000.0	Immediate	At stop	PST
P10.13	Maximum position pulse frequency	100 to 8000 kHz	1 kHz	8000	Immediate	At stop	Р
P10.14	Absolute encoder battery troubleshooting	O: Enable absolute encoder battery undervoltage, disconnection and other fault detection  1: Shield absolute encoder battery undervoltage, disconnection and other fault detection	1	0	Immediate	At stop	PST
P10.15~ P10.17	Reserved						
P10.18	Last fault type	O: No abnormal record 1: Over-current 2: Main circuit overvoltage 3: Reserved 4: Motor blocked 5: Reserved 6: Phase loss on the input side 7: Phase loss on the output side 8: Heatsink over-temperature 9: Braking resistor overload 10: Power module protection 11: Servo drive overload	1	0	-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		12: Motor overload					
		13: EEPROM read and write error					
		14: Serial port					
		communication error					
		15: Reserved					
		16: Abnormal current					
		detection circuit					
		17: Reserved					
		18: Poor auto-tuning					
		19: Encoder fault					
		20: Undervoltage during main circuit operation					
		21: Al function conflict					
		(only for SIZE D)					
		22: Parameter setting					
		error					
		23: Reserved					
		24: Al input abnormal (only for SIZE D)					
		25: Inverter module					
		sampling disconnection					
		protection					
		26: Reserved					
		27: Overspeed (The actual speed of the					
		servo motor exceeds the					
		overspeed fault					
		threshold)					
		28~30: Reserved 31: Encoder multi-turn					
		count overflow					
		32: Position deviation is					
		too large					
		33: Abnormal pulse input					
		34: Reserved					
		35: Reserved					
		36: CAN bus communication is					
		interrupted (only					
		applicable to the					
		CANopen bus version)					
		37: Homing timeout					
		38: Reserved 39: Forward overtravel					
		40: Reverse overtravel					
		41: Reserved					
		42: Reserved					
		43: External fault					
		44~45: Reserved					
		46: Short circuit to					
		ground at power-on					
		47: Reserved					
		48: Internal logic error 2					
		(Periodic task timeout) 49: Reserved					
		50~60: Reserved					
		61: Abnormal electronic					

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		gear ratio 62: Interrupt positioning alarm 63~65: Reserved 66: Homing logic error 70~71: Reserved 72: Reserved 73: Bootstrap timeout 74: Reserved 75: Absolute encoder battery undervoltage 76: Absolute encoder battery disconnection 77: The actual encoder type is inconsistent with that read by P01.00 78: Parameter not stored in EEPROM of absolute encoder 79: Absolute encoder EEPROM parameter write error 80: Reserved 81: Encoder seeking origin error 84: Absolute encoder EEPROM parameter read error 85: Drive output disconnection					
P10.19	The second fault type	The same as P10.18	1	0	-	At display	PST
P10.20	The first fault type	The same as P10.18	1	0	-	At display	PST
P10.21	The bus voltage at the last fault	0~999V	1V	0	-	At display	PST
P10.22	V-phase current at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.23	W-phase current at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.24	D-axis current reference value at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.25	Q-axis current reference value at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.26	D-axis current feedback value at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.27	Q-axis current feedback value at the last fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.28	Speed at the last fault	-6000.0~6000.0rpm	0.1rpm	0.0	-	At display	PST
P10.29	Encoder position feedback at the last fault (PUU	-2147483648~21474836 47	1	0	-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	unit)						
P10.30	DI status at the last fault	Unit place of LED: BIT0~BIT3: DI1~DI4 Tens place of LED: BIT0~BIT3: DI5~DI8 Hundreds place of LED: BIT0~BIT3: DI9~DI12	1	0	-	At display	PST
P10.31	DO status at the last fault	Unit place of LED: BIT0~BIT3: DO1~DO4 Tens place of LED: BIT0~BIT3: DO5~DO8	1	0	-	At display	PST
P10.32	Drive status at the last fault	0~FFFFH (the same as P11.11)	1	0	-	At display	PST
P10.33	Temperature at the last fault	-40.0~150.0℃	0.1℃	0.0	-	At display	PST
P10.34	The bus voltage at the second fault	0~999V	1V	0	-	At display	PST
P10.35	V-phase current at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.36	W-phase current at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.37	D-axis current reference value at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.38	Q-axis current reference value at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.39	D-axis current feedback value at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.40	Q-axis current feedback value at the second fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.41	Speed at the second fault	-6000.0~6000.0rpm	0.1rpm	0.0	-	At display	PST
P10.42	Encoder position feedback at the second fault (PUU unit)	-2147483648~21474836 47	1	0	-	At display	PST
P10.43	DI status at the second fault	Unit place of LED: BIT0~BIT3: DI1~DI4 Tens place of LED: BIT0~BIT3: DI5~DI8 Hundreds place of LED: BIT0~BIT3: DI9~DI12	1	0	-	At display	PST
P10.44	DO status at the second fault	Unit place of LED: BIT0~BIT3: DO1~DO4 Tens place of LED: BIT0~BIT3: DO5~DO8	1	0	-	At display	PST
P10.45	Drive status at the second fault	0~FFFFH (the same as P11.11)	1	0	-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P10.46	Temperature at the second fault	-40.0~150.0℃	0.1℃	0.0	-	At display	PST
P10.47	The bus voltage at the first fault	0~999V	1V	0	-	At display	PST
P10.48	V-phase current at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.49	W-phase current at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.50	D-axis current reference value at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.51	Q-axis current reference value at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.52	D-axis current feedback value at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.53	Q-axis current feedback value at the first fault	-1000.0~1000.0A	0.1A	0.0	-	At display	PST
P10.54	Speed at the first fault	-6000.0~6000.0rpm	0.1rpm	0.0	-	At display	PST
P10.55	Encoder position feedback at the first fault (PUU unit)	-2147483648~21474836 47	1	0	-	At display	PST
P10.56	DI status at the first fault	Unit place of LED: BIT0-BIT3: DI1~DI4 Tens place of LED: BIT0-BIT3: DI5~DI8 Hundreds place of LED: BIT0-BIT3: DI9~DI12	1	0	-	At display	PST
P10.57	DO status at the first fault	Unit place of LED: BIT0~BIT3: DO1~DO4 Tens place of LED: BIT0~BIT3: DO5~DO8	1	0	-	At display	PST
P10.58	Drive status at the first fault	0~FFFFH (the same as P11.11)	1	0	-	At display	PST
P10.59	Temperature at the first fault	-40.0~150.0℃	0.1℃	0.0	-	At display	PST
		P11: Disp	olay paramete	rs			
P11.00	Speed command	-6000.0~6000.0rpm	0.1rpm		-	At display	S
P11.01	Actual motor speed	-6000.0~6000.0rpm	0.1rpm		-	At display	PST
P11.02	Output voltage	0~480V	1V		-	At display	PST
P11.03	Output current	0.0~4le A	0.1A		-	At display	PST
P11.04	Q-axis current	-400.0~+400.0%le	0.1%		-	At display	PST
P11.05	D-axis current	-100.0~+100.0%le	0.1%		-	At display	PST
P11.06	Output torque	-400.0~+400.0%	0.1%		-	At	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
						display	
P11.07	Reserved						
P11.08	Average load rate	0.0~400.0%Te	0.1%		-	At display	PST
P11.09	Bus voltage	0~900V	1V		-	At display	PST
P11.10	Reserved						
P11.11	Operation state of the servo drive	0~FFFFH Bit 0: RUN/STOP Bit 1: REV/FWD Bit 2: Running at zero speed Bit 3: Accelerating Bit 4: Decelerating Bit 5: Running at constant speed Bit 6: Reserved Bit 7: Reserved Bit 7: Reserved Bit 9: DC over-current limiting Bit 9: DC over-voltage limiting Bit 10: Torque limiting Bit 11: Speed limiting Bit 12: Drive in fault Bit 13: Speed control Bit 14: Torque control Bit 15: Position control	1		-	At display	PST
P11.12	DI terminal state	0 to FFFFH 0: open; 1: closed (The high-speed pulse reference will not be refreshed synchronously	1		-	At display	PST
P11.13	DO terminal state	0 to FFH 0: open; 1: closed (The high-speed pulse output will not be refreshed synchronously	1		-	At display	PST
P11.14~ P11.15	Reserved						
P11.16	Input pulse frequency	0~4000.0kpps	0.1kpps		-	At display	PS
P11.17	Corresponding speed of input pulse command	-6000.0~6000.0rpm	0.1rpm		-	At display	PS
P11.18	Motor encoder counter value	0~4 times motor encoder lines -1	1		-	At display	PST
P11.19	Reserved						
P11.20	Number of input pulses	-2147483648~21474836 47			-	At display	PST
P11.21	Low 32 bits of position reference point position	-2147483648~21474836 47	1		-	At display	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	(encoder unit)						
P11.22	Position reference	-2147483648~21474836 47	1		-	At display	Р
P11.23	Position feedback	-2147483648~21474836 47	1		-	At display	Р
P11.24	Position error pulse	-2147483648~21474836 47	1		-	At display	Р
P11.25	Low 32 bits of position reference point position (PUU unit)	-2147483648~21474836 47	1		-	At display	Р
P11.26	Position reference (PUU unit)	-2147483648~21474836 47	1		-	At display	Р
P11.27	Position feedback (PUU unit)	-2147483648~21474836 47	1		-	At display	Р
P11.28	Position error pulse (PUU unit)	-2147483648~21474836 47	1		-	At display	Р
P11.29	Accumulated power-on hours	0 ~ maximum 65535 hours	1 hour		-	At display	PST
P11.30	Accumulated work hours	0 ~ maximum 65535 hours	1 hour		-	At display	PST
P11.31	Module temperature	-40.0℃~150.0℃	0.1℃		-	At display	PST
P11.32	Encoder single-turn position	0~8388608	1		-	At display	PST
P11.33	Absolute encoder rotation data	0~65535r	1r		-	At display	PST
P11.34	Load moment of inertia ratio	0.00~120.00	0.01		-	At display	PST
P11.35	Absolute position PUU value	Machine current absolute position (command unit) = mechanical absolute position / mechanical gear ratio -2147483648~21474836 47	Comman d unit		-	At display	PS
P11.36	Mechanical absolute position (lower 32 bits)	In absolute position linear mode or absolute position rotary mode, the	Encoder unit		-	At display	PST
P11.37	Mechanical absolute position (upper 32 bits)	load position is converted to the position of the motor side (encoder unit) Mechanical absolute position = encoder absolute position - origin offset	Encoder unit		-	At display	PST
P11.38	Absolute encoder absolute position (lower 32 bits)	The absolute position of the absolute encoder	Encoder unit		-	At display	PST
P11.39	Absolute encoder absolute position (upper 32 bits)	feedback. Encoder unit	Encoder unit		-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P11.40	Rotating load single-turn position (lower 32 bits)	In the absolute position rotation mode, the position within one revolution of the rotating	Encoder unit		-	At display	PST
P11.41	Rotating load single-turn position (upper 32 bits)	load is converted to the motor position of the motor side. Encoder unit	Encoder unit		-	At display	PST
P11.42	Rotating load single-turn position	In absolute position rotation mode, the unit of position command within	Comman d unit		-	At display	PST
P11.43	Mechanical angle (number of pulses from origin)	one revolution of the rotation load	Encoder unit		-	At display	PST
P11.44	Electrical angle	0.00~360.00°	0.01°		-	At display	PST
P11.45	Encoder multi-turn overflow value	-2147483648~21474836 47	1		-	At display	PST
P11.46	High 32 bits of position reference point position (PUU unit)	-2147483648~21474836 47	1		-	At display	PST
P11.47	Reserved						
P11.48	High 32 bits of position reference point position (encoder unit)	-2147483648~21474836 47	1		-	At display	PST
P11.49 to P11.54	Reserved						
		P12: Servo po	sitioning para	meters			
P12.00	Homing selection	O: Disabled  1: Homing enabled by the HomingStart signal input from DI  2: Electrical homing enabled by the HomingStart signal input from DI  3: Homing enabled immediately upon power-on  4: Homing performed immediately  5: Electrical homing started  6: Current position as the home	1	0	Immediate	During running	Р
P12.01	Homing mode	O: Forward, home switch as deceleration point and home  1: Reverse, home switch as deceleration point and home  2: Forward, motor Z signal as deceleration	1	9	Immediate	At stop	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		point and home  3: Reverse, motor Z signal as deceleration point and home  4: Forward, home switch as deceleration point and Z signal as home  5: Reverse, home switch as deceleration point and Z signal as home  6: Forward, positive limit switch as deceleration point and home  7: Reverse, negative limit switch as deceleration point and home  8: Forward, positive limit switch as deceleration point and Z signal as home  9: Reverse, negative limit switch as deceleration point and Z signal as home  101-134: CANopen CiA402 homing mode  1-34 (only supported by the CANopen bus version)					
P12.02	Homing command terminal mode	0: Level mode 1: Pulse mode	1	0	Immediate	At stop	Р
P12.03	Reserved						
P12.04	Positioning acceleration and deceleration curve selection	0: T-shaped curve 1: S-shaped curve	1	0	Immediate	At stop	Р
P12.05	High speed home searching speed	0.0~1000.0rpm	0.1rpm	100.0	Immediate	At stop	Р
P12.06	Low speed home searching speed	0.0~1000.0rpm	0.1rpm	10.0	Immediate	At stop	Р
P12.07	Home position offset	-1073741824~10737418 24	1	0	Immediate	At stop	Р
P12.08	Home searching acceleration/dece leration time	0~65535ms	1	200	Immediate	At stop	Р
P12.09	Homing time limit	0~65535ms	1	60000	Immediate	At stop	Р
P12.10	Positioning mode selection	0: Relative position 1: Absolute position	1	0	Immediate	At stop	Р
P12.11	Home offset mode	0: After the home is found, the position feedback=home position offset P12.07 1: After the home is	1	0	Immediate	At stop	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		found, the position feedback=current position+home position offset P12.07 2: After the home is found, continue to					
		perform the home position offset segment, and after it is done, the position feedback=0 3: After the home is found, continue to perform the home position offset segment, and after it is done, the position feedback=home position offset P12.07					
P12.12	Positioning timing selection	O: Receiving new positioning signal in the process of positioning, no response I: Receiving new positioning signal in the process of positioning, positioning the new position directly	1	0	Immediate	At stop	Р
P12.13	Single point positioning position reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.14	Positioning speed	0.1rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.15	Positioning acceleration time	1~65535ms	1ms	100	Immediate	During running	Р
P12.16	Positioning deceleration time	1~65535ms	1ms	100	Immediate	During running	Р
P12.17	Internal positioning end point setting	1~32	1	32	Immediate	At stop	Р
P12.18	Multi-point positioning mode	O: Stop after a single operation (P12.17 selects the number of segments)  1: Cycle operation (P12.17 selects the number of segments)  2: DI switching operation (selected by DI)  3: Sequential operation	1	0	Immediate	At stop	Р
P12.19	Internal position 1 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.20	Internal position 2 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.21	Internal position 3 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.22	Internal position 4 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.23	Internal position 5 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P12.24	Internal position 6 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.25	Internal position 7 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.26	Internal position 8 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.27	Internal position 9 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.28	Internal position 10 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.29	Internal position 11 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.30	Internal position 12 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.31	Internal position 13 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.32	Internal position 14 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.33	Internal position 15 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.34	Internal position 16 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P12.35	Internal position 1 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.36	Internal position 2 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.37	Internal position 3 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.38	Internal position 4 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.39	Internal position 5 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.40	Internal position 6 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.41	Internal position 7 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.42	Internal position 8 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.43	Internal position 9 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.44	Internal position 10 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.45	Internal position 11 acceleration and deceleration	0~65535ms	1ms	100	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	time						
P12.46	Internal position 12 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.47	Internal position 13 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.48	Internal position 14 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.49	Internal position 15 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.50	Internal position 16 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P12.51	Automatic operation mode timer 1	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.52	Automatic operation mode timer 2	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.53	Automatic operation mode timer 3	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.54	Automatic operation mode timer 4	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.55	Automatic operation mode timer 5	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.56	Automatic operation mode timer 6	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.57	Automatic operation mode timer 7	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.58	Automatic operation mode timer 8	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.59	Automatic operation mode timer 9	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.60	Automatic operation mode timer 10	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.61	Automatic operation mode timer 11	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.62	Automatic operation mode timer 12	0~600.00s	0.01s	1.00	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P12.63	Automatic operation mode timer13	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.64	Automatic operation mode timer 14	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.65	Automatic operation mode timer 15	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.66	Automatic operation mode timer16	0~600.00s	0.01s	1.00	Immediate	During running	Р
P12.67	Internal position 1 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.68	Internal position 2 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.69	Internal position 3 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.70	Internal position 4 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.71	Internal position 5 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.72	Internal position 6 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.73	Internal position 7 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.74	Internal position 8 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.75	Internal position 9 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.76	Internal position 10 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.77	Internal position 11 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.78	Internal position 12 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.79	Internal position 13 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.80	Internal position 14 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.81	Internal position 15 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.82	Internal position 16 positioning speed	0.0rpm~P05.17	0.1rpm	100.0	Immediate	During running	Р
P12.83	Current positioning reference position display	1~32	1	0	Immediate	At stop	Р
P12.84	Current	1~32	1	0	Immediate	At stop	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	positioning completed position display						
P12.85	Reserved						
P12.86	Interrupt positioning selection	0: Disable 1: Enabled	1	0	Immediate	At stop	Р
P12.87	Displacement of interrupt positioning	0~1073741824	Comman d unit	10000	Immediate	At stop	Р
P12.88	Constant operating speed in interrupt positioning	0.0~6000.0rpm	0.1rpm	200.0	Immediate	At stop	Р
P12.89	Acceleration/ deceleration time of interrupt positioning	0~1000ms	1ms	10	Immediate	At stop	Р
P12.90	Interrupt positioning cancel signal enable	0: Disable 1: Enable	1	1	Immediate	At stop	Р
		P14: Multi-sta	ge speed para	meters			
P14.00	Multi-speed command operation	0: Stop at the end of a single operation 1: Cyclic operation 2: Switch via external DI	1	0	Immediate	During running	S
P14.01	Speed command segments selection	1~16	1	16	Immediate	During running	S
P14.02	Runtime unit selection	0: s 1: min	1	0	Immediate	During running	S
P14.03	Acceleration time 2	0~65535ms	1ms	10	Immediate	During running	S
P14.04	Deceleration time 2	0~65535ms	1ms	10	Immediate	During running	S
P14.05	Acceleration time 3	0~65535ms	1ms	10	Immediate	During running	s
P14.06	Deceleration time 3	0~65535ms	1ms	10	Immediate	During running	S
P14.07	Acceleration time 4	0~65535ms	1ms	10	Immediate	During running	S
P14.08	Deceleration time 4	0~65535ms	1ms	10	Immediate	During running	S
P14.09	1st stage speed command	-9000~9000rpm	1rpm	0	Immediate	During running	S
P14.10	1st stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.11	1st stage speed command acceleration and deceleration time selection	O- Zero acceleration and deceleration time  1- Acceleration time 1  2- Acceleration and deceleration time 1  2- Acceleration and deceleration time 2  3- Acceleration and	1	0	Immediate	During running	S

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		deceleration time 3 4- Acceleration and deceleration time 4					
P14.12	2nd stage speed command	-6000.0~6000.0rpm	0.1rpm	200.0	Immediate	During running	S
P14.13	2nd stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.14	2nd stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	Ø
P14.15	3rd stage speed command	-6000.0~6000.0rpm	0.1rpm	400.0	Immediate	During running	S
P14.16	3rd stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.17	3rd stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.18	4th stage speed command	-6000.0~6000.0rpm	0.1rpm	600.0	Immediate	During running	S
P14.19	4th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.20	4th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.21	5th stage speed command	-6000.0~6000.0rpm	0.1rpm	800.0	Immediate	During running	S
P14.22	5th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.23	5th stage speed command acceleration and deceleration time	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1	1	0	Immediate	During running	S

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	selection	2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4					
P14.24	6th stage speed command	-6000.0~6000.0rpm	0.1rpm	600.0	Immediate	During running	S
P14.25	6th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.26	6th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	Ø
P14.27	7th stage speed command	-6000.0~6000.0rpm	0.1rpm	400.0	Immediate	During running	S
P14.28	7th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.29	7th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.30	8th stage speed command	-6000.0~6000.0rpm	0.1rpm	200.0	Immediate	During running	S
P14.31	8th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.32	8th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 3	1	0	Immediate	During running	S
P14.33	9th stage speed command	-6000.0~6000.0rpm	0.1rpm	0.0	Immediate	During running	S
P14.34	9th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.35	9th stage speed	0- Zero acceleration and	1	0	Immediate	During	S

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	command acceleration and deceleration time selection	deceleration time  1- Acceleration and deceleration time 1  2- Acceleration and deceleration time 2  3- Acceleration and deceleration time 3  4- Acceleration and deceleration time 4				running	
P14.36	10th stage speed command	-6000.0~6000.0rpm	0.1rpm	-200.0	Immediate	During running	S
P14.37	10th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.38	10th stage speed command acceleration and deceleration time selection	O- Zero acceleration and deceleration time  1- Acceleration and deceleration time 1  2- Acceleration and deceleration time 2  3- Acceleration and deceleration time 3  4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.39	11th stage speed command	-6000.0~6000.0rpm	0.1rpm	-400.0	Immediate	During running	S
P14.40	11th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.41	11th stage speed command acceleration and deceleration time selection	O- Zero acceleration and deceleration time  1- Acceleration and deceleration time 1  2- Acceleration and deceleration time 2  3- Acceleration and deceleration time 3  4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.42	12th stage speed command	-6000.0~6000.0rpm	0.1rpm	-600.0	Immediate	During running	S
P14.43	12th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.44	12th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.45	13th stage speed command	-6000.0~6000.0rpm	0.1rpm	-800.0	Immediate	During running	S
P14.46	13th stage speed command running	0~6553.5s (min)	0.1s	0.5	Immediate	During	S

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	time		(min)			running	
P14.47	13th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.48	14th stage speed command	-6000.0~6000.0rpm	0.1rpm	-600.0	Immediate	During running	s
P14.49	14th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.50	14th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 3	1	0	Immediate	During running	S
P14.51	15th stage speed command	-6000.0~6000.0rpm	0.1rpm	-400.0	Immediate	During running	S
P14.52	15th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.53	15th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S
P14.54	16th stage speed command	-6000.0~6000.0rpm	0.1rpm	-200.0	Immediate	During running	S
P14.55	16th stage speed command running time	0~6553.5s (min)	0.1s (min)	0.5	Immediate	During running	S
P14.56	16th stage speed command acceleration and deceleration time selection	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Immediate	During running	S

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		P15: Modbus con	nmunication p	arameters			
P15.00	Drive Modbus communication address	0~247 (0 is the broadcast address during Modbus communication)	1	5	Immediate	At stop	PST
P15.01	Modbus communication configuration	Unit place of LED: Baud rate selection 0: 2400BPS 1: 4800BPS 2: 9600BPS 3: 19200BPS 4: 38400BPS 5: 57600BPS 6: 115200BPS Tens place of LED: Data format 0: 1-8-2-N format, RTU 1: 1-8-1-E format, RTU 2: 1-8-1-O format, RTU 3: 1-8-1-N format, RTU	1	02	Immediate	At stop	PST
P15.02	Modbus communication timeout detection time	0.0~1000.0s (When the parameter is set to 0, no disconnection detection is performed)	0.1s	0.0	Immediate	At stop	PST
P15.03	Modbus response delay	0~1000ms	1ms	5	Immediate	At stop	PST
P15.04	Whether the function code parameters written through Modbus are stored in the EEPROM	0x06, 0x10 Whether to store parameters during write operation 0: Do not store 1: Store	1	0	Immediate	At stop	PST
		P16: CANopen co	mmunication p	parameters			
P16.00	CAN software version number	000~FFF	1	Factory setting	-	At display	PST
P16.01	CAN communication address	0~127	1	5	Power-on again	At stop	PST
P16.02	CAN communication baud rate setting	0: 125kbits/s 1: 250kbits/s 2: 500kbits/s 3: 1000kbits/s	1kbits/s	0	Power-on again	At stop	PST
P16.03	CAN communication disconnection detection time	0.0~1000.0s (When the parameter is set to 0, no disconnection detection is performed)	0.1s	0.0	Power-on again	At stop	PST
P16.04	CAN communication status	0: Boot-up 4: Stopped 5: Operational 127: Pre-operational	1	-	-	At display	PST
P16.05	PDO configuration mode selection	0: Menu configuration 1: Master configuration	1	0	Power-on again	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P16.06	TPDO1 transfer type	0~255	1	255	Power-on again	Setting	PST
P16.07	TPDO1 event timer	0~65535 ms	1ms	10	Power-on again	Setting	PST
P16.08	Number of valid mapping objects for TPDO1	0~4	1	2	Power-on again	Setting	PST
P16.09	TPDO1 mapping status	0: The mapping object is configured correctly 1: The parameter does not exist 2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other	1	0	-	At display	PST
P16.10	TPDO1 mapping object 1	0 - 0xXXXYZZ  XXXX - object dictionary index  YY - object dictionary subindex  ZZ - object length	1	60410010	Power-on again	Setting	PST
P16.11	TPDO1 mapping object 2	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	606C0020	Power-on again	Setting	PST
P16.12	TPDO1 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.13	TPDO1 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.14	TPDO2 transfer type	0~255	1	255	Power-on again	Setting	PST
P16.15	TPDO2 event timer	0~65535 ms	1ms	0	Power-on again	Setting	PST
P16.16	Number of valid mapping objects for TPDO2	0~4	1	0	Power-on again	Setting	PST
P16.17	TPDO2 mapping status	O: The mapping object is configured correctly  1: The parameter does not exist  2: The parameter is not	1	0	-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other					
P16.18	TPDO2 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.19	TPDO2 mapping object 2	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.20	TPDO2 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.21	TPDO2 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.22	TPDO3 transfer type	0~255	1	255	Power-on again	Setting	PST
P16.23	TPDO3 event timer	0~65535 ms	1ms	0	Power-on again	Setting	PST
P16.24	Number of valid mapping objects for TPDO3	0~4	1	0	Power-on again	Setting	PST
P16.25	TPDO3 mapping status	O: The mapping object is configured correctly 1: The parameter does not exist 2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other	1	0	-	At display	PST
P16.26	TPDO3 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary	1	0	Power-on again	Setting	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		subindex ZZ - object length					
P16.27	TPDO3 mapping object 2	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.28	TPDO3 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.29	TPDO3 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.30	TPDO4 transfer type	0~255	1	255	Power-on again	Setting	PST
P16.31	TPDO4 event timer	0~65535 ms	1ms	0	Power-on again	Setting	PST
P16.32	Number of valid mapping objects for TPDO4	0~4	1	0	Power-on again	Setting	PST
P16.33	TPDO4 mapping status	O: The mapping object is configured correctly  1: The parameter does not exist  2: The parameter is not mappable  3: Parameter length does not match  4: Parameter read-only  5: Parameter write only  6: PDO length does not match  other	1	0	-	At display	PST
P16.34	TPDO4 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.35	TPDO4 mapping object 2	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.36	TPDO4 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index	1	0	Power-on again	Setting	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		YY - object dictionary subindex ZZ - object length					
P16.37	TPDO4 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.38	Number of valid mapping objects for RPDO1	0~4	1	2	Power-on again	Setting	PST
P16.39	RPDO1 mapping status	0: The mapping object is configured correctly 1: The parameter does not exist 2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other	1	0	-	At display	PST
P16.40	RPDO1 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	60400010	Power-on again	Setting	PST
P16.41	RPDO1 mapping object 2	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	60FF0020	Power-on again	Setting	PST
P16.42	RPDO1 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.43	RPDO1 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.44	Number of valid mapping objects for RPDO2	0~4	1	0	Power-on again	Setting	PST
P16.45	RPDO2 mapping status	0: The mapping object is configured correctly 1: The parameter does not exist	1	0	-	At display	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other					
P16.46	RPDO2 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.47	RPDO2 mapping object 2	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.48	RPDO2 mapping object 3	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.49	RPDO2 mapping object 4	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.50	Number of valid mapping objects for RPDO3	0~4	1	0	Power-on again	Setting	PST
P16.51	RPDO3 mapping status	O: The mapping object is configured correctly 1: The parameter does not exist 2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other	1	0	-	At display	PST
P16.52	RPDO3 mapping object 1	0 - 0xXXXYZZ  XXXX - object dictionary index  YY - object dictionary subindex  ZZ - object length	1	0	Power-on again	Setting	PST
P16.53	RPDO3 mapping	0 - 0xXXXXYZZ	1	0	Power-on	Setting	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	object 2	XXXX - object dictionary index YY - object dictionary subindex ZZ - object length			again		
P16.54	RPDO3 mapping object 3	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.55	RPDO3 mapping object 4	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.56	Number of valid mapping objects for RPDO4	0~4	1	0	Power-on again	Setting	PST
P16.57	RPDO4 mapping status	0: The mapping object is configured correctly 1: The parameter does not exist 2: The parameter is not mappable 3: Parameter length does not match 4: Parameter read-only 5: Parameter write only 6: PDO length does not match other	1	0	-	At display	PST
P16.58	RPDO4 mapping object 1	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.59	RPDO4 mapping object 2	0 - 0xXXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.60	RPDO4 mapping object 3	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex ZZ - object length	1	0	Power-on again	Setting	PST
P16.61	RPDO4 mapping object 4	0 - 0xXXXYZZ XXXX - object dictionary index YY - object dictionary subindex	1	0	Power-on again	Setting	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
		ZZ - object length					
P16.62	Whether the CANopen communication write function code parameters are stored in the EEPROM	0: Do not store 1: The data written through the CAN bus is stored in the EEPROM of the drive	1	1	Immediate	At stop	-
		P18: Adva	nced paramet	ers			
P18.00	User password						
P18.01	Drive operation mode	1: VC 2: IF (P02.00 is invalid at this time, and the speed reference is P06.01) 3: VF (same as above)	1	1	Immediate	At stop	PST
P18.02	Current loop gain	1~500.00	0.01	10.00	Immediate	At stop	PST
P18.03	Current loop integral	0.5~100.0ms	0.01 0.1ms	10.00	Immediate	At stop	PST
P18.04~ P18.15	Advanced parameters						PST
P18.16~ P18.28	Reserved						
		P19: Internal po	ositioning para	meter 2			
P19.00	Internal position 17 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.01	Internal position 18 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.02	Internal position 19 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.03	Internal position 20 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.04	Internal position 21 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.05	Internal position 22 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.06	Internal position 23 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.07	Internal position 24 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.08	Internal position 25 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.09	Internal position 26 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.10	Internal position 27 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.11	Internal position 28 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.12	Internal position 29 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.13	Internal position 30 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.14	Internal position 31 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P19.15	Internal position 32 reference	-1073741824~10737418 24	1	0	Immediate	During running	Р
P19.16	Internal position 17 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.17	Internal position 18 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.18	Internal position 19 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.19	Internal position 20 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.20	Internal position 21 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.21	Internal position 22 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.22	Internal position 23 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.23	Internal position 24 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.24	Internal position 25 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.25	Internal position 26 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.26	Internal position 27 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.27	Internal position 28 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.28	Internal position 29 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.29	Internal position 30 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
P19.30	Internal position 31 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.31	Internal position 32 acceleration and deceleration time	0~65535ms	1ms	100	Immediate	During running	Р
P19.32	Automatic operation mode timer 17	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.33	Automatic operation mode timer 18	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.34	Automatic operation mode timer 19	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.35	Automatic operation mode timer 20	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.36	Automatic operation mode timer 21	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.37	Automatic operation mode timer 22	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.38	Automatic operation mode timer 23	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.39	Automatic operation mode timer 24	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.40	Automatic operation mode timer 25	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.41	Automatic operation mode timer 26	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.42	Automatic operation mode timer 27	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.43	Automatic operation mode timer 28	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.44	Automatic operation mode timer 29	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.45	Automatic operation mode timer 30	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.46	Automatic operation mode timer 31	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.47	Automatic operation mode timer 32	0~600.00s	0.01s	1.00	Immediate	During running	Р
P19.48	Internal position	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During	Р

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	17 positioning speed					running	
P19.49	Internal position 18 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.50	Internal position 19 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.51	Internal position 20 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.52	Internal position 21 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.53	Internal position 22 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.54	Internal position 23 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.55	Internal position 24 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.56	Internal position 25 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.57	Internal position 26 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.58	Internal position 27 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.59	Internal position 28 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.60	Internal position 29 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.61	Internal position 30 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.62	Internal position 31 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P19.63	Internal position 32 positioning speed	0.0rpm ~P05.17	0.1rpm	100.0	Immediate	During running	Р
P23: Special function parameters							
P23.00 to P23.05	Reserved						
P23.06	Output torque filter time constant	0 to 100.0 ms	0.1 ms	0.0	Immediate	At stop	PST
P23.07	Whether to save encoder multi-turn	0: Saved on power failure	1	0	Immediate	At stop	PST

Function code	Name	Setting range	Minimum unit	Default value	Effective time	Property	Related mode
	overflow value on power failure	1: Not saved on power failure					
P23.08 to P23.10	Reserved						
P23.11	Accumulated position errors of absolute encoder	0 to 65535	1	0	-	At display	PST
P23.12	Pulse range for homing completed	0: 100 pulses Other: Self-defined pulses	1	0	Immediate	At stop	Р
P23.13 to P23.39	Reserved						

## Chapter 8 Troubleshooting

All possible fault types, fault cause and solutions for M5 are summarized as shown in table 8-1.

Table 8-1 Fault record table

Fault code	Fault type	Fault cause	Confirming method	Solutions
		The motor cables are in poor contact.	Check whether the cable connector is loose	Fasten the connector that become loose.
		The motor cables are grounded	Check the insulation resistance between the UVW and the grounding cable of the motor.	Replace the motor if the insulation is poor.
		The motor UVW cables are short circuited.	Check whether the motor UVW cables are short circuited.	Connect the motor cables correctly.
Er.001	Drive overcurrent	The motor is damaged.	Check whether resistance between the motor cables UVW is balanced.	Replace the motor if the resistance is unbalanced.
		The gain setting is improper and the motor oscillates.	Check whether the motor oscillates or generates a shrill, noise, or view the running graphics.	Re-adjust the gain.
		The encoder cable is incorrectly wired, corrosive, or connected loosely.	Check whether the encoder wiring is good and reliable.	Re-weld or fasten the encoder cable
		The main circuit input voltage is too high.	Measure the input power line voltage range.	Adjust the power voltage according to the specification.
		The braking resistor fails.	Measure the resistance between P and PB.	If the resistor is open, replace the external braking resistor.
Er.002	Drive main circuit overvoltage	External braking resistor value does not match (The resistance of the the external resistor is too large, and the energy absorption during braking is insufficient.)	Confirm the braking resistor value.	Select the appropriate braking resistor value according to operating conditions and load.
		The motor is in abrupt acceleration/deceleration state.	Confirm the deceleration ramp time during running and monitor the DC bus voltage P11.09.	Increase the acceleration/deceleration time in the allowed range.
		The power output phase (UVW) loss or incorrect phase sequence occurs on the servo drive.	Perform motor trial running when the motor has no load and check the motor wiring.	Connect the motor cables correctly again or replace them.
Er.004	Motor is blocked	The UVW cable breaks.	Check the wiring.	Connect the motor cables correctly again or replace them.
		The motor rotor is locked due to mechanical factors.	Confirm the running command and motor speed.	Eliminate mechanical factors.
Er.006	Input side phase loss	There is phase loss in input L1, L2, L3.	Check input wiring; check input power.	If the input power is single-phase 220V, then P10.00=1; if the input power is three-phase 220V, check whether the input power is missing phase, and replace the cable wiring.

Fault code	Fault type	Fault cause	Confirming method	Solutions
Er.007	Output side phase loss	There is phase loss in output U, V, W.	Check the output wiring Check the motor and the cables	Replace the cable wiring.
		Ambient temperature is too high	Check the cooling conditions around the drive.	Improve the servo drive cooling conditions, reduce the ambient temperature.
Er.008	Drive overheat	Multiple overload operation	Check fault records, whether overload fault has been reported.	Waiting for 60s to reset after overload, increase the drive, motor capacity, increase the acceleration and deceleration time, reduce the load.
		The fan is damaged.	Whether the fan is running when running	Replace the fan
		The cable of the external braking resistor is in poor connection, becomes loose or breaks.	Check the braking resistor wiring according to the correct wiring diagrams.	Rewire according to the correct wiring diagrams.
Er.009	Er.009 Braking resistor overload	The jumper across terminals P and PB is disconnected when the internal braking resistor is used.	Confirm the power terminal jumper wiring	Properly connect the jumper.
		The capacity of the servo drive or the braking resistor is insufficient.	Calculate the maximum braking energy	Improve braking resistor capacity or servo unit capacity, increase acceleration and deceleration time.
		The load inertia is too large.	Confirm the load inertia	Improve the drive, motor, resistor capacity.
		There is interphase short circuit or grounding short circuit in output three phases.	Check cable and output motor insulation.	Replace the cable or motor.
		Instantaneous over-current of the drive	See the over-current solutions	See the over-current solutions
Er.010	Power module protection	The auxiliary power supply is damaged; the drive voltage is insufficient.	Seek for service support	Seek for service support
		Inverter module bridging conduction	Seek for service support	Seek for service support
		Abnormal control board	Seek for service support	Seek for service support
		Braking pipe damaged	Seek for service support	Seek for service support
		Wiring of the motor and encoder is incorrect.	Check the wiring according to the correct wiring diagram	Rewire according to the correct wiring diagram, replace the cable.
Er.011	Er.011: Servo drive overload	The load is too heavy. The motor keeps output of effective torque higher than the rated torque for a long time.	Confirm the overload characteristic and operation instructions of the servo drive or servo motor.	Increase the drive, motor capacity, reduce the load, increase the acceleration and deceleration time.
Er.012	Er.012: Motor overload	The acceleration/ deceleration is too frequent or the load inertia is too large.	View inertia ratio, confirm start-stop cycle	Increase the acceleration and deceleration time.
		The gain adjustment is inappropriate, the rigidity is too strong, the motor vibrates and the sound is	Observe whether the motor vibrates and generates noise during running.	Re-adjust the gain.

Fault code	Fault type	Fault cause	Confirming method	Solutions
		abnormal		
		The servo drive or motor model is set incorrectly.	View motor model settings	Set the correct model.
		The motor block occurs due to mechanical factors, resulting in very heavy load during running.	Check the running reference and the actual motor speed by using the drive debugging platform or the operation panel.	Eliminate mechanical factors.
		Note:You can clear the fault.	t or re-power on the system	60s after occurrence of the overload
Er.013	EEPROM read/write	The read/write error of the control parameters occurs.	Confirm whether the instantaneous power failure occurs in the process of writing parameter.	After restoring the default parameter (P02.22), re-enter the parameters.
	fault	Writing parameter times exceeds the maximum within a certain time.	Confirm whether the change of parameters is frequent from the host device.	Change the parameter writing method and write again.
		Improper setting of communication parameters.	Confirm the function code setting.	Set the correct baud rate, communication data format, etc.
Er.014	Abnormal serial port communication	The communication cable is wired incorrectly or unreliably connected, disconnected, etc.	Check whether the communication cable is correct and reliable.	Reconnect the communication cable, or replace the communication cable.
	communication	Improper setting of fault parameters.	Check whether the P15.02 setting is too short.	Set P15.02 correctly.
		The host device does not work.	Confirm the host system signal	Check whether the host device is working.
Er.016	Current detection	The circuit is abnormal.	-	Seek for technical support
E1.016	circuit abnormal	The wiring or the plug-in units of the control board loosens.	Check whether the control board cables and plug-in units are loose	Check them and rewiring
		The parameters of the motor are incorrect.	Confirm the motor nameplate parameters	Re-enter the correct motor parameters.
Er.018	Poor auto-tuning	When reverse running is prohibited, reverse rotating auto-tuning is performed.	Confirm whether it is set to prohibit reverse function.	Cancel the reverse running prohibition
		Motor wiring is wrong.	Check motor wiring.	Confirm that the UVW power cable is connected properly and the phase sequence is correct.
Er.019	Encoder fault	Encoder type error	Check encoder type	Enter the correct encoder parameters.
		Encoder disconnection	Check encoder cable	Replace encoder cable.
	Undervoltage	Grid voltage drop	Measure whether the grid voltage is abnormal	Improve the power grid.
Er.020	during main circuit operation	The load is too large or the motor does not match the drive	Confirm the load matching conditions	Select the appropriate drive and motor.

Fault code	Fault type	Fault cause	Confirming method	Solutions
Er.021	Al function conflict (only for SIZE D)	The same Al is used for different functions.	Check the settings of the AI channel in the function parameters.	Confirm AI functions and avoid conflicts.
Er.022	The control mode parameter setting is incorrect	Parameter identification is performed in non-VC control mode.	Confirm the setting of the control mode in the parameter.	Confirm the control mode parameters.
		The Al voltage is too high.	Measure AI channel input voltage.	Reduce the AI voltage to less than 12 V
Er.024	Abnormal AI input (only for SIZE D)	The AI wiring is incorrect	Check the AI wiring according to the correct wiring diagram.	Re-wiring.
Er.025	Inverter module temperature sampling	The temperature sampling circuit is abnormal.		Seek for service support
E1.025	disconnection protection	The temperature sensor or signal cable is abnormal.		Seek for service support
		The initial angle of the encoder is wrong	See P01.22 to check and confirm the initial angle of the encoder	Retune the encoder angle
Er.027	Er.027 Servo motor overspeed	The actual speed of the servo motor exceeds the overspeed threshold.	Confirm whether the overspeed threshold is appropriate (the overspeed threshold is set by P10.12, if P10.12 is equal to 0, the overspeed threshold is 1.2 times the maximum motor speed; if P10.12 is not equal to 0, the overspeed threshold is P10.12 and 1.2 times the maximum speed of the motor, whichever is smaller).	Set the correct overspeed threshold.
		The UVW phase sequence is incorrect.	Check whether the UVW phase sequence on the servo drive side is consistent with that on the motor side.	Connect the UVW cables according to the correct phase sequence.
		Input reference is higher than the overspeed level.	Confirm the input reference	Reduce the input reference, or adjust the gain.
		The motor speed overshoots.	Confirm the motor speed waveform	Reduce the controller gain, adjust the servo gain, or adjust the operating conditions.
		The servo drive is faulty.	Confirm whether the fault remains after the drive is powered off and powered on again	Replace the servo drive.
Er.031	Encoder multi-turn count overflow	The multi-turn count exceeds 65535.	Check whether P11.33 exceeds the maximum number of encoder turns.	Run the motor under the speed mode, and make the multi-turn count value deviate from the overflow threshold 65535; or hide the multi-turn overflow fault
Er.032	Position deviation is too large	The position deviation exceeds the set value of P05.21.	Check whether the position deviation detection range P05.21 is too small or whether the position gain P08.02 is	Increase the position loop gain P08.02.

Fault code	Fault type	Fault cause	Confirming method	Solutions
			too small.	
Er.033	Pulse input abnormal	The pulse frequency exceeds the value set by P10.13.	Confirm whether the maximum position pulse frequency P10.13 is too small	Set P10.13 again according to the maximum position pulse frequency required for the normal operation of the machine.  If the output pulse frequency of the upper computer is greater than 4MHz, the output pulse frequency of the upper computer must be reduced.
Er.036 (only applicable to the CANopen bus version)	CAN bus communication interrupted	The communication between the CAN master station and the servo is interrupted for more than the time of P16.03.	Confirm the wiring between the CAN master and the servo.	Rewire or set the appropriate disconnection detection time P16.03 according to the communication cycle.
Er.037	Homing timeout	After the homing is enabled, the home is not found within the time of P12.09.	Confirm the homing mode and the homing timeout detection time P12.09.	Set an appropriate homing timeout detection time according to the homing path.
Er.039	Positive overtravel	When P10.04=0, it exceeds the positive limit switch during running.	Check whether mechanical equipment encounters limit switch.	Run the motor in reverse to get the device off the limit switch.
Er.040	Negative overtravel	When P10.04=0, it exceeds the negative limit switch during running.	Check whether mechanical equipment encounters limit switch.	Run the motor in reverse to get the device off the limit switch.
Er.043	External fault	External fault terminal action.	Check whether the fault terminal is triggered by mistake.	Check external wiring.
Er.046	Output-to-ground	The power output cables (UVW) of the servo drive are short circuited to ground.	Disconnect the UVW cables from the motor, and measure whether the motor UVW cables are short circuited to ground.	Connect the cables again or replace them.
E1.040	short-circuit	The motor is short circuited to ground.	Disconnect the UVW cables from the motor, and measure whether the motor UVW cables are short circuited to the motor grounding wire.	Replace the motor.
Er.049	Internal logic error 2			Seek for service support
Er.061	Electronic gear ratio error	The electronic gear ratio is set incorrectly.	Confirm whether the electronic gear ratio parameter setting is reasonable.	Correctly set the electronic gear ratio parameters.
Er.062	Interrupt positioning alarm			Seek for service support
Er.066	Homing logic is wrong	The setting of the homing parameters is unreasonable, or the homing command is executed during positioning.	Confirm the homing parameters such as acceleration and deceleration time of homing search and homing mode.	Set the appropriate homing parameters according to the actual homing mode, or wait for the positioning to complete before returning to the homing operation.
Er.073	Failed to bootstrap	When the 220V drive is enabled, the motor speed is too large (over	Before enabling, check if the motor rotates.	Enable it after the motor is stationary or lower than 100rpm.

Fault code	Fault type	Fault cause	Confirming method	Solutions
		100rpm).		
Er.075	Absolute encoder battery undervoltage			Seek for service support
Er.076	Absolute encoder battery disconnection	The absolute value encoder battery is disconnected or the battery voltage is lower than 2.75V during the drive is powered off	Confirm whether the encoder battery wiring is disconnected during the drive is powered off; measure whether the battery voltage is too low.	If Er.076 is reported when the power is turned on for the first time, press the reset button to clear the fault; if the fault cannot be cleared after multiple resets, replace the encoder cable or the encoder battery.
Er.077	Encoder type setting error	The actual encoder type is inconsistent with that read by P01.00.	Check whether the encoder type to be read written in P01.00 is consistent with the actual encoder type	Determine the motor model and change the value of P01.00.
Er.078	No parameter is stored in absolute encoder EEPROM	When P01.00 reads the absolute value encoder EEPROM, the EEPROM has no parameters.	Check whether the parameters have been written in the encoder EEPROM.	Seek for service support
Er.079	Absolute encoder EEPROM parameter write error	An error occurred when writing parameters to the EEPROM in the absolute encoder.	Power off and restart to see if the parameters can be rewritten.	Confirm the encoder type, replace the encoder, or replace the motor.
Er.081	Encoder seeking origin error			Seek for service support
Er.084	Absolute encoder EEPROM parameter read error			Seek for service support
Er.085	Drive output disconnection	The U/V/W output cables and terminals of the drive are disconnected or not connected reliably.	Check the connection of output cables and terminals.	Ensure the output cables are connected reliably.

All the possible alarm types for M5 are summarized as shown in table 8-2.

Table 8-2 Alarm code table

Alarm code	Alarm type	Alarm cause	Confirming method	Solutions
	AL.012 Motor overload	Wiring of the motor and encoder is incorrect or poor	Check the wiring according to correct wiring diagram.	Rewire according to correct wiring diagram, replace the cable.
		The load is too heavy. The motor keeps output of effective torque higher than the rated torque for a long time.	Confirm the overload characteristic and operating instructions of the servo drive or servo motor.	Increase the drive, motor capacity, reduce the load, increase the acceleration and deceleration time.
AL.012		The acceleration/ deceleration is too frequent or the load inertia is too large.	View inertia ratio, confirm start-stop cycle	Increase the acceleration and deceleration time.
		The gain adjustment is inappropriate, the rigidity is too strong, the motor vibrates and the sound is abnormal	Observe whether the motor vibrates and generates noise during running.	Re-adjust the gain.

Alarm code	Alarm type	Alarm cause	Confirming method	Solutions
		The servo drive or motor model is set incorrectly.	Check the motor model setting.	Set the correct motor model .
		Motor blocking occurs due to mechanical factors, resulting in very heavy load during running.	Check the running reference and the actual motor speed by using the drive debugging platform or the operation panel.	Eliminate mechanical factors.
		Improper setting of communication parameters.	Confirm the function code setting.	Set the correct baud rate, communication data format, etc.
AL.014	Abnormal serial	The communication cable is wired incorrectly or unreliably connected, disconnected, etc.	Check whether the communication cable is correct and reliable.	Reconnect the communication cable, or replace the communication cable.
	communication	Improper setting of alarm parameters.	Check whether the P15.02 setting is too short.	Set P15.02 correctly.
		The host device does not work.	Confirm the host system signal	Check whether the host device is working.
AL.024	Al input	Al channel voltage is too high.	Measure AI channel input voltage.	Adjust the input voltage to less than 12 V.
AL.024	abnormal (only for SIZE D)	The AI channel is wired incorrectly.	Check with the correct wiring diagram.	Rewire.
AL 005	Temperature	The temperature sampling circuit is abnormal.		Seek for service support
AL.025	sampling disconnection	The temperature sensor or signal cable is abnormal.		Seek for service support
AL.038	DI emergency brake warning	Emergency brake terminal action.	P02.09=1, enable emergency braking. When the drive is running, if the emergency brake terminal is activated, it will alarm.	Given by normal logic
AL.039	Positive overtravel warning	When P10.04=1, the drive position exceeds the positive limit switch.	Check whether the DI terminal of group P03 is set with DI function 35 Check whether the DI terminal logic of the corresponding bit of input signal monitoring P11.12 is valid.	Check the running mode, and under the premise of safety, give a negative command or rotate the motor to make the logic of the "positive limit switch" terminal invalid.
AL.040	Negative overtravel warning	When P10.04=1, the drive position exceeds the negative limit switch.	Check whether the DI terminal of group P03 is set with DI function 36 Check whether the DI terminal logic of the corresponding bit of input signal monitoring P11.12 is valid.	Check the running mode, and under the premise of safety, give a negative command or rotate the motor to make the logic of the "negative limit switch" terminal invalid.
AL.062	Interrupt positioning warning	Enable interrupt positioning command at zero speed.	Check the servo operation status.	Interrupt positioning operation in non-zero speed state.

Alarm code	Alarm type	Alarm cause	Confirming method	Solutions
AL.075	Absolute encoder battery undervoltage	Absolute encoder battery voltage is lower than 3.1V during drive power-up.	When the operation is enabled, it will report low, and if it is not enabled, it will report AL.075, and measure whether the battery voltage is lower than 3.1V.	Replace the encoder cable or encoder battery.

## **Appendix 1 Modbus Communication Protocol**

## 1. Networking mode

The drive has two networking modes: single host/multiple slaves mode and single host/single slave mode.

#### 2. Interface mode

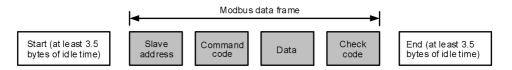
RS485 interface: asynchronous and half-duplex. Default: 1-8-N-2, 9600bps, RTU. Refer to Group P15 function code for the parameter setting.

#### Communication mode

- (1) The communication protocol of the drive is Modbus protocol, which does not only support common register reading and writing, but also expands some commands to manage the drive function codes.
- (2) The drive is slave, adopting host/salve mode P2P communication. The drive will not response to the command sent by the host via broadcast address.
- (3) In multiple units communication or long-distance communication, parallel connecting the resistance of 100 to 120 ohms with the positive end and negative end of the communication signal line of the host station can enhance its immunity to interference.
- (4) M provides RS485 interface only. If the communication interface of the external equipment is RS232, the RS232/RS485 conversion equipment is needed.

### 4. Protocol format

Modbus protocol supports the RTU mode, and the corresponding frame format is as shown in Attached Fig.1-1.



Attached Fig.1-1 Modbus protocol format

Modbus adopts the "Big Endian" encoding mode, which sends the high bytes first and then sends the low bytes. Modbus data frame is RTU mode. The minimum idle time value between frames under the internal convention is as follows: the idle time that the frame head and frame trail pass the bus shall not be less than that of 3.5 bytes to define the frame. The data verification adopts CRC-16 and the verify checksum includes the whole information. The high and low bytes of the checksum can only be sent after their exchanging. Please refer to the example after the protocol for the detailed CRC verification. Please note: At least 3.5 characters of the BUS idle time shall

In the sample below, it is used to read the parameters of the internal register 0101 (P01.01) of No.5 slave in the RTU mode.

be kept between the frames and it doesn't need to accumulate the start and end idle time.

Request frame:

Slave	Command	Data			Check code		
address	code	Register address Number of bytes read		Cneck	code		
0x05	0x03	0x01	0x01	0x00	0x01	0xD5	0xB2

#### Response frame:

Slave	Command	Data			Data			
address	code	Number of bytes responded	Register content		Check o	ode		
0x05	0x03	0x02	0x13	0x88	0x44	0xD2		

In the above table, the check code is the CRC verification value. Please refer to the following text for the computing method of the CRC verification.

#### Protocol functions

The main function of Modbus is reading/writing parameters. Different command codes determine different operation requests. The Modbus protocol of M5 drive supports the operations as shown in the following table:

Command code	Meaning
0x03	Reading the drive parameters, including function code parameters, control parameters and status parameters.
0x06	Change the single 16-byte function code parameter or control parameter of the drive, and whether the parameter value is saved is determined by P15.04 after power off.
0x10	Change multiple function code or control parameters of the drive, and whether the parameter value is saved is determined by P15.04 after power off.
0x41	Change the single 16-byte function code parameter or control parameter of the drive, and the parameter value will be saved after power off.
0x43	Change multiple function code or control parameters of the drive, and the parameter values will be saved after power off.

All the function code parameters, control parameters and status parameters of the drive are mapped as the read/write registers of Modbus. The read/write features and range of the function code parameter follow the drive user manual. The group number of the drive function code is mapped as the high byte of the register address and the group internal index (i.e. the serial number of the parameter in the group) is mapped as the low byte of the register address. The control parameter and status parameter of the drive are virtual function code groups of the drive. The correspondence between the group numbers of the function codes and the high bytes of the register address mapped are as shown in the following table.

Drive parameter group	High byte of the address mapped	Drive parameter group	High byte of the address mapped
Group P00	0x00	Group P12	0x0C
Group P01	0x01	Group P13	0x0D
Group P02	0x02	Group P14	0x0E
Group P03	0x03	Group P15	0x0F
Group P04	0x04	Group P16	0x10
Group P05	0x05	Group P18	0x12

Drive parameter group	High byte of the address mapped	Drive parameter group	High byte of the address mapped
Group P06	0x06	Group P19	0x13
Group P07	0x07	Group P23	0x17
Group P08	0x08	Control parameter group	0x64
Group P09	0x09	Status parameter group	0x65
Group P10	0x0A		
Group P11	0x0B		

For example, the register address of the function code parameter P03.02 of the drive is 0x0302, and the register address of the first control parameter (control word 1) is 0x6400.

As the format of the whole data frame has been detailed in the above text, the following text will focus on the format and meanings of the "command code" and "data" of Modbus protocol. These two parts constitute the Modbus application layer protocol data unit. Any reference to application layer protocol data unit to below refers to such two parts.

#### (1) Read the drive parameters

The application-layer protocol data units are as follows.

#### Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x03
Start register address	2	0x0000~0xFFFF
Number of registers	2	0x0001~0x000A

If the operation is successful, the response frame is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x03
Number of bytes read	1	2 * Number of registers
Content read	2 * Number of registers	Parameter value

If the operation fails, it will return to the abnormal response frame. The abnormal response frame includes the error code and exception code. In which, the error code = (command code + 0x80), and the exception code indicates the error cause.

#### Abnormal response frame format:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Error code	1	(Command code + 0x80)
Exception code	1	

The exception codes and their meanings are as follows:

Exception code	Meaning
----------------	---------

0x01	Invalid command code
0x02	Invalid register address.
0x03	Data error (the data is not within the upper/lower range).
0x04	Slave operation failure (including the error caused by that the data is within the upper/lower range, but it is invalid).
0x05	The command is valid and in process (It is mainly used to save the data into the nonvolatile memory cell).
0x06	The salve is busy, please try again later. It is mainly used to save the data into the nonvolatile memory cell.
0x16	Operation not supported (mainly refer to the control parameter and status parameter, for example, do not support reading the property, leave-factory value and upper/lower limit)
0x17	The number of registers in the request frame is wrong (for example, when the operation is 32-byte, the number of bytes is odd).
0x18	Information frame error (including information length error and verification error).
0x20	Parameters cannot be changed.
0x21	Parameters cannot be changed during the drive running.
0x22	Password required for parameters.

(2) Change the single 16-byte function code parameter and status parameter of the drive, and whether the parameter value is saved is determined by P15.04 after power off.

When this command is used, whether the rewritten parameter value is saved or not is set by P15.04 upon power on after power off.

The application-layer protocol data units are as follows.

#### Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x06
Register address	2	0x0000~0xFFFF
Register content	2	0x0000~0xFFFF

If the operation is successful, the response frame is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x06
Register address	2	0x0000~0xFFFF
Register content	2	0x0000~0xFFFF

If the operation is failed, it will return to the abnormal response frame and its format is as shown above.

(3) Change multiple function code parameters and control parameters of the drive, and whether the parameter value is saved is determined by P15.04 after power off. When this command is used, whether the rewritten parameter value is saved or not is set by P15.04 upon power on after power off.

The application-layer protocol data units are as follows.

#### Request format:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x10
Start register address	2	0x0000~0xFFFF
Number of registers in operation	2	0x0001~0x000A
Number of bytes of register content	1	2 * Number of registers in operation
Register content	2 * Number of registers in operation	

If the operation is successful, the response frame is as follows:

Application-layer protocol data unit	Data length (number of bytes)	Value or range
Command code	1	0x10
Start register address	2	0x0000~0xFFFF
Number of registers in operation	2	0x0001~0x000A

This command is used to change the content of the continuous data cells from the start register address. If the operation is failed, it will return to the abnormal response frame and its format is as shown above.

- (4) Change single 16-byte function code parameters and status parameters of the drive, and the parameter values will be saved after power off. The command code 0x41 is used to change the single 16-byte function code parameters or control parameters of the drive, and store the value into the nonvolatile memory cell. Its command format is the same as that of 0x06. The only difference is as follows: when the 0x06 command operation is successful, whether the parameter value is saved after power-off is set by P15.04, and when the 0x41 operation is successful, the parameter value is saved after power-off.
- (5) Rewrite multiple drive function code parameters and status parameters, and the parameter values will be saved after power off. The command code 0x43 is used to rewrite multiple drive function code parameters or control parameters, and store them in the non-volatile memory cell. Its command format is the same as that of 0x10. The only difference is as follows: when the 0x10 command operation is successful, whether the parameter value is saved after power off is set by P15.04, and when the 0x43 operation is successful, the parameter value is saved after power off.

## 6. Control parameters and status parameters of drive

The control parameters of the drive can realize the start, stop, running speed setting and other functions of the drive. Inquiring the status parameters of the drive can get the parameters like output current, output torque, motor speed, and encoder position, etc.

#### (1) Control parameters

The control parameters of the drive are as shown in the following table:

Register address	Parameter name	Save upon power off	Remarks
0x6400	Control word 1	No	Refer to its bit definition list
0x6401	Speed reference	No	
0x6402	Auxiliary speed reference	No	Enabled when the auxiliary reference channel is serial port communication and the auxiliary reference is in valid bit (BIT2 of control word 2).
0x6403	Reserved		
0x6404	Reserved		
0x6405	Torque reference	No	In the torque control mode, it is enabled when the torque reference channel is serial port and is in the torque control mode.
0x6406	Virtual DI terminal setting	No	BIT0~BIT9: DI1~DI10, the corresponding selected bit of P03.14 is enabled.
0x6407	Virtual DO terminal setting	No	BIT0~BIT5: DO1~DO6, when P03.15~P03.20=7, the corresponding terminal is enabled.

#### Note

- 1. When reading the control parameter, the value returned is the value written in the previous communication;
- 2. In the control parameters, the maximum length of "speed setting" and "auxiliary speed reference" is 32 bits, and for the others, the length is 16 bits;
- 3. In the control parameters, for the scaling of each reference, input/output setting range and decimal point, please refer to the corresponding function code parameter.

The bit definition of the control word 1 is as shown in the following table:

Bit	Value	Function	Remarks
	111B	Stop for external fault	Coast to stop and the drive displays external fault
	110B	Stop in mode 1	Coast to stop
BIT2~BIT0	101B	Stop in mode 0	Stop according to the deceleration time set (enabled when the jog is disabled)
	100B	Running command	Start the drive (enabled when the jog is disabled)
	Others	No command	
BIT3	1	Run reversely	Set the running direction when the
БПЗ	0	Run forward	running command is valid
	1	Enable acceleration/deceleration	BIT0~BIT3, BIT7~BIT8 of control
BIT4	BIT4 0 Disable acceleration/deceleration	character 1 will be enabled only when this bit is enabled	
BIT5	1	The control character 1 of the host device is valid	The select bit for the validity of the control character 1 of the host

Bit	Value	Function	Remarks
	0	The control character 1 of the host device is disabled	device
BIT6	0	Reserved	
BIT7	1	Jog forward	
DIT	0	The "jog forward" is disabled	When both jog forward and reversely
BIT8	1	Jog reversely	are valid, it does not run; when both are disabled, the jog will stop.
БПО	0	The "jog reversely" is disabled	, , , ,
BIT9	1	The fault reset is valid	The select bit for the validity of the fault
DITS	0	The fault reset is disabled	reset of the host device
BIT15~BIT10	0	Reserved	

#### □ Note

- 1. The control command (control words 1 and 2) of the host device is valid only when the value of "running command channel selection" is "communication command"; the overall word 1 is valid only when its BIT5 is valid; BIT0~BIT3, BIT7~ BIT8 are valid only when its BIT4 is valid.
- 2. The host device processes the faults and alarms as follows: when the drive meets faults, for control words 1 and 2, only the fault reset command is valid, any other commands from the host device are disabled. That is, the host device shall reset the fault first before sending any other commands. When the alarm occurs, the control character is valid.

#### (2) Status parameters

Register address	Parameter name	Remarks
0x6500	Status word 1	
0x6501	Speed command	
0x6502	Actual motor speed	
0x6503	Output voltage	
0x6504	Output current	
0x6505	q-axis current	
0x6506	d-axis current	
0x6507	Output torque	
0x6508	Reserved	
0x6509	Bus voltage	
0x650A	Control voltage	
0x650B	Servo drive running status	
0x650C	DI terminal status	BIT0 to BIT11: DI1 to DI12
0x650D	DO terminal status	BIT0 to BIT7: DO1 to DO8
0x650E	Al1 input voltage (only for SIZE D)	
0x650F	Al2 input voltage (only for SIZE D)	
0x6510	Input pulse frequency	
0x6511	Input pulse command corresponding speed	
0x6512	Motor encoder counter value	

Register	_	
address	Parameter name	Remarks
0x6513	Motor encoder Z pulse position	
0x6514	Number of input pulses	
0x6515	Position reference point position	
0x6516	Position reference	
0x6517	Position feedback	
0x6518	Position error pulse	
0x6519	Position reference point position (PUU units)	
0x651A	Position reference (PUU units)	
0x651B	Position feedback (PUU units)	
0x651C	Position error pulse (PUU units)	
0x651D	Module temperature	
0x651E	Last fault type	
0x651F	Second fault type	
0x6520	First fault type	
0x6521	The bus voltage at the last fault time	
0x6522	V-phase current at the last fault time	
0x6523	W-phase current at the last fault time	
0x6524	The d-axis current reference value at the last fault time	
0x6525	The q-axis current reference value at the last fault time	
0x6526	D-axis current feedback value at the last fault time	
0x6527	Q-axis current feedback value at the last fault time	
0x6528	Speed at the last fault time	
0x6529	Encoder position feedback at the last fault time (PUU units)	
0x652A	DI status at the last fault time	
0x652B	DO status at the last fault time	
0x652C	Drive status at the last fault time	
0x652D	Temperature at the last fault time	
0x652E	Drive operating status word 2	

#### Note

- 1. The status parameter does not support the writing operation.
- 2. In the status parameter, the maximum length of "speed command" and "actual motor speed" is 32 bits, and for the others, the length is 16 bits.

The bit definition of the status word 1 of the drive is as shown in the following table:

Bit	Value	Function	Remarks
BIT0	0	Reserved	
DITA	1	Drive running	
BIT1	0	Drive stop	
BIT2	1	Drive runs reversely	

Bit	Value	Function	Remarks
	0	Drive runs forward	
BIT3	1	Enable serial port reference	
БПЗ	0	Disable serial port reference	
DITA	1	Meet the main setting	
BIT4	0	Does not meet the main setting	
DITE	1	Fault	If the value is 1, it means there is a fault.
BIT5	0	No fault	Please refer to BIT15~BIT8 of status word 1 to identify the current fault type.
BIT6	1	Alarm	If the value is 1, it means there is an alarm. Please refer to BIT15~BIT8 of status word 1 to
BITO	0	No alarm	identify the current alarm type.
BIT7	0	Reserved	
BIT15~BIT8	0x00~0xFF	Fault or alarm code	O: No fault or alarm;  Not 0: it means there is a fault or alarm, you need to consider both the status of BIT5 and
213 BHG	SASS GALL		BIT6 to identify if it is a fault or alarm code. Please refer to P97.15 for the fault and alarm types.

The bit definition of the status word 2 of the drive is as shown in the following table:

D:4	Malan	Francisco de la constanta de l	Domosto
Bit	Value	Function	Remarks
		Drive operating mode:	
BIT1~ BIT0		0: Speed mode	
BITT~ BITU		1: Position mode	
		2: Torque mode	
BIT2	1	Jog operation	
BITZ	0	Non-jog operation	
BIT3		Homing in progress	
БПЗ	0	Non-homing operation	
BIT4	1	Inertia identification in progress	
5114	0	Non-inertia identification	
Other		Reserved	

## 7. Expand access mode

The standard protocol only supports the register of 16 bits, and the above description is also based on the register of 16 bits. The parameters of M5 series drive include both 16 bits (single character) and 32 bits (double characters). So, the data of both lengths shall be considered when reading/writing the parameters.

There are two modes in which the drive parameters are accessed to, including 16-bit mode and 32-bit mode, that is, the user can read/write the parameters with 16 bits or 32 bits as the unit separately. The 16-bit mode and 32-bit mode are identified through the "start register address" of the request frame. If the highest byte of the address is 0, the reading/writing shall be done in the 16-bit mode, otherwise, they shall be done in the 32-bit mode. As shown in the following table.

	Start register address	Access mode	Remarks
BIT15	BIT14~BIT0	Access mode	remans
0	Actual address of the start parameter	16-bit	
1	Actual address of the start parameter	32-bit	

When accessing to the parameters in the 32-bit mode, as the unit of the register of the request frame is 16 bits and each parameter of 32 bits needs two registers of 16 bits, the "number of registers" shall be set correctly. The "number of registers" in the request frame shall be twice of that of the parameters to be accessed to, otherwise, it will return to the abnormal response frame.

#### (1) Reading operation

The 16-bit access mode is as described above.

For the 32-bit access mode, the unit of the data returned is 32 bits.

As shown in the following table, reading 4 continuous function codes with P01.01 as the start address (the slave address is 5).

#### Request frame:

Diti	Va	lue	
Bytes	16-bit mode	32-bit mode	Description
0	0x05	0x05	Slave address
1	0x03	0x03	Command code
2~3	0x0101	0x8101	Start address (in the 32-bit mode, the highest byte of the start address is 1)
4~5	0x0004	0x0008	Number of registers (in the 32-bit mode, the number of registers is twice of that of parameters)
6~7	Check code	Check code	CRC verification

#### If the operation is successful, the response frame is as follows:

_		Value	
Bytes	16-bit mode	32-bit mode	Description
0	0x05	0x05	Slave address
1	0x03	0x03	Command code
2	0x08	0x16	Number of bytes read
3~4	Value P01.01		
5~6	Value P01.02	Value P01.01	Content read:
7~8	Value P01.03	Value D04 00	16-bit mode: 8 bytes in total
9~10	Value P01.04	Value P01.02	32-bit mode: 16 bytes in total
11~12	Check code	V/ L B0/ 00	
13~14	=	Value P01.03	
15~16	=	Value P01.04	
17~18	_	value P01.04	

5.		Value	2
Bytes	16-bit mode	32-bit mode	Description
19~20	=	Check code	

If the operation is failed, it will return to the abnormal response frame and its format is as shown above.

There are two types of drive parameters: one type of parameters adopts the decimal system and the other type is the variables adopting the hexadecimal system. The former is used to indicate the actual variables, such as the current, voltage, speed, power, torque, percentage, etc. which shall consider the positive and negative. Its data type is int or long. The latter is used for the mode selection or the status indication, such as displaying the parameters selection, indicating the running status, etc. which needn't consider the positive and negative. Its data type is unsigned int or unsigned long. The type and the value range of parameters are as shown in the following table:

Туре	Number of bits	Value range	Remarks
int	16	-32768~32767	
long	32	-2147483648~2147483647	Parameter of type I
unsigned int	16	0~65535	
unsigned long	32	0~4294967296	Parameter of type II

If the 16-bit access mode is adopted to read the parameter with an actual length of 32 bits, the 16 low bits of this parameter of 32 bits will be captured and returned. This value may be not equal to the original value; it will be detailed in the following text.

If the 32-bit access mode is adopted to read the parameter with an actual length of 16 bits, the 32-bit data returned is the data expanded, that is, the length of the 16-bit parameter is expanded. The principles for the length expansion are as follow: if the highest bit of the 16-bit parameter value is 0, its 16 high bits will be filled with 0; if the highest bit is 1, it needs to judge the type of the parameter, for the parameter of type I, its 16 high bits will be filled with 1, but for the parameter of type II, its 16 high bits will be filled with 0.

If the data length is the same, that is, reading the 16-bit parameter in the 16-bit mode or reading the 32-bit parameter in the 32-bit mode, there is no need to expand or cut the length, the original value will be returned.

Assuming the parameter types of P01.01~P01.07 are as follows:

The value of P01.01 is 4500 (16-bit parameter of type I, 0x1194);

The value of P01.02 is 65036 (32-bit parameter of type I, 0x0000FE0C);

The value of P01.03 is -500 (16-bit parameter of type I, 0xFE0C);

The value of P01.04 is 5000 (32-bit parameter of type I, 0x00001388);

The value of P01.05 is 100000 (32-bit parameter of type I, 0x000186A0);

The value of P01.06 is -100000 (32-bit parameter of type I, 0x FFFE7960);

The value of P01.07 is 0x FFFF (16-bit parameter of type II).

The values returned in the reading operation are as shown in the following table:

Register address	Access mode	Value returned	Description
P01.01	16-bit	0x1194	The actual value is returned.

Register address	Access mode	Value returned	Description
	32-bit	0x00001194	The 16 high bits are filled with 0 and the actual value is returned.
P01.02	16-bit	0xFE0C	The 16 low bits are captured and the value returned is -500, which is different from the actual value.
	32-bit	0x0000FE0C	The actual value is returned.
	16-bit	0xFE0C	The actual value is returned.
P01.03	32-bit	0xFFFFFE0C	The 16 high bits are filled with 1 and the actual value is returned.
P01.04	16-bit	0x1388	The 16 low bits are captured and the actual value is returned .
	32-bit	0x00001388	The actual value is returned.
P01.05	16-bit	0x86A0	The 16 low bits are captured and the value returned is -31072, which is different from the actual value.
	32-bit	0x000186A0	The actual value is returned.
P01.06	16-bit	0x 7960	The 16 low bits are captured and the value returned is 31072, which is different from the actual value.
	32-bit	0x FFFE7960	The actual value is returned.
P01.07	16-bit	0x FFFF	
P01.07	32-bit	0x0000FFFF	Parameter of type II, the 16 high bits are filled with 0.

As shown in the above table, when reading the parameter with an actual length of 32 bits in the 16-bit mode, the value returned may not be equal to the actual value. Therefore, please note: the reading operation of the 16-bit mode is only applicable to parameters with the current value range from -32768 to 32767, and the reading operation of other parameters shall adopt the 32-bit mode.

#### (2) Writing operation

#### 1) Command codes 0x06 and 0x41

Both of these command codes supports changing the single parameter of 16 bits and do not support the 32-bit access mode. If the highest bit of the start register address in the request frame is 1, it will return to the abnormal information frame, indicating that the address is wrong.

#### Note:

- 1. The writing operation of the 16-bit mode is only applicable to the parameter of type I with the current value range from -32768 to 32767 and the parameter of type II with the current value range from 0 to 0xFFFF.
- 2. For the parameter of type I, when these two types of commands are used to write the value of 16 bits into the parameter with an actual length of 32 bits, the actual written value is the expanded value. The principles for the length expansion are as follows: expanding according to the highest bit of the 16-bit parameter value to be written, if the highest bit is 1, the 16 high bits will be filled with 0xFFFF, otherwise, they will be filled with 0x0000. If the

expanded value is within the value range of the parameter, the value is valid and it is allowed to change the parameter, then the value can be written successfully. There is no need to expand the parameter of type II. For example: assuming that the values of function codes P01.01 and P01.02 are 32-bit date and 16-bit data respectively and they are both parameters of type I, when the writing operation on them is successful, the data written are as shown in the following table.

Register address	Value to be written	Actual written value	Description
P01.01	0x1194	0x00001194	The 16 high bits is filled with 0x0000.
P01.01	0xFE0C	0xFFFFE0C	The 16 high bits is filled with 0xFFFF.
P01.02	0x1194	0x1194	
P01.02	0xFE0C	0xFE0C	

#### 2) Command codes 0x10 and 0x43

These two types of command codes can be used to change multiple function code parameters or control parameters and they support both 16-bit and 32-bit access modes.

The 16-bit access mode is as described above.

For the 32-bit access mode, the unit of the data to be written is 32 bits.

As shown in the following table, changing 4 continuous function codes with P02.00 as the start address (the slave address is 5).

#### Request frame:

	Value		
Bytes	16-bit mode	32-bit mode	Description
0	0x05	0x05	Slave address
1	0x10/0x43	0x10/0x43	Command code
2~3	0x0200	0x8200	Start address (in the 32-bit mode, the highest byte of the start address is 1)
4~5	0x0004	0x0008	Number of registers (in the 32-bit mode, the number of registers is twice of that of parameters)
6	0x08	0x16	Number of bytes of register content
7~8	Value P02.00	\/-lu- D00 00	Content to be written:
9~10	Value P02.01	Value P02.00	
11~12	Value P02.02	Value B00 04	16-bit operation: 8 bytes in total
13~14	Value P02.03	Value P02.01	32-bit operation: 16 bytes in total
15~16	Check code		
17~18	-	Value P02.02	
19~20	-	V. J	
21~22	_	Value P02.03	
23~24	-	Check code	

If the operation is successful, the response frame is as follows:

Bytes Value Description	
-------------------------	--

	16-bit mode	32-bit mode	
0	0x05	0x05	Slave address
1	0x10/0x43	0x10/0x43	Command code
2~3	0x0200	0x8200	Start address (in the 32-bit mode, the highest byte of the start address is 1)
4~5	0x0004	0x0008	Number of registers (in the 32-bit mode, the number of registers is twice of that of parameters)
6~7	Check code	Check code	CRC verification

If the operation is failed, it will return to the abnormal response frame and its format is as shown above.

#### □ Note

- 1. The writing operation of the 16-bit mode is only applicable to the parameter of type I with the writing range from -32768 to 32767 and the parameter of type II with the writing range from 0 to 0xFFFF. The writing operation of other parameters shall adopt the 32-bit mode.
- 2. For the parameter of type I, when the value of 16 bits is written into the parameter with an actual length of 32 bits in the 16-bit mode, the actual written value is the expanded value. The principles for the length expansion are as follow: expanding according to the highest bit of the 16-bit parameter value to be written, if the highest bit is 1, the 16 high bits will be filled with 0xFFFF, otherwise, they will be filled with 0x0000. If the expanded value is within the value range of the parameter, the value is valid and it is allowed to change the parameter, then the value can be written successfully. There is no need to expand the parameter of type II and they are independent of the values of the 16 high bits.
- 3. In the 32-bit access mode, no matter the actual length is 16 bits or 32 bits, as long as the value to be written is within the value range of the parameter, the value is valid and it is allowed to change the parameter, then the value can be written successfully.
- 4. To change the parameter with an actual length of 16 bits in the 16-bit mode, please refer to the description above.

#### 8. Cautions

- (1)For the command codes 0x10 and 0x43, when writing several function code parameters of the drive continually, if the writing operation of any function code is invalid (for example, the parameter value is invalid, the parameter cannot be changed, etc.), the error message will be returned and none of the parameters can be changed; when writing several control parameters, if the writing operation of any parameter is invalid (for example, the parameter value is invalid, the parameter cannot be changed, etc.), the operation will return from the storage address of the first fault, this parameter and its following parameters cannot be changed normally, but the parameters before it can be written normally and the error message will be returned.
- (2) When the command codes 0x06 and 0x10 are written, the function code P15.04 can be used to set whether the parameters are saved after power off.

## 9. CRC verification

For the purpose of improving speed, CRC-16 is often realized through the table. The following is the C language source code for realizing CRC-16. Please note: the final results have exchanged high and low bytes, that is, the result is the CRC checksum to be sent

```
/* The function returns the CRC as a
unsigned short CRC16 (unsigned char *msg, unsigned char
length)
                                                        unsigned short type */
{
     unsigned char uchCRCHi = 0xFF:
                                                        /* high byte of CRC initialized */
     unsigned char uchCRCLo = 0xFF;
                                                        /* low byte of CRC initialized */
     unsigned uIndex;
                                                        /* index into CRC lookup table */
                                                        /* pass through message buffer */
     while (length--)
     {
                                                        /* calculate the CRC */
          uIndex = uchCRCLo ^ *msg++;
          uchCRCL o = uchCRCHi ^
 (crcvalue[uIndex] >>8);
          uchCRCHi =crcvalue[uIndex]&0xff:
     }
     return (uchCRCHi | uchCRCLo<<8) ;
}
/* Table of CRC values */
const unsigned int crcvalue[] = {
0x0000,0xC1C0,0x81C1,0x4001,0x01C3,0xC003,0x8002,0x41C2,0x01C6,0xC006,0x8007,0x41C7,
0x0005,0xC1C5,0x81C4,0x4004,0x01CC,0xC00C,0x800D,0x41CD,0x000F,0xC1CF,0x81CE,0x400E,
0x000A.0xC1CA.0x81CB.0x400B.0x01C9.0xC009.0x8008.0x41C8.0x01D8.0xC018.0x8019.0x41D9.
0x001B.0xC1DB.0x81DA.0x401A.0x001E.0xC1DE.0x81DF.0x401F.0x01DD.0xC01D.0x801C.0x41DC.
0x0014,0xC1D4,0x81D5,0x4015,0x01D7,0xC017,0x8016,0x41D6,0x01D2,0xC012,0x8013,0x41D3,
0x0011,0xC1D1,0x81D0,0x4010,0x01F0,0xC030,0x8031,0x41F1,0x0033,0xC1F3,0x81F2,0x4032,
0x0036,0xC1F6,0x81F7,0x4037,0x01F5,0xC035,0x8034,0x41F4,0x003C,0xC1FC,0x81FD,0x403D,
0x01FF.0xC03F.0x803E.0x41FE.0x01FA.0xC03A.0x803B.0x41FB.0x0039.0xC1F9.0x81F8.0x4038.
0x0028,0xC1E8,0x81E9,0x4029,0x01EB,0xC02B,0x802A,0x41EA,0x01EE,0xC02E,0x802F,0x41EF,
0x002D,0xC1ED,0x81EC,0x402C,0x01E4,0xC024,0x8025,0x41E5,0x0027,0xC1E7,0x81E6,0x4026,
0x0022,0xC1E2,0x81E3,0x4023,0x01E1,0xC021,0x8020,0x41E0,0x01A0,0xC060,0x8061,0x41A1,
0x0063,0xC1A3,0x81A2,0x4062,0x0066,0xC1A6,0x81A7,0x4067,0x01A5,0xC065,0x8064,0x41A4,
0x006C,0xC1AC,0x81AD,0x406D,0x01AF,0xC06F,0x806E,0x41AE,0x01AA,0xC06A,0x806B,0x41AB,
0x0069.0xC1A9.0x81A8.0x4068.0x0078.0xC1B8.0x81B9.0x4079.0x01BB.0xC07B.0x807A.0x41BA.
0x01BE,0xC07E,0x807F,0x41BF,0x007D,0xC1BD,0x81BC,0x407C,0x01B4,0xC074,0x8075,0x41B5,
```

```
0x0077,0xC1B7,0x81B6,0x4076,0x0072,0xC1B2,0x81B3,0x4073,0x01B1,0xC071,0x8070,0x41B0,
0x0050,0xC190,0x8191,0x4051,0x0193,0xC053,0x8052,0x4192,0x0196,0xC056,0x8057,0x4197,
0x0055,0xC195,0x8194,0x4054,0x019C,0xC05C,0x805D,0x419D,0x005F,0xC19F,0x819E,0x405E,
0x005A,0xC19A,0x819B,0x405B,0x0199,0xC059,0x8058,0x4198,0x0188,0xC048,0x8049,0x4189,
0x004B,0xC18B,0x818A,0x404A,0x004E,0xC18E,0x818F,0x404F,0x018D,0xC04D,0x804C,0x418C,
0x0044,0xC184,0x8185,0x4045,0x0187,0xC047,0x8046,0x4186,0x0182,0xC042,0x8043,0x4183,
0x0041,0xC181,0x8180,0x4040}
If the CRC checksum of each byte to be sent is computed on line, it will take a longer time, but it can save the
program space occupied by the table. The code for computing CRC online is as follows:
unsigned int crc check (unsigned char *data,unsigned char length)
{
     int i:
     unsigned crc_result=0xffff;
     while (length--)
     {
           crc result^=*data++;
           for (i=0:i<8:i++)
                 if (crc_result&0x01)
                 crc result= (crc result>>1) ^0xa001;
                 }
                 else
           crc result=crc result>>1;
           }
     }
```

## 10. Application example

}

To start No.5 drive and make it rotate forward with a speed of 500.0rpm (expressed as 5000 internally), the command is as follows:

return (crc result= ( (crc result&0xff) <<8) | (crc result>>8) );

Data	Address	Command	Register	Number of	Register	Register content	Check
frame	Address	code	address	registers	content		code

					Number of bytes		
Request	0x05	0x10	0x6400	0x0002	0x04	0x0034, 0x1388	0x30C5
Response	0x05	0x10	0x6400	0x0002	None	None	0x5F7C

#### No.5 drive coast to stop:

Data frame	Address	Command code	Register address	Register content	Check code
Request	0x05	0x06	0x6400	0x0036	0x1768
Response	0x05	0x06	0x6400	0x0036	0x1768

#### No.5 drive jog-forward:

Data frame	Address	Command code	Register address	Register content	Check code
Request	0x05	0x06	0x6400	0x00B0	0x96CA
Response	0x05	0x06	0x6400	0x00B0	0x96CA

#### No.5 drive jog-stop:

Data frame	Address	Command code	Register address	Register content	Check code
Request	0x05	0x06	0x6400	0x0130	0x96FA
Response	0x05	0x06	0x6400	0x0130	0x96FA

#### No.5 drive fault reset:

Data frame	Address	Command code	Register address	Register content	Check code
Request	0x05	0x06	0x6400	0x0220	0x97C6
Response	0x05	0x06	0x6400	0x0220	0x97C6

#### Read the running speed of No.5 drive and the response running speed is 500.0rpm (16 bits mode):

Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Check code
Request	0x05 0x03 0		0x6502	0x0001	None	0x3A82
Response	0x05 0x03		None	0x02	0x1388	0x44D2

#### Read the running speed of No.5 drive and the response running speed is 500.0rpm (32 bits mode):

Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Checksum
Request	0x05	0x03	0xE502	0x0002	None	0x5343
Response	0x05	0x03	None	0x04	0x00001388	0xB2A5

Change the acceleration time 1 (i.e. function code P06.07) of No.5 drive to be 100ms, which cannot be saved upon power off (16 bits mode).

Data frame Add
----------------

Data frame	Address	Command code	Register address	Register content	Check code
Request	0x05	0x06	0x0607	0x0064	0x38EC
Response	0x05	0x06	0x0607	0x0064	0x38EC

Change the acceleration time 1 (i.e. function code P06.07) of No.5 drive to be 100ms, which cannot be saved upon power off (32 bits mode).

Data frame	Address		Register address	Number of registers	Number of bytes of register content	Register content	Check code
Request	0x05	0x10	0x8607	0x0002	0x04	0x00000064	0xECF4
Response	0x05	0x10	0x8607	0x0002	None	None	0xD8C5

Read the output current of No.5 drive and the response output current is 30.0A (16 bits mode):

			•		,	
Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Check code
Request	0x05	0x03	0x6504	0x0001	None	0xDA83
Response	0x05	0x03	None	0x02	0x012C	0x49C9

Read the output current of No.5 drive and the response output current is 30.0A (32 bits mode):

				. '		
Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Check code
Request	0x05	0x03	0xE504	0x0002	None	0xB342
Response	0x05	0x03	None	0x04	0x0000012C	0xBFBE

Read the deceleration time 1 (i.e. P06.08) of No.5 drive and the response deceleration time is 60ms (16 bits mode):

Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Check code
Request	0x05	0x03	0x0608	0x0001	None	0x04C4
Response	0x05	0x03	None	0x02	0x003C	0x4995

Read the deceleration time 1 (i.e. P06.08) of No.5 drive and the response deceleration time is 60ms (32 bits mode):

Data frame	Address	Command code	Register address	Number of registers or number of bytes read	Register content	Check code
Request	0x05	0x03	0x8608	0x0002	None	0x6D05
Response	0x05	0x03	None	0x04	0x0000003C	0xBFE2

## 11. Scaling of drive parameters

(1) Scaling of the speed: 1:10

To make the drive run at 500.0rpm, the main setting shall be 0x1388 (5000).

(2) Scaling of time: 1:1

To make the acceleration time of the drive to be 100ms, the function code shall be set as 0x0064 (100).

(3) Scaling of current: 1:10

If the feedback current of the drive is 0x001E (30), the present current shall be 3.0 A.

- (4)The output power is its absolute value.
- (5) For other parameters, please refer to the function parameter descriptions.

## Appendix 2 Warranty and Service

Shenzhen Megmeet Electrical Co., Ltd. manufactures motor drive products strictly according to the ISO9001:2015 standard. In case of any product abnormalities, please contact the distributor or the headquarter. Our company will provide full technical support for you.

#### 1. Warranty period

The product is warranted for 18 months from the purchase date, however, the warranty date shall not exceed 24 months after the manufacturing date on the nameplate.

#### 2. Warranty scope

During the warranty period, any product abnormalities incurred due to our company can be freely repaired or replaced by our company. In case of the following situations, maintenance fees will also be charged even if the product is still in the warranty period.

- (1) The damages are caused by fire, flood, strong lightning strike, etc.
- (2) The damages are caused by users' unauthorized modifications.
- (3) The product is damaged due to drop or in transmission after the purchase.
- (4) The product is damaged because the standard requirements are not obeyed in actual use.
- (5) The product is damaged because the user does not follow the instructions of the user manual.
- 3. After-sales service
- (1) If there are specific requirements for drive installation and trial operation, or the working status of the drive is not satisfactory (such as unsatisfactory performance and function), please contact the distributor or Shenzhen Megmeet Electrical Co., Ltd.
- (2) In case of any abnormality, contact the distributor or Shenzhen Megmeet Electrical Co., Ltd. immediately for help.
- (3) During the warranty period, our company will repair any drive abnormality incurred due to the product manufacturing and design free of charge.
- (4) If the product is out of the warranty period, our company can provide paid repairing service according to the customers' needs.
- (5) The service change is calculated by actual costs. If there is an agreement, the agreement shall prevail.

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Tel: +86-755-86600500 Fax: +86-755-86600562

Zip code: 518057

Website: https://www.megmeet.com

# Parameter record table

 record table		

## Shenzhen Megmeet Electrical Co., Ltd. M5-P Series Servo Drive Warranty Bill

Customer company:				
Detailed address:				
Postal Code:	Contact:			
Tel:	Fax:			
Machine model:				
Power:	Machine No.:			
Contract No.:	Purchase date:			
Service unit:				
Contact :	Tel:			
Maintenance personnel:	Tel:			
Maintenance date:				
Comment on service:				
□Good □Fair □ Other comment:	∃So so □ Poor			
User's signature:	Date:			
Return visit record in Customer Service Center:				
Others:	□Telephone return visit □Letter return visit			
Signature of the techn	ical support engineer: Date:			

**Note**: This bill becomes invalid if the user can not be visited.

## Shenzhen Megmeet Electrical Co., Ltd. M5-P Series Servo Drive Warranty Bill

Customer company:					
Detailed address:					
Postal Code:	Contact :				
Tel:	Fax:				
Machine model:					
Power:	Machine No.:				
Contract No.:	Purchase date:				
Service unit:					
Contact :	Tel:				
Maintenance personnel:	Tel:				
Maintenance date:					
Comment on service:	1				
□Good □Fair □So so □ Poor Other comment:					
User's signature:	Date:				
Return visit record in Customer Service Center:					
Others:	□Telephone return visit □Letter return visit				
Signature of the technical support engineer: Date:					

**Note**: This bill becomes invalid if the user can not be visited.