

# Preface

First of all, thank you for purchasing the VA series servo drive of SHENZHEN V&T TECHNOLOGIES CO.,LTD.!

The VA series servo drive is a high-performance synchronous and asynchronous integrated AC servo drive developed for permanent magnet synchronous AC motors and three-phase asynchronous motors. This series of products supports RS485 communication and EtherCAT bus. It can realize multi-servo networked control and fieldbus control system with the host computer.

This manual is the user manual for the VA series servo drive

This manual provides users with relevant instructions for model selection, installation, parameter setting, on-site commissioning and fault diagnosis.

In order to use this product correctly, please read this manual carefully before using it.

If you have any questions with the function and performance, please consult our technical support personnel for help, which will help you to use the products correctly.

Please keep the manual properly for later use.

Due to continuous improvement of products, the information provided by the company is subject to change without notice.

# High Reliability Design

## ■ Comply with International Relevant Product Standards

### ■ Normalized Design

- ◆ Normalized design of the hardware interface: the control board and the button type operation panel are normalized for customer's use and maintenance.
- ◆ Normalized design of software protocols: The drive series have normalized protocols (Modbus protocol) of terminal RS485, operation panel RS485, and universal expansion port SPI.
- ◆ Unified design of main circuit terminals: 0.75G to 15G drives terminal are the same, to facilitate the operation and maintenance.
- ◆ Built-in braking unit design: standard configuration for 0.75G to 15G, to reduce the cost and the installation space.
- ◆ Full series standard common DC bus design: The standard common DC bus can be realized without modifying the drive or adding peripheral circuit. It is applicable to such industry applications as paper making, air compressor, metallurgy and EPS.

### ■ Adaptability Design

- ◆ Independent duct design: The full series supports the application demand of mounting heatsink out of the cabinet, and is applicable to the dusty environments.
- ◆ Compact structure design: With complete thermal emulation and unique cold plate process, the product has compact structure, meeting the demands of OEM customers.
- ◆ Complete system protection design: The advanced system designs, e.g., protective coating on PCB, galvanizing the copper buses, and adopting sealed key in full series of product components, and the button and shuttle type operation panels can offer accessories meeting the IP54 requirement, greatly improve the protection capacity of the system. It is applicable to the applications with dusty and corrosive environment, such as wire-drawing machine, printing, dyeing and ceramics.
- ◆ Wide voltage range design: DC operating voltage range is DC 350–720V.
- ◆ Precise current detection and protection: The full series drive adopt precise Hall sensor to detect the output current, meeting real time control and protection requirement quickly of software and hardware, ensuring the performance and reliability of the system.
- ◆ All-round whole machine protection function: current limiting protection of soft/hardware, overcurrent protection, overvoltage protection, short circuit protection to ground, overload protection, pass-through protection of IGBT, current abnormality detection and other protection functions, etc.
- ◆ Perfect terminal protection function: short circuit and overload protection for the +24V and +10V power supply of the control terminal, operation panel cable reverse connection protection, input signal cable disconnection and abnormal analog input protection.
- ◆ Overheat alarm protection function: automatically adjust according to temperature to ensure reliable operation of products.
- ◆ Comprehensive switch power supply protection function: short circuit protection and overload

protection of switch power supply's each output,power-on soft start function,self-locking of loop and

- ◆ open circuit,and voltage limiting protection function ,these ensure the reliability of the whole machine.

## **Abundant and Flexible Function**

### **■ Speed Command Selection Is Flexible and Convenient**

- ◆ Keyboard given
- ◆ Analog given
- ◆ RS485 given: International standard Modbus protocol
- ◆ Multi-segment speed given
- ◆ Terminal given
- ◆ Process PID given
- ◆ Simple PLC speed given
- ◆ Pulse given
- ◆ Each of the above given methods can be switched online.

### **■ Multiple Pulse Command Receiving Methods**

- ◆ CW+CCW。
- ◆ Orthogonal pulse
- ◆ Pulse + direction
- ◆ CW+CCW

### **■ Digital Operation Panel**

- ◆ Button type and shuttle type selectable, RS485 communication mode, standard network port connection.
- ◆ The button layout complies with the Ergonomic principle. One-button function code access and exit, making it easy for the operation.
- ◆ The standard configuration operation panel can realize parameter copy and remote control function (maximum length: 500m).

### **■ Host computer communication**

- ◆ The operation panel and terminals provide RS485 ports, the communication protocol is Modbus,
- ◆ Parameter upload and download can be realized.
- ◆ Ethercat bus

## **Customized Functions**

### **■ Enhanced Function**

- ◆ The software filtering time for the analog input of AI1, AI2 and AI3 is settable to enhance the anti-interference capacity.
- ◆ It supports the overload protection with motor temperature feedback.

## Safety Precautions

Description of the security mark:



**DANGER:** incorrect use can result in fire, serious injury, or death



**ATTENTION:** incorrect use may result in moderate or minor injury to the person and equipment damage.

### ■ Use



#### **DANGER**

- This series of server drives is used to control the operation of three-phase motors. It cannot be used to control single-phase motors or for other purposes, otherwise it may cause drive fault or fire.
- This series of server drives cannot be easily applied to applications such as medical devices that are directly related to personal safety.
- This series of server drives is manufactured under a strict quality management system. If a rive fault occurs, it can cause a major accident or loss. Security measures such as edundancy or bypass need to be set, just in case.

### ■ Receiving Inspection



#### **ATTENTION**

- If the server drive is damaged or lack of parts, it cannot be installed, otherwise an accident may occur.

### ■ Installation



#### **ATTENTION**

- When handling and installing, please hold the bottom of the product. Do not just hold the case to prevent it from hurting your foot or breaking the drive.
- The server drive should be mounted on a flame retardant such as metal. Keep away from lammable objects and keep away from heat.
- Do not drop drilling residue into the server drive during installation work. Otherwise drive fault may occurs.
- When the server drive is installed in the cabinet, the electric control cabinet should be equipped with fan and vent. The air flue should be built in the cabinet to facilitate heat dissipation.

## ■ Wiring





- The wiring must be conducted by qualified electricians. Otherwise, electric shock may happen or servo drive may be damaged.
- Before wiring, confirm that the power supply is disconnected. Otherwise, electric shock may happen or fire.
- The PE terminal must be grounded firmly; otherwise, the servo drive enclosure may become live.
- Please do not touch the main circuit terminals. The wires of the main circuit terminals must not contact the servo drive enclosure. Otherwise, electric shock may happen.
- The connecting terminals for the braking resistor are Ⓟ2/B1 and B2. Please do not connect terminals other than these two. Otherwise, fire may be caused.
- The leakage current of the servo drive system is more than 3.5mA, and the actual value of the leakage current is determined by the operation application conditions. servo drive and the motor must be grounded firmly to ensure the safety.





- The three-phase power supply cannot connect to output terminals U/T1, V/T2 and W/T3; otherwise, the servo drive will be damaged.
- It is forbidden to connect the servo drive output terminals to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the servo drive may be damaged.
- Please confirm that the power supply phases and rated input voltage are consistent with those indicated by the nameplate, otherwise, the servo drive may be damaged.
- Do not perform dielectric strength test on the servo drive, otherwise, the servo drive may be damaged.
- The wires of the main circuit terminals and the wires of the control circuit terminals shall be laid separately or in a square-crossing mode, otherwise, the control signal may be interfered.
- The wires of the main circuit terminals should adopt lugs with insulating sleeves.
- The sectional area of input and output cables should be selected according to the servo drive power.
- When the cables between the servo drive and the motor are longer than 100m, it is suggested to use output reactor to avoid the over current fault caused by the distribution capacitor.
- If the servo drive equipped with a DC reactor, DC reactor must be connected between the terminals of Ⓟ1 and Ⓟ2, otherwise the servo drive will not display after power on.


## ■ Operation

 <b>Danger</b>
<ul style="list-style-type: none"><li>● Power supply can only be connected after the wiring is completed and the cover is installed. It is forbidden to remove the cover in live condition; otherwise, electric shock may happen.</li><li>● When automatic fault reset function or restart function is enabled, isolation measures shall be taken for the mechanical equipment, otherwise, personal injury may be caused.</li><li>● When the servo drive is power on, its terminals are still live even when in stop state. Do not touch the servo drive terminals; otherwise electric shock may happen.</li><li>● The fault and alarm signal can only be reset after the run command has been cut off. Otherwise, personal injury may be caused.</li></ul>
 <b>Note</b>
<ul style="list-style-type: none"><li>● Do not start or shut down the servo drive by switch on or off the power supply, otherwise, the servo drive may be damaged.</li><li>● Before operation, please confirm whether the motor and equipment are in the allowable use range, otherwise, the equipment may be damaged.</li><li>● The heat-sink and the braking resistor have high temperature. Please do not touch such device; otherwise, you may be burnt.</li><li>● When it is used in the application of crane or lifting equipment, mechanical brake should also be equipped.</li><li>● Please do not change the servo drive parameters randomly. Most of the factory settings can meet the requirement, and the user only needs to set some necessary parameters. Any random change of the parameter may cause the damage of the mechanical equipment.</li></ul>

## ■ Maintenance, Inspection

 <b>Danger</b>
<ul style="list-style-type: none"><li>● In the power-on state, please do not touch the servo drive terminals; otherwise, electric shock may happen.</li><li>● If the cover is to be removed, the power supply must be disconnected first.</li><li>● Waiting for at least 10 minutes after power off or confirm that the CHARGE LED is off before maintenance and inspection to prevent the human injury caused by the residual voltage of the electrolytic capacitor in main circuit.</li><li>● The components shall be maintained, inspected or replaced by qualified electricians.</li></ul>
 <b>Note</b>
<ul style="list-style-type: none"><li>● The circuit boards have large scale CMOS IC. Please do not touch the board to avoid the circuit board damage caused by ESD.</li></ul>

## ■ Others

 <b>Danger</b>
<ul style="list-style-type: none"><li>● It is forbidden to modify the servo drive unauthorizedly; otherwise, human injury may be caused.</li></ul>

# Content

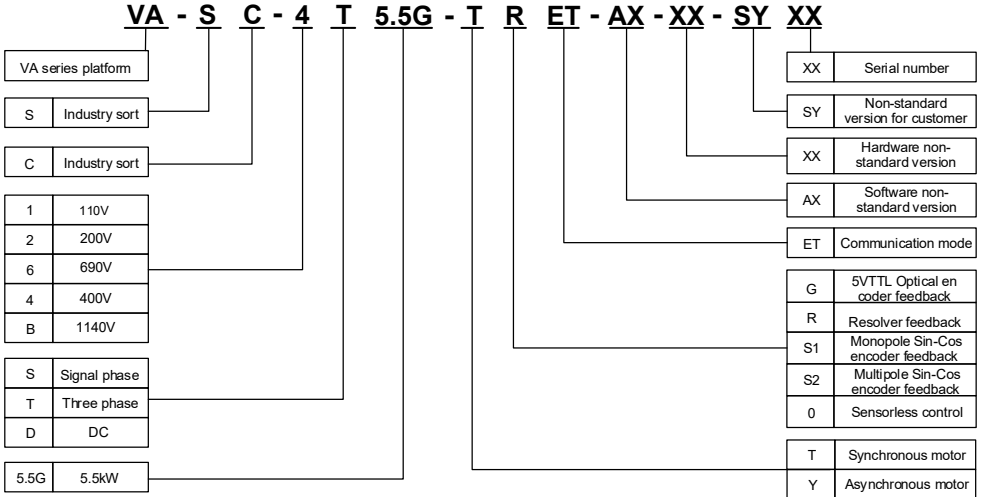
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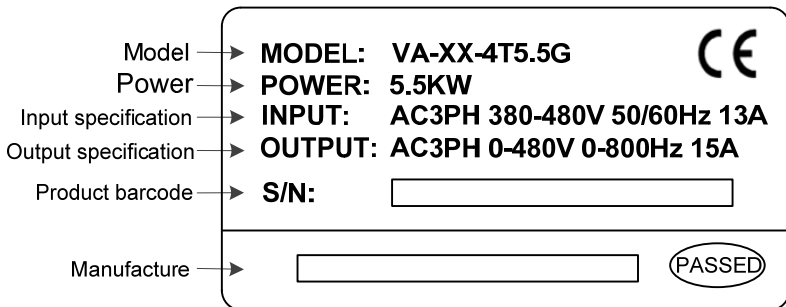


## Chapter 1 Introduction to VA Series Drive

### 1.1 Product Model Description



### 1.2 Product Nameplate Description



### 1.3 Product Series

■ VA-XX-4TXXG

Power (kW)	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	
Applicable motor (kW)	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	
Output	Voltage (V)	Three-phase 0 to rated input voltage															
	Rated current (A)	9	13	17	24	30	39	45	60	75	91	112	150	176	210	253	304
	Maximum current (A)	16	23	31	43	54	70	81	108	135	164	202	270	317	378	400	547
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time characteristics)															
Input	Rated voltage/frequency	3-phase 380V~480V 50Hz/60Hz															
	Allowable voltage range	323V~528V; Voltage imbalance ≤3%; allowable frequency fluctuation: ±5%															
	Rated current (A)	10	15	19	26	33	43	50	66	83	100	123	165	160*	196*	232*	282*
Braking unit	Built-in as standard								Built-in as option								
Protection class	IP20																
Cooling mode	Self cooled	Air convection cooling															

### 1.4 Technical Specifications

Control features	Control mode	Sensorless control	Sensor control
	Starting torque	0.2% of motor rated speed, 180% of rated torque	0 rpm, 180% of rated torque
	Speed control range	1:200	1:1000
	Speed accuracy	± 0.5%	± 0.02%
Product functions	Key functions	Undervoltage adjustment, flying start, torque limitation, multi-preset speed, motor parameters auto-tuning, flux-weakening control, current limitation	
	Speed reference mode	Modbus, keypad, external digital input, analog, simple PLC, PID, pulse input	
	Dynamic braking	Braking unit action voltage: 650 ~ 750V;	
	Dual 485 communication	Dual 485 communication ports support Modbus protocol (RTU). The standard operation panel can realize remote control box function with a maximum distance of 500m.	
	Common DC	The full series can realize common DC bus supply for several drives.	
Independent duct	The full series adopts independent duct design and supports the installation of heatsink outside the cabinet		

Protection functions	Power supply undervoltage, overcurrent protection, overvoltage protection, interference protection, abnormal comparison reference input, auto-tuning failure, IGBT protection, heatsink overtemperature protection, overload protection, motor overload protection, peripheral protection, abnormal current detection, output to ground short circuit, abnormal power failure protection, abnormal input power, output phase failure, abnormal EEPROM, abnormal relay contact, temperature sensor taking sample anomaly, encoder disconnection, abnormal +10V power supply, abnormal analog input, motor overtemperature (PTC), abnormal communication, abnormal software version compatibility, abnormal copying, abnormal expansion card connection, terminal mutual exclusion detection failure, hardware overload protection	
Efficiency	At rated power, 7.5kW and below power class ≥93%, 45kW and below power class ≥95%, 55kW and above power class ≥98%	
Environment	Operating site	The product shall be mounted vertically in the electric control cabinet with good ventilation. Horizontal or other installation modes are not allowed. The cooling media is the air. The product shall be installed in the environment free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, steam and drip.
	Ambient temperature	-10 ~ +40°C, derated at 40 ~ 50°C, the rated output current shall be decreased by 1% for every temperature rise of 1°C
	Humidity	5~95%, no condensing
	Altitude	0 ~ 2000m, derated above 1000m, the rated output current shall be decreased by 1% for every rise of 100m
	Vibration	3.5 m/s <sup>2</sup> , 2~9Hz; 10 m/s <sup>2</sup> , 9~200Hz; 15 m/s <sup>2</sup> , 200~500Hz。
	Storage temperature	-40~+70°C。

### 1.5 Braking Resistor Lectotype

Drive model	Braking unit	Braking resistor (10% ED, Max. 10s)				Braking torque %
		Power	Resistor	Minimum resistance of braking resistor	Qty.	
VA-XX-4T3.7G	Built-in	550W	150Ω	66.7Ω	1	135
VA-XX-4T5.5G		800W	100Ω	66.7Ω	1	135
VA-XX-4T7.5G	as standard	1070W	75Ω	66.7Ω	1	130
VA-XX-4T11G		1600W	50Ω	40Ω	1	135
VA-XX-4T15G		2000W	40Ω	25Ω	1	125
VA-XX-4T18.5G	Built-in as option	4800W	32Ω	20Ω	1	125
VA-XX-4T22G		4800W	27.2Ω	20Ω	1	125
VA-XX-4T30G		6000W	20Ω	14Ω	1	125
VA-XX-4T37G		9600W	16Ω	14Ω	1	125
VA-XX-4T45G		9600W	13.6Ω	10Ω	1	125
VA-XX-4T55G		6000W	20Ω	7Ω	2	135
VA-XX-4T75G		9600W	13.6Ω	5Ω	2	145

Note:

➢ The connection mode for multiple braking resistors is parallel connection. For example, the drive of

VA-XX-4T55G, the braking resistor is suggested to select two 6000W 20  $\Omega$  braking resistor parallel connection, amount to braking resistor is 12000W, 10  $\Omega$  .

- The braking resistor must not be lower than minimum resistance, otherwise, the braking unit may be damaged.
- The table is for a reference only. Actual braking resistor resistance and power should be determined by motor generation power, system inertia, deceleration time and potential energy, etc.

## Chapter 2 Product Installation

### 2.1 Installation Environment of Product

- Avoid installing in areas with oil mist, metal dust and dust.
- Avoid installing in areas with harmful gases, liquids, corrosive, flammable or explosive gases.
- Avoid installing in places with a lot of salt.
- Do not install in direct sunlight.
- Do not install on flammable objects such as wood.
- Never leave drilling residues inside the drive during installation work.
- Please install it vertically in the electric control cabinet, and install a cooling fan or cooling air conditioner to prevent the ambient temperature from rising above 45 °C.
- For the harsh installing environment, it is recommended to install the drive radiator outside the cabinet.

### 2.2 Installation Direction and Space

In order not to reduce the cooling effect of the drive, be sure to install it vertically, as shown below, and make sure that there is some space.

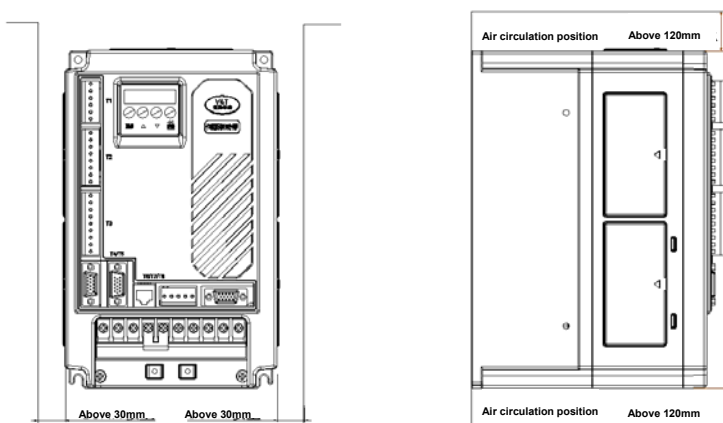


Figure 2-1 VA-XX-4T7.5G and below power levels

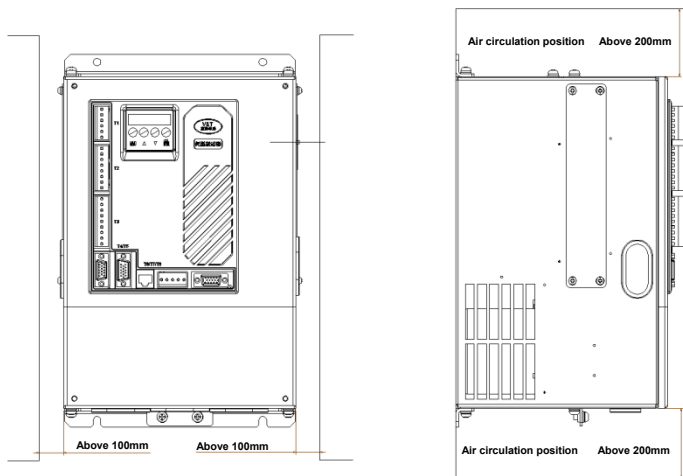


Figure 2-2 VA-XX-4T11G and above power levels

## 2.3 Product Appearance, Installation Dimension and Approximate Weight

### 2.3.1 Product appearance

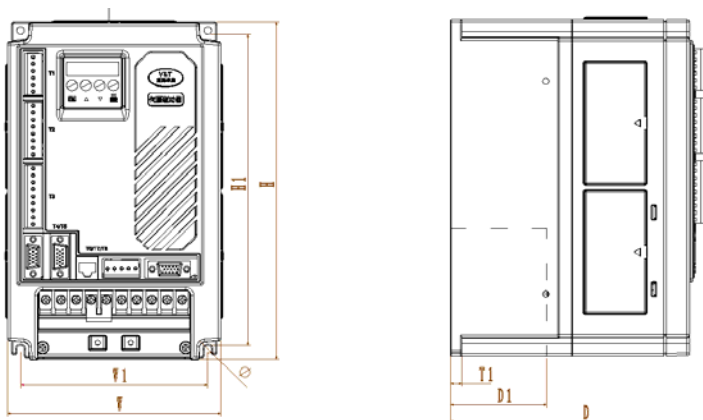


Figure 2-3 VA-XX-4T7.5G and below power levels

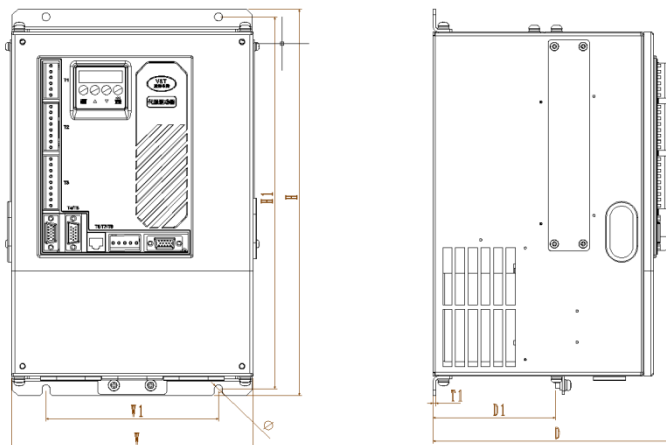


Figure 2-4 VA-XX-4T11G and above power levels

### 2.3.2 Installation dimension and approximate weight of product

Voltage	Model	Appearance and Installation Dimension (mm)								approximate weight (kg)
		W	H	D	W1	H1	D1	T1	Hole d	
400V	VA-XX-4T3.7G	155	249	197.7	136	232	69	8	5.5	3.3
	VA-XX-4T5.5G									
	VA-XX-4T7.5G									
	VA-XX-4T11G	210	337	230	150	324	107.5	2.5	7	8.5
	VA-XX-4T15G									
	VA-XX-4T18.5G	285	440	250	200	425	107.5	2.5	7	17
	VA-XX-4T22G									
	VA-XX-4T30G									
	VA-XX-4T37G	315	575	247	220	553	123.5	2.5	10	25
	VA-XX-4T45G									
	VA-XX-4T55G	400	615	275	270	590	123.5	3.0	10	35
	VA-XX-4T75G									
	VA-XX-4T90G	465	745	335	343	715	156	3.0	12	55
	VA-XX-4T110G									
VA-XX-4T132G	540	890	395	370	855	205.5	4.0	14	85	
VA-XX-4T160G										

## 2.4 Name of each part of the drive

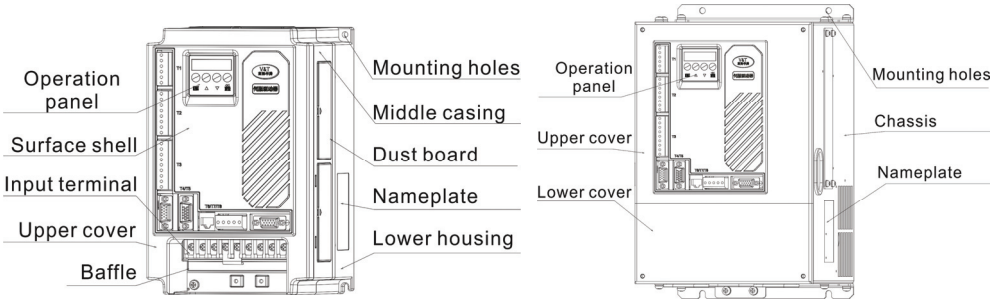


Figure 2-5 VA-XX-4T7.5G and below power levels      Figure 2-6 VA-XX-4T11G and above power levels

## 2.5 Disassembly and Installation of Drive

### 2.5.1 VA-XX-4T7.5G and Below Disassemble and Install

- ◆ Remove the upper cover

Press the upper lid in the 1 direction of FIG. 2-7 and lift the upper lid in the 2 direction

- ◆ Install the upper cover

Aim at the clamping joint of the upper cover in the direction of 1 in FIG. 2-8 and press down the upper cover in the direction of 2 until a "click" is heard, ensuring that the hook on the left and right sides is fully stuck into the upper shell.

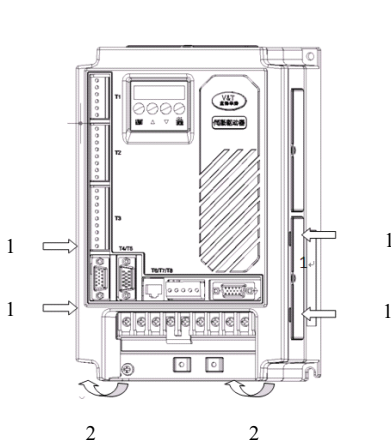


Figure 2-7 removal of upper cover

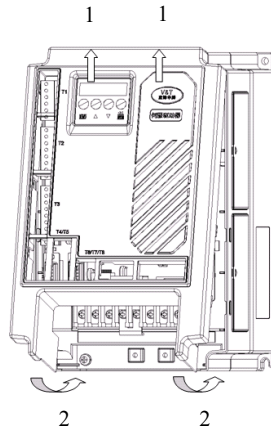


Figure 2-7 Installation of upper cover



◆ Disassembly and Installation of Face Shell

According to the direction 1 in FIG. 2-9, all the clamps of the shell are pressed inside to separate the clamps of the shell and the clamps of the upper cover. Then the shell can be removed by pulling the clamps outward in the direction 2

Aim the shell at the clamping joint of the upper cover as shown in FIG. 2-10 and press down the shell with force in direction 1. Make sure that all the hooks of the shell are stuck in the slot of the upper cover.

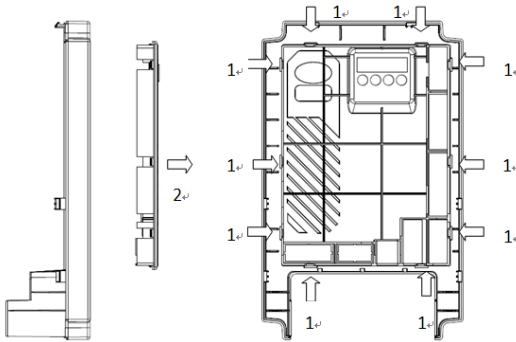


Figure 2-9 Shell Disassembly

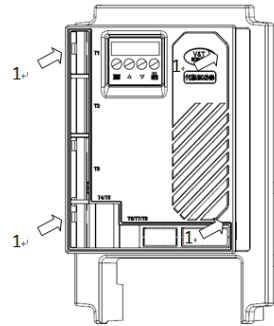


Figure 2-10 Shell Mounting

## 2.5.2 Disassembly and Installation of VA-XX-4T11G~VA-XX-4T75G

■ Removal and Mounting of Covers of VA-XX-4T11G~VA-XX-4T75G with Sheet-metal Enclosure

◆ Remove upper and lower cover

Remove the two mounting screws for the lower cover and lift the lower cover 2 in the 2-10 direction.

Remove the four mounting screws of the upper cover plate. Remove the upper cover plate in 4 directions in FIG. 2-11 (take care to remove the wiring first).

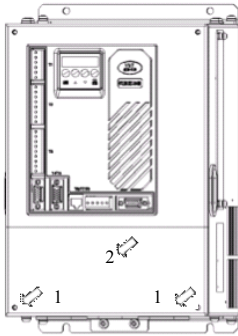


Figure 2-10 removal of lower cover

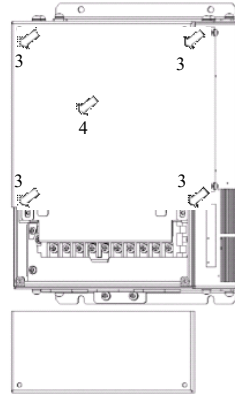


Figure 2-11 removal of upper cover

### 2.5.3 Open and Close of Doors of VA-XX-4T90G and Above Power Class with Sheet-metal Enclosure

◆ Opening of the door

Press the latch following direction 1 in Figure2-12 and open the door following direction 2.

◆ Mounting of cover

After the wiring operation of main circuit terminals and control circuit terminals is completed, close the door following direction 1 in Figure2-13, and then press down the latch following direction2 to lock door.

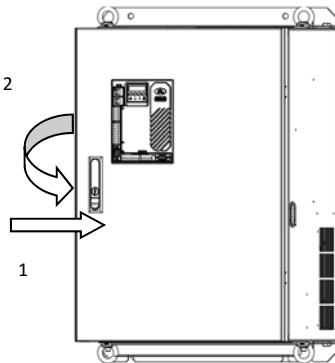


Figure 2-12 opens the door panel

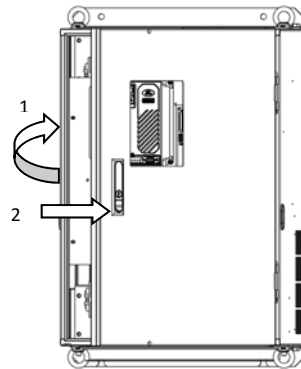


Figure 2-13 closes the door panel

## Chapter 3 Wiring of Drive

### 3.1 Connection of the Drive and Peripheral Devices

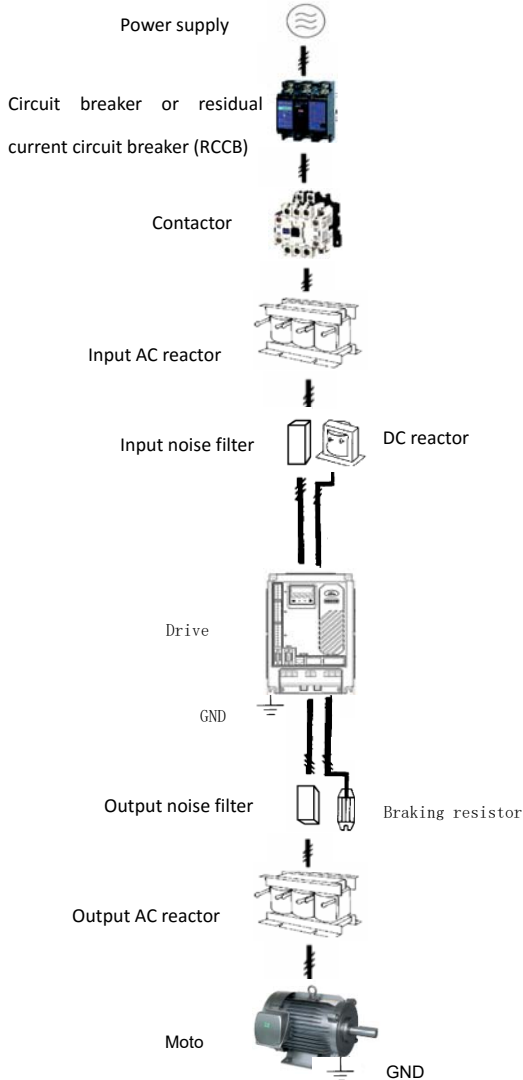


Figure3-1 Connection diagram of the product and peripheral devices

## 3.2 Description of Peripheral Devices for Main Circuit

Circuit breaker	The circuit breaker capacity shall be 1.5 ~ 2 times of the drive rated current. The time features of the circuit breaker shall fully consider the time features of the drive overload protection.
RCCB (Residual current circuit breaker)	Because the drive output is the high-frequency pulse, there will be high-frequency leakage current. Special RCCB shall be used when installing RCCB at the input end of the drive. It is suggested that B type RCCB be used, and the leakage current value shall be set to 300mA.
Contactor	Frequent contactor action will cause drive failure, so the highest frequency for the open and close of contactor shall not exceed 10 times/min. When braking resistor is used, to avoid the overtemperature damage of the braking resistor, a thermal protection relay with braking resistor overtemperature detection shall be installed to disconnect the contactor at the contact control power side of the thermal protection relay.
Input AC reactor or DC reactor	<ol style="list-style-type: none"> <li>The power supply capacity is more than 600kVA or 10 times of the drive capacity.</li> <li>If there is switch type reactive-load compensation capacitor or load with silicon control at the same power node, there will be high peak current flowing into input power circuit, which damage the rectifier components.</li> <li>When the voltage imbalance of the three-phase power supply of the drive exceeds 3%, the rectifier component will be damaged.</li> <li>It is required that the input power factor of the drive shall be higher than 90%. When the above situations occur, install the AC reactor at the drive input side or DC reactor to the DC reactor terminal.</li> </ol>
Input noise filter	The noise input from the power and output from the drive can be reduced.
Output noise filter	When the output end of the drive is connected with noise filter, the conduction and radiation interference can be reduced.
Output AC reactor	When the cable connecting the drive and the motor is longer than 100m, it is suggested to install AC output reactor to suppress the high-frequency oscillation to avoid damaging motor insulation, large leakage current and frequent drive protective action.

## 3.3 Models of Main Circuit Peripheral Devices

Model	Circuit Breaker (A)	Contactor (A)	R/L1、S/L2、T/L3、⊕1、 ⊕2/B1、B2、⊖、U/T1、V/T2、 W/T3			PE Terminal ⊕		
			Terminal screw	Tightening torque (N·m)	Cable specification (mm <sup>2</sup> )	Terminal screw	Tightening torque (N·m)	Cable specification (mm <sup>2</sup> )
VA-XX-4T3.7G	25	16	M4	1.2~1.5	4	M4	1.2~1.5	4
VA-XX-4T5.5G	32	25	M4	1.2~1.5	6	M4	1.2~1.5	6
VA-XX-4T7.5G	40	32	M4	1.2~1.5	6	M4	1.2~1.5	6
VA-XX-4T11G	63	40	M5	2.5~3.0	6	M5	2.5~3.0	6
VA-XX-4T15G	63	63	M5	2.5~3.0	6	M5	2.5~3.0	6
VA-XX-4T18.5G	100	63	M6	4.0~5.0	10	M6	4.0~5.0	10
VA-XX-4T22G	100	100	M6	4.0~5.0	16	M6	4.0~5.0	16

Model	Circuit Breaker (A)	Contact (A)	R/L1、S/L2、T/L3、⊕1、⊕2/B1、B2、⊖、U/T1、V/T2、W/T3			PE Terminal ⊕		
			Terminal screw	Tightening torque (N·m)	Cable specification (mm <sup>2</sup> )	Terminal screw	Tightening torque (N·m)	Cable specification (mm <sup>2</sup> )
VA-XX-4T30G	125	100	M6	4.0~5.0	25	M6	4.0~5.0	16
VA-XX-4T37G	160	100	M8	9.0~10.0	25	M8	9.0~10.0	16
VA-XX-4T45G	200	125	M8	9.0~10.0	35	M8	9.0~10.0	16
VA-XX-4T55G	315	250	M10	17.6~22.5	50	M10	14.0~15.0	25
VA-XX-4T75G	350	330	M10	17.6~22.5	60	M10	14.0~15.0	35
VA-XX-4T90G	315	250	M10	17.6~22.5	70	M10	14.0~15.0	35
VA-XX-4T110G	350	330	M10	17.6~22.5	100	M10	14.0~15.0	50
VA-XX-4T132G	400	330	M12	31.4~39.2	150	M12	17.6~22.5	75
VA-XX-4T160G	500	400	M12	31.4~39.2	185	M12	17.6~22.5	50×2

### 3.4 Product Terminal Configuration

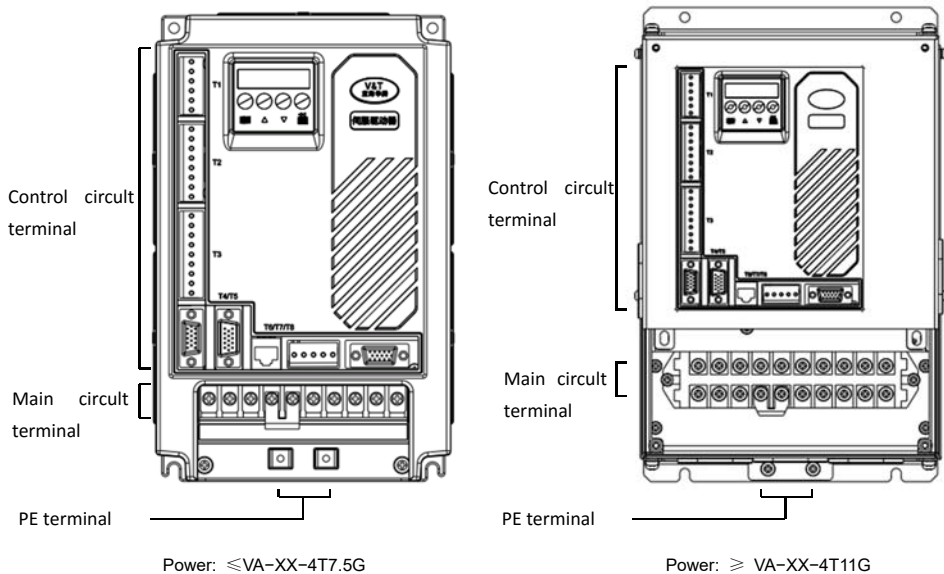
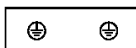


Figure3-2 Product terminal configuration

## 3.5 Main Circuit Terminal Introduction

### 3.5.1 VA-XX-4T3.7G~VA-XX-4T15G

R/L1	S/L2	T/L3	⊕1	⊕2/B1	B2	⊖	U/T1	V/T2	W/T3
POWER			OPTION			MOTOR			



Terminal symbol	Terminal name and function description
R/L1、S/L2、T/L3	Three-phase AC input terminal
⊕1、⊕2/B1	DC reactor connecting terminal, short circuited with copper bus upon delivery
⊕2/B1、B2	Braking resistor connecting terminal
⊕2/B1、⊖	DC power input terminal; DC input terminal for external braking unit
U/T1、V/T2、W/T3	Three-phase AC output terminal
⊕	Grounding terminal PE

## 3.6 Attention for Main Circuit Wiring

### 3.6.1 Power Supply Wiring

- ◆ It is forbidden to connect the three phase power supply cable to the drive output terminals; otherwise, the internal components of the drive will be damaged.
- ◆ The drive shall connect to the power supply through a circuit breaker or RCCB and contactor to protect the drive input against over current or disconnects the input power for maintenance.
- ◆ Please confirm that the power supply phases, rated input voltage are consistent with that of the nameplate, otherwise, the drive may be damaged.

### 3.6.2 Motor Wiring

- ◆ It is forbidden to short circuit or grounding the drive output terminal, otherwise the internal components of the drive will be damaged.
- ◆ Do not short circuit the output cable and the enclosure, otherwise electric shock may happen.
- ◆ It is forbidden to connect the output terminal of the drive to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the drive may be damaged.
- ◆ When contactor is installed between the drive and motor, it is forbidden to switch on/off the contactor when the drive is running; otherwise, large current will flow into the drive, triggering the drive protection action.
- ◆ Length of cable between the drive and motor
- ◆ If the cable between the drive and the motor is too long, the high-order harmonic leakage current of the output end will cause adverse impact on the drive and the peripheral devices. Output AC reactor

should be installed if the motor cable is longer than 100m, Refer to the following table for the carrier frequency setting.

Length of cable between the drive and motor	≤ 50m	≤ 100 m	> 100m
Carrier frequency	< 15kHz	< 10kHz	< 5kHz

### 3.6.3 Grounding Wiring

- ◆ The drive will produce leakage current. The higher the carrier frequency is, the larger the leakage current will be. The leakage current of the drive system is more than 3.5mA, and the specific value of the leakage current is determined by the application conditions. To ensure the safety, the drive and the motor must be grounded.
- ◆ The grounding resistance shall be less than 10 ohm. For the grounding wire diameter requirement, refer to “3.3 Models of Main Circuit Peripheral Devices”.
- ◆ Do not share grounding wire with the welding machine and other power equipment.
- ◆ In the applications with more than 2 drives, keep the grounding wire away from forming a loop.



Figure 3-3 Grounding wiring

### 3.6.4 Countermeasures for Conduction and Radiation Interference

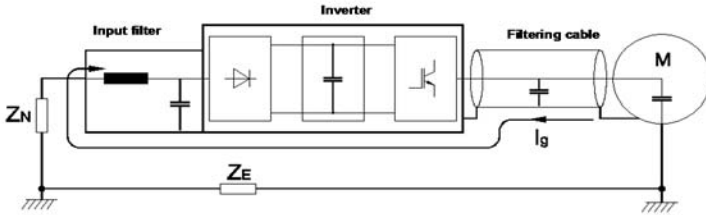


Figure3-4 Noise current illustration

- ◆ When the input noise filter is installed, the wire connecting the filter to the drive input power terminals shall be as short as possible.
- ◆ The filter enclosure and mounting cabinet shall be reliably connected in large area to reduce the back flow impedance of the noise current  $I_g$ .
- ◆ The wire connecting the drive and the motor shall be as short as possible. The motor cable adopts 4-core cable, with the grounding end grounded at the drive side, the other end connected to the motor enclosure. The motor cable shall be sleeved into the metal tube.
- ◆ The input power wire and output motor wire shall be kept away from each other as long as possible.
- ◆ The equipment and signal cables vulnerable to influence shall be kept far away from the drive.
- ◆ Main signal cables shall adopt shielded cable. It is suggested that the shielded layer shall be grounded with 360-degree grounding method and sleeved into the metal tube. The signal cable shall be kept far away from the drive input wire and output motor wire. If the signal cable must cross the input wire and output motor wire, they shall be kept orthogonal.
- ◆ When frequency reference is analog voltage or current signals, shielded twisted pair cable shall be used. The shielded layer shall be connected to the PE terminal of the drive, and the signal cable length should be less than 50m.
- ◆ The wires of the control circuit terminals RA/RB/RC and other control circuit terminals shall be separately routed.
- ◆ It is forbidden to short circuit the shielded layer and other signal cables or equipment.
- ◆ When the drive is connected to the inductive load equipment (e.g. electromagnetic contactor, relay and solenoid valve), surge suppressor must be installed on the load equipment coil, as shown in the following figure.

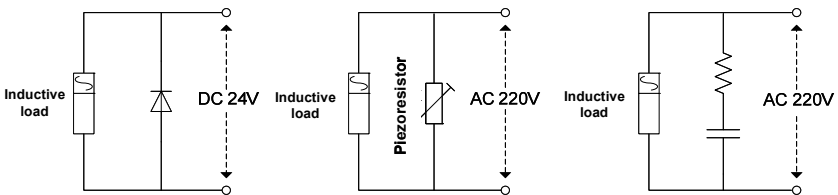


Figure3-5 Application of inductive load surge suppressor



### 3.7 Terminal Wiring

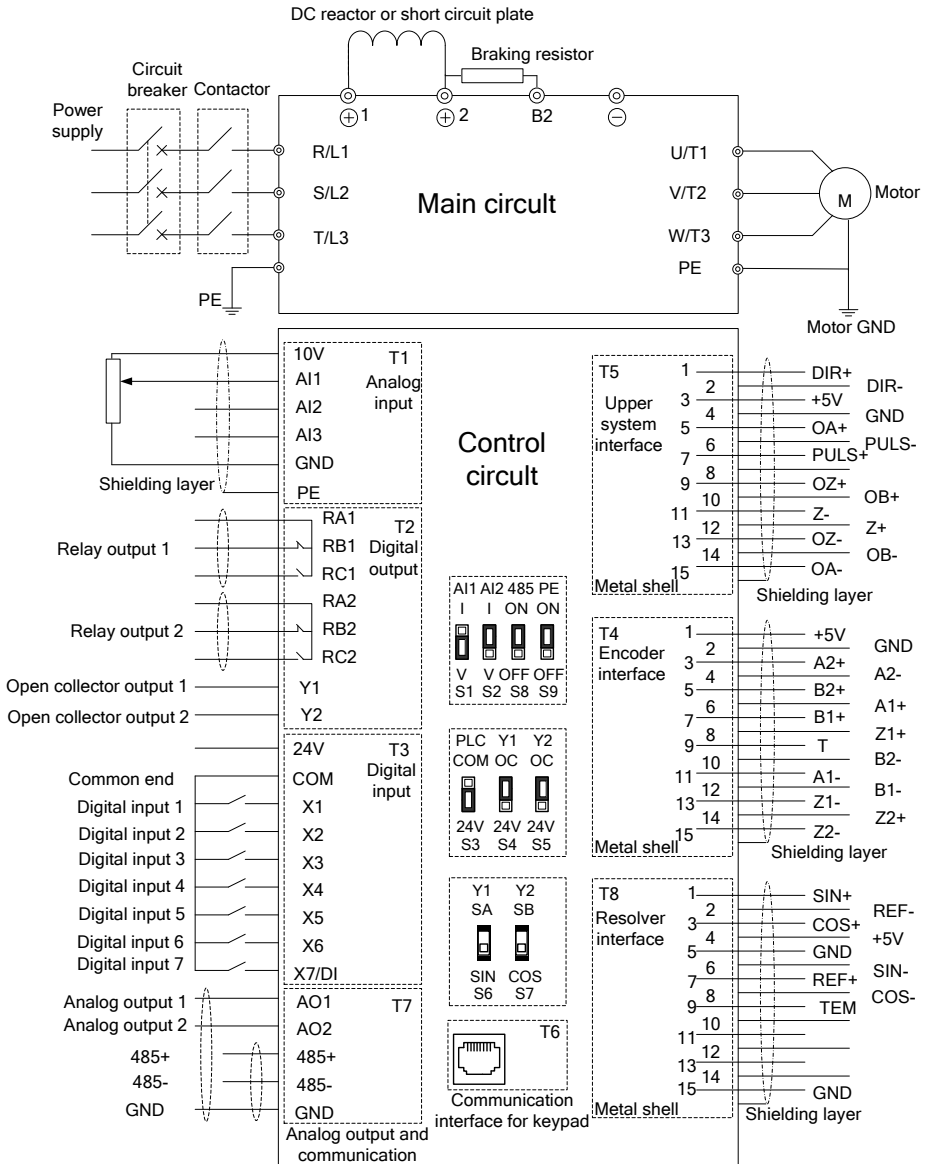
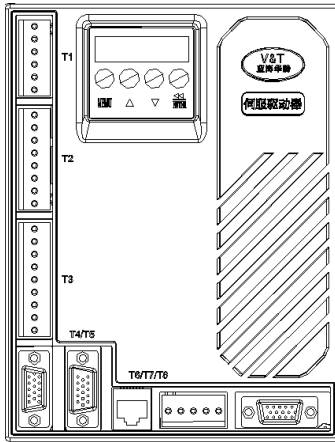
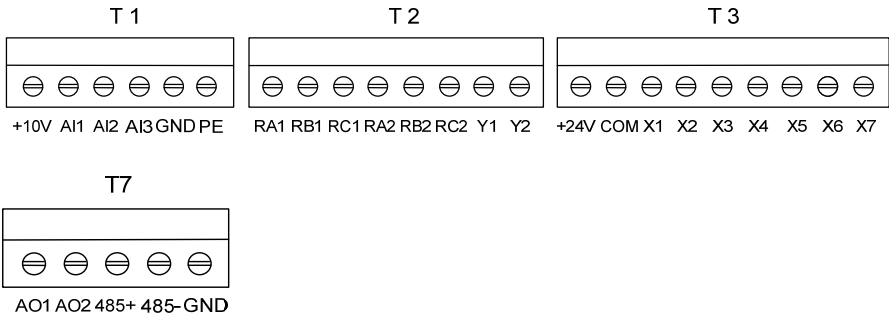


Figure3-6 Terminal wiring diagram

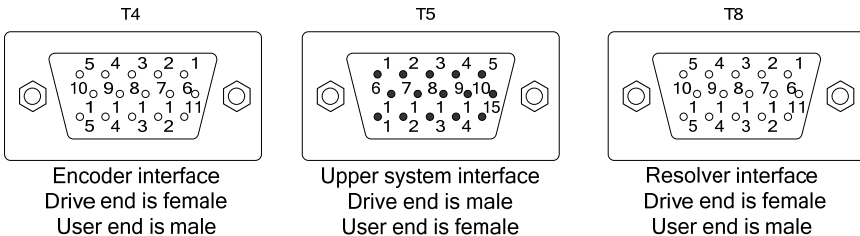
### 3.8 Control Circuit Terminal Position



#### ■ T1/T2/T3/T7 Terminal Sequence



#### ■ T4/T5/T8 Terminal Sequence



## 3.9 Functions of Control Circuit Terminals

Type	Terminal	Description	Specification
485	485+	Positive end of RS485	Rate: 4800/9600/19200/38400/57600bps Up to 32 sets of equipment can be paralleled. Relay shall be used if the number exceeds 32 Maximum distance: 500m
	485-	Negative end of RS485	
	GND	Ground terminal of RS485 shielding layer	Internal isolated with COM
	T6	485 port for operation panel	The maximum distance between the operation panel and the operation panel interface is 15 meters (standard twisted non-shielded network cable)
Digital input	+24V	+24V	24V $\pm$ 10%, internal isolated with GND Maximum output current: 200mA, with overload and short circuit protection
	PLC	Power supply of multi-function input terminal	Short circuited with +24V by default
	X1~X7	Multi-function input terminals 1 ~ 7	Input specification: 24VDC,5mA Frequency range: 0~200Hz Voltage range: 24V $\pm$ 20%
	COM	Ground terminal for +24V	Internal isolated with GND
Digital output	Y1	Open collector output	Voltage range: 24V $\pm$ 20% ; Maximum input current: 50mA
	Y2	Open collector output	
	COM	Open collector output common end	Internal isolated with GND
Analog input	+10V	Analog input reference voltage	10V $\pm$ 3%, internal isolated with COM Maximum output current: 10mA, with short circuit and overload protection
	AI1	Analog input channel 1	0~20mA: Input impedance 500 $\Omega$ Maximum input current: 30mA 0~10V: Input impedance 20k $\Omega$ Maximum input voltage: 15V Resolution: 12 bits (0.025%) 0~20mA or 0~10V input can be selected by jumper
	AI2	Analog input channel 2	
	AI3	Analog input channel 3	-10V~10V: input impedance 20k $\Omega$ Resolution: 12 bits (0.025%) Maximum input voltage: $\pm$ 15V
	GND	Analog ground terminal	Internal isolated with COM If connects adjustable potentiometer between +10V and GND, the resistance of the potentiometer shall be more than 5k $\Omega$ .
Analog output	AO1	Analog output 1	-10V~10V: allowable output impedance $\geq$ 10k $\Omega$ Output precision: 2% Resolution: 10 bits (0.1%) With short circuit protection
	AO2	Analog output 2	
	GND	Analog ground terminal	Internal isolated with COM
Relay output	RA1/RB1/R C1	Relay output	RA1~RB1: normally closed RA1~RC1: normally open Contact capacity: 250VAC/1A, 30VDC/1A
	RA2/RB2/R C2	Relay output	RA2~RB2: normally closed RA2~RC2: normally open Contact capacity: 250VAC/1A, 30VDC/1A

Type	Terminal	Description	Specification
Resolver interface and sincos encoder interface	1	SIN+	SIN+
	2	REF-	REF-
	3	COS+	COS+
	4	+5V	+5V power positive end
	5	GND	+5V power negative end
	6	SIN-	SIN-
	7	REF+	REF+
	8	COS-	COS-
	9	TEM	Temperature sensor (KTY-84 by default)
	10	/	/
	11	/	/
	12	/	/
	13	/	/
	14	/	/
Encoder interface	15	GND	+5V power negative end
	1	+5V1	+5V1 power positive end
	2	GND1	+5V1 power negative end
	3	A2+	2 <sup>nd</sup> encoder A2+
	4	A2-	2 <sup>nd</sup> encoder A2-
	5	B2+	2 <sup>nd</sup> encoder B2+
	6	A1+	1 <sup>st</sup> encoder A1+
	7	B1+	1 <sup>st</sup> encoder B1+
	8	Z1+	1 <sup>st</sup> encoder Z1+
	9	T	
	10	B2-	2 <sup>nd</sup> encoder B2-
	11	A1-	1 <sup>st</sup> encoder A1-
	12	B1-	1 <sup>st</sup> encoder B1-
	13	Z1-	1 <sup>st</sup> encoder Z1-
	14	Z2+	2 <sup>nd</sup> encoder Z2+
15	Z2-	2 <sup>nd</sup> encoder Z2-	
Upper system interface	1	DIR+	Pulse input DIR +
	2	DIR-	Pulse input DIR -
	3	+5V1	+5V1 power positive end
	4	GND1	+5V1 power negative end
	5	OA+	Encoder feedback output OA+
	6	PULS-	Pulse input PULS -
	7	PULS+	Pulse input PULS+
	8	/	/
	9	OZ+	Encoder feedback output OZ+
	10	OB+	Encoder feedback output 出 OB+
	11	Z-	Z+ signal input negative end
	12	Z+	Z+ signal input positive end
	13	OZ-	Encoder feedback output OZ-
	14	OB-	Encoder feedback output OB-
	15	OA-	Encoder feedback output OA-

Note: \* If connects adjustable potentiometer between +10V and GND, the resistance of the potentiometer shall be more than 5kΩ.

### 3.10 Pulse input Wiring mode

- Differential pulse input wiring mode

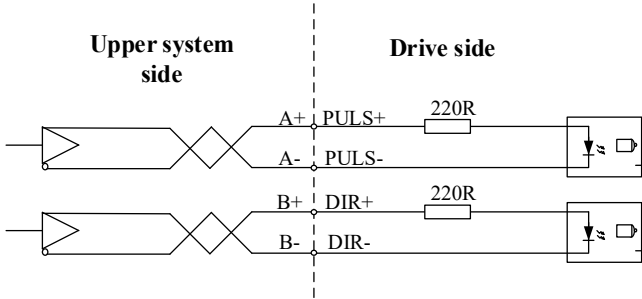
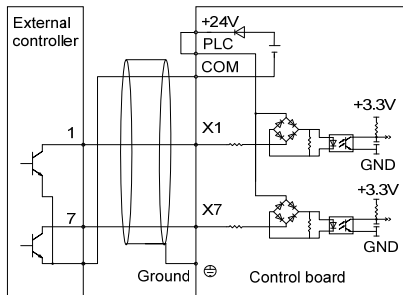


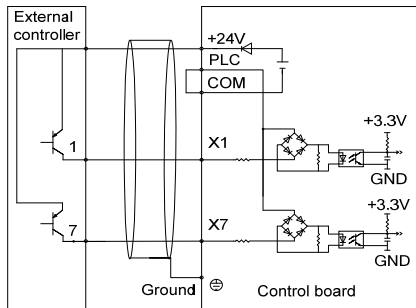
Figure 3-7 Differential pulse drive mode wiring

### 3.11 Digital input and digital output terminal wiring mode

- Apply internal +24V power supply, wiring in NPN sink current wiring mode



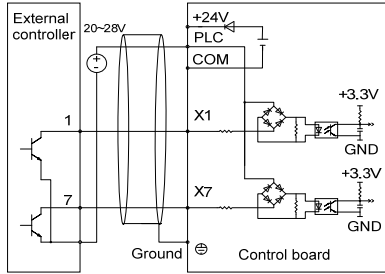
- Apply internal +24V power supply, wiring in PNP draw-off current wiring mode



Note:

The short-link line between terminal +24V and terminal PLC must be removed and short-link line shall be connected between terminal PLC and terminal COM.

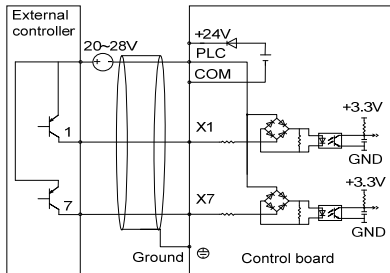
- Apply external power supply, wiring in NPN sink current wiring mode



**Note:**

The short-link line between terminal +24V and terminal PLC must be removed.

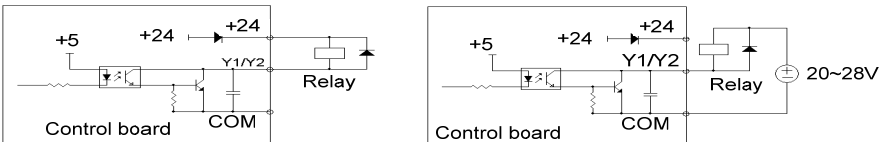
- Apply external power supply, wiring in PNP draw-off current wiring mode



**Note:**

The short-link line between terminal +24V and terminal PLC must be removed.

- The wiring modes of the multi-function output terminals apply internal +24V and external power supply



**Note:**

The external diode must be ensured the polarity is correct, otherwise, Y1/Y2 terminal will be damaged.

### 3.12 Control Circuit Peripheral Devices

Terminal number	Terminal screw	Tightening torque (N·m)	Cable specification (mm <sup>2</sup> )	Shielded twisted pair cable
+10V、AI1、AI2、AI3、485+、485-、AO1、AO2、GND	M3	0.5~0.6	0.75	Shielded cable
+24V、PLC、X1、X2、X3、X4、X5、X6、X7/DI、COM、Y1、Y2/DO、COM、RA、RB、RC、RA1、RC1、RA2、RC2	M3	0.5~0.6	0.75	Shielded twisted pair cable

### 3.13 Description of Jumper Function

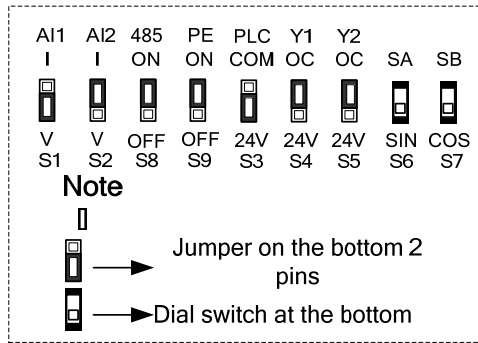


Figure 3-8 Jumper selection

Name	Function	Default
S1	AI1 jumper selection: I is the current input (4~20mA), V is the voltage input (0~10V)	0~10V
S2	AI2 jumper selection: I is the current input (4~20mA), V is the voltage input (0~10V)	4~20mA
S3	PLC jumper selection: PLC and COM short connection , PLC and +24V short connection	PLC and +24V short connection
S4	Y1 jumper selection: (Short connection with OC or +24V)	Y1~OC
S5	Y2 jumper selection: (Short connection with OC or +24V)	Y2~OC
S6	Resolver or sincos encoder selection	Resolver
S7	Resolver or sincos encoder selection	Resolver
S8	485 terminal resistor selection: ON: 100Ω terminal resistor is selected OFF: Terminal resistor is not selected	OFF
S9	PE selection: GND、COM to PE selection: ON: GND、COM and PE short connection OFF: GND、COM and PE not short connection	ON

## Chapter 4 Keypad Introduction

### 4.1 Introduction

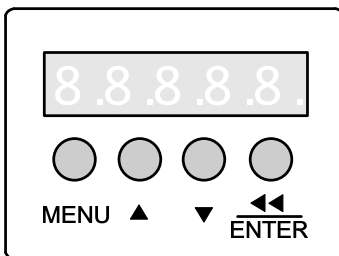


Figure 4-1 Keypad

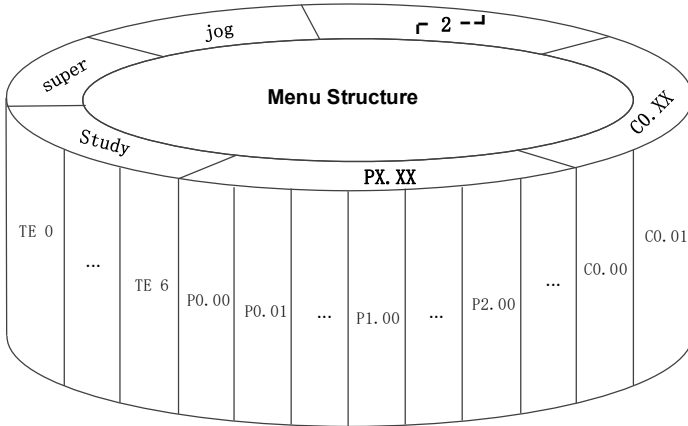
### 4.2 Description of Keys on Keypad

Symbol	Name	Description
<b>MENU</b>	<b>MENU</b>	<ol style="list-style-type: none"> <li>1、 Back to the previous menu.</li> <li>2、 Discard the current parameter modification.</li> <li>3、 Cycle through different menus in sequence.</li> </ol>
▲	▲	<ol style="list-style-type: none"> <li>1、 In first level menu, increase parameters number PX.YZ according to edit bit.</li> <li>2、 In second level menu, increase the parameters value.</li> <li>3、 In running status, increase the speed reference when the speed reference channel is keypad reference.</li> <li>4、 In the default display mode, view the monitoring values corresponding to the monitoring parameters of group C0.XX in sequence.</li> </ol>
▼	▼	<ol style="list-style-type: none"> <li>1、 In first level menu, decrease parameters number PX.YZ according to edit bit.</li> <li>2、 In second level menu, decrease the parameters value.</li> <li>3、 In running status, decrease the speed reference when the speed reference channel is keypad reference.</li> <li>4、 In the default display mode, view the monitoring values corresponding to the monitoring parameters of group C0.XX in sequence.</li> </ol>
◀◀ <b>ENTER</b>	<</ENTER	Shift key / Enter key: <ol style="list-style-type: none"> <li>1、 Long press to enter the next menu.</li> <li>2、 Long press to enter the parameters setting mode.</li> <li>3、 Long press data storage to confirm.</li> <li>4、 Cycle from right to left.</li> </ol>



### 4.3 Menu Style

#### 4.3.1 Menu Structure



#### 4.3.2 Identify LED Symbols

The relationship between characters displayed by LED and characters/numbers are as follows:

LED	Meanings	LED	Meanings	LED	Meanings	LED	Meanings
	0		9		N		S
	1		b		n		T
	2		C		O		t
	3		c		o		U
	4		d		P		V
	5		E		q		y
	6		F		-		j
	7		G		r		.
	8		A		J		

## 4.4 Keypad display and key operation

### 4.4.1 Display status classification

There are 7 types of display status of keypad:

SN	Status	Meaning
1	Display parameters in stop status	The default display interface in standby mode is the current system working mode.
2	Display parameters in running status	Press $\wedge$ 、 $\vee$ key to switch the displayed parameters, P0.17 can be used to set the displayed parameters
3	Fault and alarm display status	When the driver has a fault alarm, it will enter this state directly, which means that all the keyboard indicators are flashing.
4	Display status of first level menu	Press and hold the $\llcorner$ /ENTER key under the first level menu status to enter directly.
5	Display status of second level menu	Press and hold the $\llcorner$ /ENTER key under the first level menu display status to enter directly.
6	Modify parameter status	After entering the current user parameter, when the current edit bit flashes, you can modify the parameter value through the $\wedge$ 、 $\vee$ key.
7	Message status	Enter C0.XX parameter to view corresponding driver parameter status information in running or stop status.

### 4.4.2 LED Display and Description

LED display	Meaning	Description
	--2-	Display of system control mode in standby mode: 1: Position control mode 2: Speed control mode 3: Torque control mode
	study	Motor parameters auto-tuning mode, Long press $\llcorner$ /ENTER can enter the auto-tuning content selection interface
	SUPER	Reserved function for manufacturer
		In auto-tuning mode, press $\llcorner$ /ENTER to stop auto-tuning process
	JOG	Jog function, Long press $\llcorner$ /ENTER key to RUN or STOP

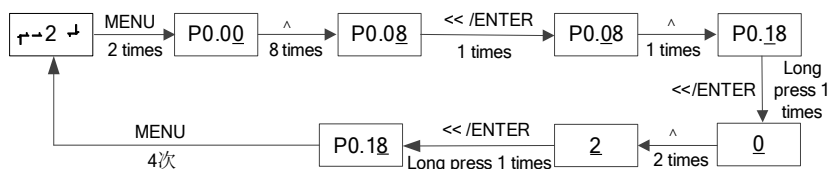
LED display	Meaning	Description
	TE 0	Auto-tuning mode selection. Long press $\ll$ /ENTER to start auto-tuning process after select auto-tuning mode Auto-tuning mode selection: TE 0: Auto-tuning is disabled TE 1: Motor parameters static auto-tuning TE 2: Motor parameters static auto-tuning +current loop PI auto-tuning TE 3: Motor parameters rotation auto-tuning TE 4: Motor parameters rotation auto-tuning +current loop PI auto-tuning TE 5: Motor parameters rotation auto-tuning +encoder auto-tuning TE 6: Motor parameters rotation auto-tuning +current loop PI auto-tuning +encoder auto-tuning
	GOOD	Good, auto-tuning function is completely OK. If the auto-tuning fails, the fault status will be displayed.
	P0.00	Parameters number
	C0.00	Monitoring parameter group
	FAIL	Fault report

## 4.5 Operation example

In the following example, the display parameter is the system working mode, and the system working mode is the speed control by default "r-2". Underlined in the following indicates the current edit bit.

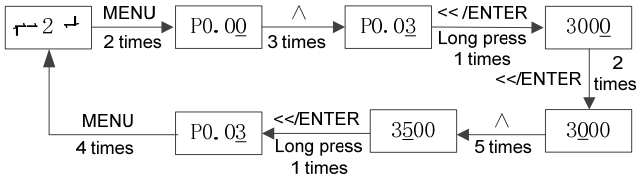
### 4.5.1 Reset to Factory Defaults

Reset to Factory Defaults, setting P0.18 to 2.

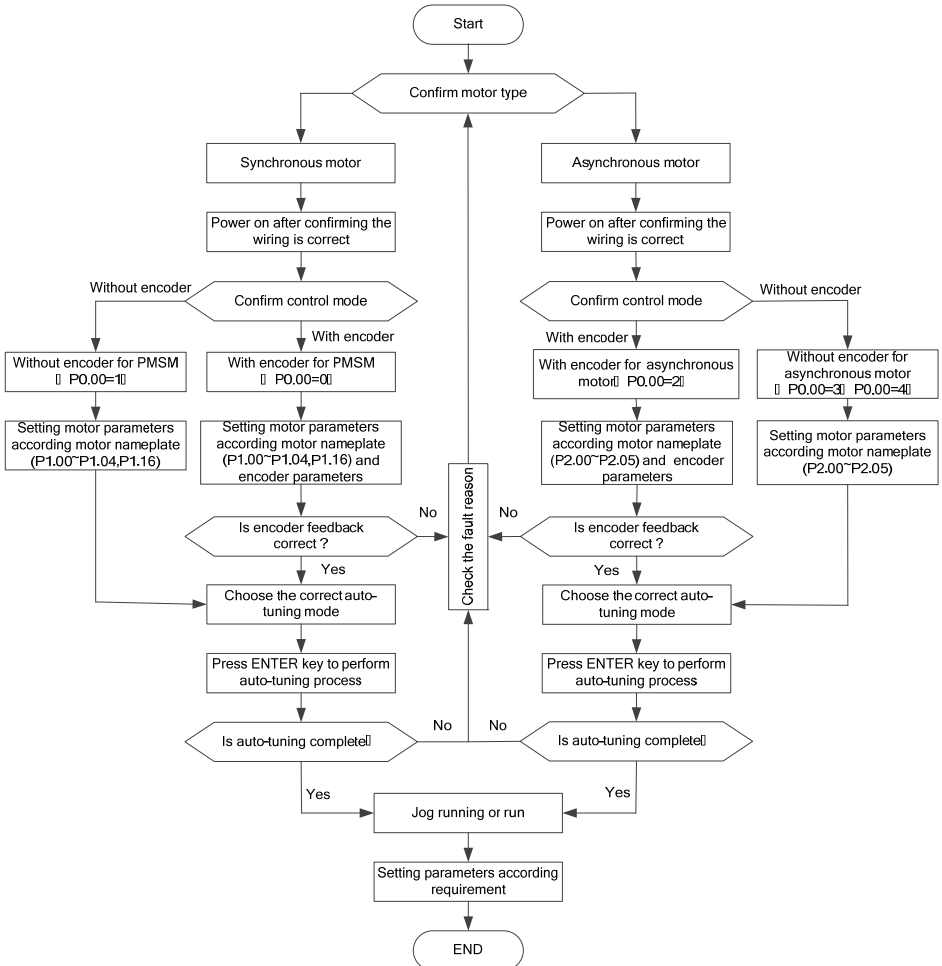


### 4.5.2 Change parameters

Setting maximum speed P0.03 to 3500.



### 4.6 Running for the First Time



## Auto-tuning description

Press **MENU** key till the LED display study, long press **<</ENTER** key to TE 0, and press **▲**、**▼** key to select auto-tuning mode, Finally, long press key **<</ENTER** to start the auto-tuning.

Auto-tuning mode:

TE 0: Auto-tuning is disabled

TE 1: Motor parameters static auto-tuning

TE 2: Motor parameters static auto-tuning +current loop PI auto-tuning

TE 3: Motor parameters rotation auto-tuning

TE 4: Motor parameters rotation auto-tuning +current loop PI auto-tuning

TE 5: Motor parameters rotation auto-tuning +encoder auto-tuning

TE 6: Motor parameters rotation auto-tuning +current loop PI auto-tuning +encoder auto-tuning

**Note:**

TE 1、TE 2、TE 3、TE 4 can be used in all control modes.

TE 5、TE 6 can be used with encoder feedback control mode and the control mode is sensor vector control.

When start auto-tuning mode of TE 3, TE 4, TE 5, TE 6, the motor will rotate, please pay attention to safety; please pay attention to whether the motor allows forward running and reverse running.

It is recommended to select TE 4 when the control mode is without encoder speed feedback and the motor allows forward and reverse rotation.

Select TE 2 when rotation is not allowed rotation.

Select TE 6 when the control mode is sensor control mode with encoder speedback.

Generally, the motor inertia may be different from that of the user's motor when leaving the factory. It is suggested that the user perform auto-tuning more than two times for better performance.

**Note:**

1. If the fault code Err X is displayed after auto-tuning, it means that the auto-tuning fails, and the wiring and parameters setting shall be rechecked for start auto-tuning again.

2. In the process of asynchronous motor auto-tuning, the acceleration and deceleration time is the speed loop acceleration and deceleration time. So the acceleration time P7.02 and deceleration time P7.03 should not be set too small or too large for asynchronous auto-tuning. Generally, they can be defaulted in self-learning. Default parameters are generally used.

**Trial operation method:**

In the power on default display "-2-".

Press "MENU/ESC" 5 times to enter trail mode and display "-JOG-".

Long press "<</ENTER" key to enter trail running speed reference and the display value "100".

Long press "<</ENTER" key to start trail running, the LED will display the output current, press the up and down keys to change the motor speed.

Long press "<</ENTER" key to stop trail running.

## Chapter 5 Parameter List

Description of each meaning in the function code parameter simple list

Simple list field	Explanation
Number of function code	Indicate the code of the function code, such as P0.00.
Name of function code	The name of the function code explains the function of the function code.
Factory value	The function code restores the setting value after the factory value is operated.
Setting range	Minimum value and maximum value allowed to be set by the function code;
Unit	V: voltage; A: current; °C: degree; Ω: ohm; mH: milligrant; rpm: rotating speed; %: percentage; bps: Baud rate Hz, kHz: frequency; ms, s, min, h, kh: time; kW: power; /: no unit, etc.
Attribute	○: The function code can be modified during operation; ×: This function code can only be modified during downtime; *: This function code is read-only and cannot be modified.
Option of function code	Setting list of function code parameter
User setting	For users to record parameters.

### 5.1 Parameter simple list of basic menu function code

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
<b>P0 group: system parameters</b>							
P0.00	Control method	1	0~4	1	×	0: synchronous inductive vector 1: synchronous non-inductive vector 2: asynchronous motor inductive vector 3: asynchronous motor non-inductive vector 1 4: asynchronous motor non-inductive vector 2	
P0.01	System working mode	2	0~3	1	×	1: position loop 2: speed loop 3: torque ring	
P0.02	Special machine code	0	0~4	/	×	0: general model 1~4: no function	
P0.03	Maximum rotating speed	3000	0~30000	1	×	0~30000	
P0.04	Enable selection	2	0~2	1	○	0: RS485 enable 1: terminal enable 2: keyboard enable	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P0.05	Speed command selection	1	0~9	1	○	0: RS485 given 1: keyboard given 2: AI1 given 3: AI2 given 4: AI3 given 5: terminal given 6: multi-speed 7: pulse input given 8: process PID given 9: simple PLC given	
P0.06	Keyboard running speed command	100	-3000~3000	rpm	○	-3000~3000	
P0.07	Initial value of terminal given rotating speed	100	-3000~3000	rpm	○	-3000~3000	
P0.08	Modification rate of terminal given rotating speed	1.0	0.1~6553.5	/	○	0.1~6553.5	
P0.09	Terminal given rotating speed attribute	0	0000~1111	/	○	Ones: whether the shutdown is allowed to be modified 0: allowed 1: not allowed Tens: running and modified rotating speed increment stop processing 0: keep 1: not keep Hundreds: power down processing 0: power down storage 1: power down and not storage	
P0.10	Speed command reverse	0	0~1	/	○	0: not reverse 1: reverse	
P0.11	Torque limit selection	0	0~3	/	×	0: parameter is used as limit 1: AI1 signal is used as limit 2: AI2 signal is used as limiter 3: AI3 signal is used as a limiter	
P0.12	Output power correction factor	100	0~200	1	○	0~200	
P0.13	Positive torque limiter	150	0~300.0	%	×	0~300.0	
P0.14	Negative torque limiter	150	0~300.0	%	×	0~300.0	
P0.15	Torque ring command selection	0	0~3	/	×	0: RS485 command 1: AI1 signal is used as limiter 2: AI2 signal is used as limiter 3: AI3 signal is used as a limiter	
P0.16	Parking mode	0	0~1	/	×	0: Free parking 1: slow down parking	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P0.17	Keyboard default	1	0~10000	/	○	C0.00~C0.XX	
P0.18	Parameter recovery/save	0	0~2	/	○	0: no operation 1: save all parameters 2: restore factory values	
P0.19	Allow enable and power on	0	0~1	/	○	0: do not allow enable and power-on 1: allow enable and power-on	
P0.20	Speed lower limit function selection	0	0~1	/	○	0: invalid 1: valid	
P0.21	Lower limit speed setting	1000	0~3000	rpm	○	0~3000	
P0.22	Output power filter coefficient	20	1~600	/	○	1~600	
P0.23	Motor overload protection time	600	10~65535	S	○	10~65535	
P0.24	Motor temperature alarm point	100	40~200	℃	○	40~200	
P0.25	Motor temperature sensor selection	0	0~1	/	○	0: KTY84-130 1: PT100	
P0.26	Overvoltage stall protection allowing	1	0~1	/	○	0: not allowed 1: allowed	
P0.27	Overvoltage stall protection point	730.0	0.0~6553.5	V	○	0.0~6553.5	
P0.28	Random super password verification	Random	0~9999	/	○	0~9999	
P0.29	Machine authorization code			/	×		
P0.30	Overcurrent stall protection allowing	1	0~1	/	×	0: not allowed 1: allowed	
P0.31	Overcurrent stall protection point	100	0~100	%	×	0~100	
P0.32	Undervoltage recovery self-start function selection	0	0~2	/	○	0: Fault free parking, turn off enable 1: stop according to the setting mode, turn off enable 2: stop according to the setting mode, not turn off enable	
P0.33	Power failure to judge voltage	0.0	0.0~800.0	V	○	0.0~800.0	
P0.34	Power failure maintaining voltage	0.0	0.0~1000.0	V	○	0.0~1000.0	
P0.35	Power failure protection rotating speed	0.0	0~30000	RPM	○	0~30000	



Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P0.36	Software compilation time (year)						
P0.37	Software compilation time (month, day)						
P0.38	Software compilation time (hours, minutes)						
P0.39	Encoder feedback frequency filter coefficient	0	0~65535		○	0~65535	
P0.40	Voltage regulation ratio	1.00	0.00~100.00		○	0.00~100.00	
P0.41	Voltage regulation integral	200	0~65535		○	0~65535	
P0.42	Automatic speed reduction voltage regulation	5	0~510.0		○	0.0~510.0V, the setting value is greater than P0.33 function start, other value function is invalid	
P0.43	Input pulse frequency filter coefficient	0.5	0.0~6553.5	s	○	0.0~6553.5	
<b>P1 group: synchronous motor parameters</b>							
P1.00	Rated power of synchronous motor	18.2	0.1~300.0	kW	○	0.1~300.0	
P1.01	Rated voltage of synchronous motor	380	0~1400	V	○	0~1400	
P1.02	Rated rotating speed of synchronous motor	3000	0~30000	rpm	○	0~30000	
P1.03	Rated voltage of synchronous motor	36.0	0.1~1000.0	A	○	0.1~1000.0	
P1.04	Pole pair of synchronous motor	4	1~99	/	×	1~99	
P1.05	Stator phase resistance of synchronous motor	0.3	0.001~4.000	Ω	○	0.001~4.000	
P1.06	Permanent magnet flux linkage of synchronous motor	250	1~4000	mWb	○	1~4000	
P1.07	D-axis inductance of synchronous motor	3.2	0.00~80.00	mH	○	0.00~80.00	
P1.08	Q-axis inductance of synchronous motor	3.4	0.00~80.00	mH	○	0.00~80.00	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P1.09	Lifting coefficients of synchronous non-inductive torque	300	0~300	%	○	0~300	
P1.10	Synchronous maximum D-axis current	15.0	0.0~1000.0	A	○	0.0~1000.0	
P1.11	Synchronous non-inductive start mode	1	0~2	/	○	0: direct 0 speed start 1: rotating speed tracking start 2: start with initial position recognition	
P1.12	Allow MTPA	0	0~1	/	○	0: MTPA not allowed 1: MTPA allowed	
P1.13	Salient pole rate type of synchronous motor	0	0~1	/	○	0: salient pole rate is greater than 1 1: salient pole rate is less than 1	
P1.14	Initial position identification signal strength	4	2~6	1	○	2~6	
<b>P2 group: synchronous motor parameters</b>							
P2.00	Rated voltage of asynchronous motor	380	1~1140	V	○	1~1140	
P2.01	Rated power of asynchronous motor	4.0	0.4~6553.5	KW	×	0.4~6553.5	
P2.02	Rated frequency of asynchronous motor	50.0	0.0~6553.5	HZ	○	0.0~6553.5	
P2.03	Pole pair of asynchronous motor	2	1~100	/	×	1~100	
P2.04	Rated rotating speed of asynchronous motor	1450	2~65535	rpm	×	2~65535	
P2.05	Rated current of asynchronous motor	8.0	0.5~6553.5	A	○	0.5~6553.5	
P2.06	No-load current of asynchronous motor	5.0	0.5~6553.5	A	○	0.5~6553.5	
P2.07	Stator resistance of asynchronous motor	1.000	0.002~65.535	Ω	○	0.002~65.535	
P2.08	Stator leakage inductance of asynchronous motor	6.00	0.02~655.35	H	○	0.02~655.35	
P2.09	Rotor resistance of asynchronous motor	0.6	0.002~65.535	Ω	○	0.002~65.535	
P2.10	Mutual inductance of asynchronous motor	90.00	0.02~655.35	H	○	0.02~655.35	
P2.11	Full resistance of asynchronous motor	1.000	0.002~65.535	Ω	○	0.002~65.535	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P2.12	Oscillation suppression allowing of asynchronous motor	1	0~1	/	○	0: not allowed 1: allowed	
P2.13	Oscillation suppression factor of asynchronous motor	50	0~100	/	○	0~100	
P2.14	Starting mode of asynchronous motor	0	0~2	/	○	0: start frequency starting 1: DC brake start 2: rotating speed tracking start	
P2.15	Starting frequency of asynchronous motor	0.50	0.00~60.00	HZ	○	0.00~60.00	
P2.16	Starting frequency keeping time of asynchronous motor	0.0	0.0~3600.0	S	○	0.0~3600.0	
P2.17	Rotating speed tracking current of asynchronous motor	25.0	0.1~100.0	A	○	0.1~100.0	
P2.18	Rotating speed tracking search time of asynchronous motor	0.5	0.2~200.0	S	○	0.2~200.0	
P2.19	DC braking current of asynchronous motor	0.0	0.0~200.0	%	○	0.0~200.0	
P2.20	DC braking start frequency of asynchronous motor	0.00	0.00~300.00	Hz	○	0.00~300.00	
P2.21	DC brake keeping time of asynchronous motor	0.00	0.00~30.00	S	○	0.00~30.00	
P2.22	Slip compensation gain of asynchronous motor	100.0	0.00~300.0	%	○	0.0~300.0	
P2.23	Power generation state slip limiter	300	0~65535	RPM	○	0~65535	
P2.24	Motorized state slip limiter	600	0~65535	RPM	○	0~65535	
<b>P3 group: terminal input and output parameters</b>							
P3.00	Terminal operation control mode	0	0~3	1	○	0: two-wire type 1: two-wire type 2 2: three-wire type 1 3: three-wire type 2 4: three-wire type 3	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P3.01	X1 terminal function	0	0~30	/	○	0: no function 1: enable 2: inverted direction 3: enable + positive direction command 4: enable + reverse direction command 5: external fault 6: fault reset 7: multi-speed 0 8: multi-speed 1 9: multi-speed 2 10: multi-speed 3 11: spindle positioning 12: cut position loop 13: process PID integral suspension 14: process PID terminal switching 15: PID forced speed switching 16: simple PLC current segment timing clear 17: simple PLC reset 18: terminal given speed increasing 19: terminal given speed decreasing 20: terminal given speed increment clear 21: normal inching turning 22: reverse inching turning 23: three-wire control 24: zero servo 25: emergency stop 26: positioning selection 1 27: positioning selection 2 28: positioning selection 3 29: positioning point acquisition 30: input pulse clear 31: terminal given speed is prohibited to reverse 32: the second encoder of position loop cutting	
P3.02	X2 terminal function	0	Same as above.	/	○	Same as above.	
P3.03	X3 terminal function	0	Same as above.	/	○	Same as above.	
P3.04	X4 terminal function	0	Same as above.	/	○	Same as above.	
P3.05	X5 terminal function	0	Same as above.	/	○	Same as above.	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P3.06	X6 terminal function	0	Same as above.	/	○	Same as above.	
P3.07	X7 terminal function	0	Same as above.	/	○	Same as above.	
P3.08	Y1 terminal output function selection	0	0~16	/	○	0: no function 1: ready 2: slow power on completion 3: run 4: speed reaches the upper limit 5: speed reaches the lower limit 6: release 7: acceleration process 8: deceleration process 9: fault output 10: positioning completed output 11: speed reaching output 12: speed loop / position loop switching state output 13: simple PLC stage running completion output 14: simple PLC cycle running completion output 15: communication control output 16: arrive at zero speed 17: position reaching signal	
P3.09	Y2 terminal output function selection	0	Same as above.	/	○	Same as above.	
P3.10	Output function selection of relay 1	0	Same as above.	/	○	Same as above.	
P3.11	Output function selection of relay 2	0	Same as above.	/	○	Same as above.	
P3.12	Output function selection of relay 3	0	Same as above.	/	○	Same as above.	
P3.13	X terminal logic inversion	0	0~127	/	○	0~127	
P3.14	X1 input filtering times	0	0~10	1	○	0~10	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P3.15	Enable selection of terminal cut position loop	0	0~1	/	○	0: no enable 1: enable	
P3.16	Detection threshold of speed reaching signal	5	0~65535	Rpm	○	0~65535	
<b>Group P4: analog input and output parameters</b>							
P4.00	AI1 filter time constant	0.5	0.0~100.0	mS	○	0.0~100.0	
P4.01	AI1 zero bias	0.00	200.00~200.00	%	○	-200.00~200.00	
P4.02	AI1 gain	100.0	0.00~200.00	%	○	0.00~200.00	
P4.03	AI2 filter time constant	0.5	0.0~100.0	mS	○	0.0~100.0	
P4.04	AI2 zero bias	0.00	200.00~200.00	%	○	-200.00~200.00	
P4.05	AI2 gain	100.0	0.00~200.00	%	○	0.00~200.00	
P4.06	AI3 function selection			/		Not available	
P4.07	AI3 filter time constant	0.5	0.0~100.0	mS	○	0.0~100.0	
P4.08	AI3 zero bias	0.0	200.00~200.00	%	○	-200.00~200.00	
P4.09	AI3 gain	100.0	0.00~200.00	%	○	0.00~200.00	
P4.10	AO1 function selection	0	0~20	/	○	0: speed command. 1: speed feedback. 2: Q axis current command. 3: Q-axis current feedback. 4: bus voltage. 5~20: (reserved)	
P4.11	AO1 gain	100%	0~200%	/	○	0~200%	
P4.12	AO1 zero bias	0	-32768~32767	/	○	-32768~32767	
P4.13	AO2 function selection	0	0~20	/	○	0: speed command. 1: speed feedback. 2: Q axis current command. 3: Q-axis current feedback. 4: bus voltage. 5~20: (reserved)	
P4.14	AO2 gain	100%	0~200%	/	○	0~200%	
P4.15	AO2 zero bias	0	-32768~32767	/	○	-32768~32767	
<b>P5 group: encoder parameters</b>							
P5.00	Motor feedback encoder selection	0	0~1	1	○	0: the first photoelectric encoder 1: resolver	
P5.01	Sinusoidal signal zero bias	0	-32768~32767	1	○	-32768~32767	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P5.02	Cosine signal zero bias	0	-32768~32767	1	○	-32768~32767	
P5.03	Resolver amplitude correction factor	16209	0~65535	1	○	0~65535	
P5.04	Resolver anomaly detection threshold	14384	0~65535	1	○	0~65535	
P5.05	Initial deflection angle of synchronous motor	0	0~65535	1	○	0~65535	
P5.06	Resolver pole logarithm	1	1~99	1	○	1~99	
P5.07	Resolver phase sequence exchange	0	0~1	1	○	0: not exchange 1: exchange	
P5.08	Line number of first photoelectric encoder	1024	4~65535	1	○	Line number of the first photoelectric encoder;	
P5.09	Gear ratio of the first photoelectric encoder	1	1~65535	1	○	1~65535	
P5.10	Gear ratio of the first photoelectric encoder Denominator	1	1~65535	1	○	1~65535	
P5.11	Direction of the first photoelectric encoder	0	0~1	1	○	0: invariant 1: inverted	
P5.12	Line number of second photoelectric encoder	1024	4~65535	1	○	4~65535	
P5.13	Gear ratio of the second photoelectric encoder Molecule	1	1~65535	1	○	1~65535	
P5.14	Gear ratio of the second photoelectric encoder Denominator	1	1~65535	1	○	1~65535	
P5.15	Direction of the second photoelectric encoder	0	0~1	1	○	0: invariant 1: inverted	
P5.16	Angle compensation coefficient	4000	10~10000	1	○	10~10000	
<b>P6 group: pulse input / encoder output parameters</b>							
P6.00	Pulse input type	0	0~2	1	○	0: orthogonal 1: pulse + direction 2: CW + CCW	
P6.01	Pulse input direction	0	0~1	1	○	0: invariant 1: inverted	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P6.02	Speed pulse input gear ratio Molecule	1	1~65535	1	○	1~65535	
P6.03	Speed pulse input gear ratio Denominator	1	1~65535	1	○	1~65535	
P6.04	Speed pulse input filtering	10	0~65535	1	○	0~65535	
P6.05	Encoder feedback output pulse Number of lines	1024	4~65535	1	○	4~65535	
P6.06	Encoder feedback output pulse Z pulse bias	0	0~65535	1	○	0~65535	
P6.07	Encoder feedback output pulse method	0	0~2	1	○	0: Direct output of the first optical encoder 1: direct output of the second optical encoder 2: resolver	
<b>P7 group: debugging parameters</b>							
P7.00	Speed loop gain	40.0	0.0~1000.0	Hz	○	0.0~1000.0	
P7.01	Speed loop integral time constant	10.0	0.0~6553.5	mS	○	0.0~6553.5	
P7.02	Acceleration time	5.00	0.00~120.00	S	○	0.00~120.00	
P7.03	Deceleration time	5.00	0.00~120.00	S	○	0.00~120.00	
P7.04	Motor inertia	200	1~65535	kg*m <sup>2</sup> *1000 0	○	1~65535	
P7.05	Weak magnetic gain	300	0~800	1	○	0~800	
P7.06	Speed command filter time constant	0	0~100	mS	○	0~100	
P7.07	Speed feedback filtering times	15	1~200	1	○	1~200	
P7.08	Acceleration time 1	5.00	0.00~120.00	S	○	0.00~120.00	
P7.09	Deceleration time 1	5.00	0.00~120.00	S	○	0.00~120.00	
P7.10	Acceleration time 2	5.00	0.00~120.00	S	○	0.00~120.00	
P7.11	Deceleration time 2	5.00	0.00~120.00	S	○	0.00~120.00	
P7.12	Acceleration time 3	5.00	0.00~120.00	S	○	0.00~120.00	
P7.13	Deceleration time 3	5.00	0.00~120.00	S	○	0.00~120.00	



Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
<b>P8 group: current loop parameters</b>							
P8.00	Voltage utilization rate	95	84~120	%	○	84~120	
P8.01	Current loop gain	5.0	0.0~100.0	V/A	○	0.0~100.0	
P8.02	Current loop integral time constant	10.0	0.0~6553.5	mS	○	0.0~6553.5	
P8.03	Debug mode control word	0	0~65535	1	○	0~65535	
P8.04	Debug input 1	0	0~65535	1	○	0~65535	
P8.05	Debug input 2	0	0~65535	1	○	0~65535	
P8.06	High speed current loop gain	5.0	0.0~200.0	V/A	○	0.0~200.0	
P8.07	High speed current loop integral time Constant	10.0	0.0~6553.5	mS	○	0.0~6553.5	
P8.08	High speed current loop PI switching	0	0~1	/	○	0: switching 1: not switch	
P8.09	High speed current loop PI strength	100	50~150	/	○	50~150	
P8.10	Compensation gain	50	0~100			0~100	
<b>P9 group: position loop parameters</b>							
P9.00	Position loop gain	5.0	0.0~6553.5	/	○	0.0~6553.5	
P9.01	Position loop speed limiter	1500	0~65535	1	○	0~65535	
P9.02	Position loop acceleration time	0.00	0.00~655.35	S	○	0.00~655.35	
P9.03	Position loop deceleration time	0.00	0.00~655.35	S	○	0.00~655.35	
P9.04	Position reaching detection window	5	0~65535	1	○	0~65535	
P9.05	Position loop pulse input gear ratio molecule	1	1~65535	1	○	1~65535	
P9.06	Position loop pulse input gear ratio denominator	1	1~65535	1	○	1~65535	
P9.07	Position feedforward gain	0.00	0~200.00	/	○	0~200.00	
P9.08	Position feedforward filtering time	0.000	0~2.000	s	○	0~2.000	
P9.09	Position command filtering	0	0~65535	/	○	0~65535	
P9.10	Position loop output filtering time	0.000	0.000~65.535	s	○	0.000~65.535	
P9.11	Position loop feedback encoder selection	0	0~1	/	○	0: motor end encoder 1: the second encoder	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
P9.12	Pulse input gear ratio molecule of the second encoder	1	1~65535	1	○	1~65535	
P9.13	Pulse input gear ratio denominator of the second encoder	1	1~65535	1	○	1~65535	
P9.14	Transmission ratio filter coefficient of the second encoder	0.5	0.1~6553.5	S	○	0.1~6553.5	
<b>PA 组 定位参数</b> <b>PA group: positioning parameters</b>							
PA.00	Positioning encoder selection	0	0~2	1	○	0: The first photoelectric encoder 1: resolver 2: the second photoelectric encoder	
PA.01	Positioning position 1	0	0~65535	1	○	0~65535	
PA.02	Positioning search speed	0	0~65535	1	○	0: Direct positioning 1~65535	
PA.03	Positioning deceleration time	2.00	0.00~655.35	S	○	0.00~655.35	
PA.04	Position loop positioning gain	5.0	0.0~6553.5	0.1	○	0.0~6553.5	
PA.05	Maximum speed of direct positioning	500	0~1500	Rpm	○	0~1500	
PA.06	Positioning direction	0	0~2	/	○	0: Original running direction 1: positive direction 2: negative direction	
PA.07	Positioning position 2	0	0~65535	1	○	0~65535	
PA.08	Positioning position 3	0	0~65535	1	○	0~65535	
PA.09	Positioning position 4	0	0~65535	1	○	0~65535	
PA.10	Positioning position 5	0	0~65535	1	○	0~65535	
PA.11	Positioning position 6	0	0~65535	1	○	0~65535	
PA.12	Positioning position 7	0	0~65535	1	○	0~65535	
PA.13	Positioning position 8	0	0~65535	1	○	0~65535	
PA.14	Positioning completion signal output delay	1	0~65535	ms	○	0~65535	
PA.15	Inertia self-learning circle	1	0~20	/	○	0~20	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
PA.16	Inertia self-learning time	0.2	0.0~10.0	S	○	0.0~10.0	
PA.17	Inertia self-learning operation	0	0~65535	/	○	0: no action 6666: start self-learning	
PA.18	Speed feedforward (position loop takes effect)	0.00	0.00~250.00		○	0.00~250.00	
PA.19	Speed feedforward filtering (position loop takes effect)	0.0	0.0~100.0		○	0.0~100.0	
<b>PB group: communication parameters</b>							
PB.00	RS485 local address	1	1~253	1	○	1~253	
PB.01	RS485 baud rate	3	0~5	1	○	0:4800                    1:9600 2:19200                 3:38400 4:57600                 5:115200	
PB.02	Keyboard download permission (not available)	0	0~1	1	○	0: Do not allow the keyboard to be downloaded in batches. 1: allow the keyboard to be downloaded in batches.	
PB.03	Communication data format	000	0~289	1	○	LED ones: data bit 0: 8-bit data bit 1: 7-bit data bit LED tens: parity check bit 0: no check 1: odd check 2: even check, LED hundreds: stop bit 0: 1 stop bit 1: two stop bits	
PB.04	485 communication time-out period	0	0~65535	1	○	0 (invalid) 1-65535	
PB.05	485 communication response delay	0	0~65535	ms	○	0~65535	
<b>PC group: simple PLC parameters</b>							
PC.00	Simple PLC operation mode	0	0~3	1	○	0: stop after a single run 1: keep the final value after a single run 2: continuous cycle 3: limited cycle	
PC.01	Simple PLC power-down memory selection	0	0000~FFFF	1	○	Ones: power-down memory selection 0: no memory 1: power-down memory Tens: stop and keep selection 0: not keep 1: keep	
PC.02	The first speed source selection	0	0~5	1	○	0: multi-speed 1 1:485 communication given 2: keyboard given 3: AI1 4: AI2                    5: AI3 4: AI2 5: AI3	
PC.03	Multi-speed 1	0	-32768~32767	rpm	○	-32768~32767	
PC.04	Multi-speed 2	0	-32768~32767	rpm	○	-32768~32767	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
PC.05	Multi-speed 3	0	-32768~32767	rpm	○	-32768~32767	
PC.06	Multi-speed 4	0	-32768~32767	rpm	○	-32768~32767	
PC.07	Multi-speed 5	0	-32768~32767	rpm	○	-32768~32767	
PC.08	Multi-speed 6	0	-32768~32767	rpm	○	-32768~32767	
PC.09	Multi-speed 7	0	-32768~32767	rpm	○	-32768~32767	
PC.10	Multi-speed 8	0	-32768~32767	rpm	○	-32768~32767	
PC.11	Multi-speed 9	0	-32768~32767	rpm	○	-32768~32767	
PC.12	Multi-speed 10	0	-32768~32767	rpm	○	-32768~32767	
PC.13	Multi-speed 11	0	-32768~32767	rpm	○	-32768~32767	
PC.14	Multi-speed 12	0	-32768~32767	rpm	○	-32768~32767	
PC.15	Multi-speed 13	0	-32768~32767	rpm	○	-32768~32767	
PC.16	Multi-speed 14	0	-32768~32767	rpm	○	-32768~32767	
PC.17	Multi-speed 15	0	-32768~32767	rpm	○	-32768~32767	
PC.18	Multi-speed 16	0	-32768~32767	rpm	○	-32768~32767	
PC.19	Simple PLC 1st speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.20	Simple PLC 1st speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.21	Simple PLC 2nd speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.22	Simple PLC 2nd speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.23	Simple PLC 3rd speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.24	Simple PLC 3rd speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.25	Simple PLC 4th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.26	Simple PLC 4th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.27	Simple PLC 5th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.28	Simple PLC 5th speed acceleration and deceleration	0	0~3	/	○	0~3	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
	time selection						
PC.29	Simple PLC 6th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.30	Simple PLC 6th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.31	Simple PLC 7th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.32	Simple PLC 7th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.33	Simple PLC 8th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.34	Simple PLC 8th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.35	Simple PLC 9th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.36	Simple PLC 9th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.37	Simple PLC 10th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.38	Simple PLC 10th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.39	Simple PLC 11th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.40	Simple PLC 11th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.41	Simple PLC 12th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.42	Simple PLC 12th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.43	Simple PLC 13th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
PC.44	Simple PLC 13th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.45	Simple PLC 14th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.46	Simple PLC 14th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.47	Simple PLC 15th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.48	Simple PLC 15th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.49	Simple PLC 16th speed running time	0.0	0.0~6553.5	s(H)	○	0.0~6553.5	
PC.50	Simple PLC 16th speed acceleration and deceleration time selection	0	0~3	/	○	0~3	
PC.51	Simple PLC running time unit	0	0~1	/	○	0: S          1: H	
PC.52	PLC limited number of cycles	1	1~65535	1	○	1~65535	
PC.53	Jog rotating speed	100	-8000~8000	rpm	○	-8000~8000	
PC.54	Jog acceleration time	5.00	0.00~120.00	s	○	0.00~120.00	
PC.55	Jog deceleration time	5.00	0.00~120.00	s	○	0.00~120.00	
<b>PD group: process PID parameters</b>							
PD.00	Process closed loop enable	0	0~1	1	○	0: off 1: on	
PD.01	PID given source selection	0	0~3	1	○	0: Keyboard setting 1: AI1 2: AI2                  3: AI3 2: I2 3: AI3	
PD.02	PID feedback source selection	1	0~3	1	○	0: Communication given 1: AI1 2: AI2                  3: AI3 2: AI2 3: AI3	
PD.03	Process closed-loop keyboard setting	20.00	0.00~100.00	%	○	Relative value, 100.00% corresponds to 100.00% of feedback amount, 0.00~100.00%	
PD.04	Process closed-loop ratio P1	10.00	0.00~655.35	%	○	0.00~655.35	
PD.05	Process closed-loop integral I1	5.00	0.00~655.35	s	○	0.00~655.35	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
PD.06	Process closed-loop differential D1	0.00	0.00~655.35	s	○	0.00~655.35	
PD.07	Sampling time	1	1~65535	2ms	○	1~65535	
PD.08	Deviation limit	0.10	0.00~655.35	%	○	0.00~655.35	
PD.09	PID adjustment limit selection	0	0~1	/	○	0: Positive polarity 1: negative polarity	
PD.10	PID output upper limit	100.00	P9.11~100.00%	%	○	P9.11~100.00%	
PD.11	PID output lower limit	0.00	-100.00%~P9.10	%	○	-100.00%~P9.10	
PD.12	PID feedback disconnection detection threshold	0.00	0.00~100.00%	%	○	0.00% 不検測 0.00% not detect 0.01~100.00% 0.01 -100.00%	
PD.13	PID feedback disconnection detection time	0.0	0.0~6553.5	s	○	0.0~6553.5 0.0~6553.5	
PD.14	PID adjustment selection	0	0000~1111	/	○	0bit: integral pause XI terminal control 0: invalid 1: valid 1bit: whether to stop integration when the output reaches the limit value; 0: stop 1: not stop 2bit: Whether the output allows to reverse 0: allowed 1: not allowed	
PD.15	PID given feedback range	1000	1~65535	1	○	1~65535	
PD.16	Differential limiter	5.00	0.00~100.00%	%	○	0.00~100.00%	
PD.17	PID given change time	0.00	0.00~655.35	s	○	0.00~655.35	
PD.18	PID feedback filtering time	0.00	0.00~655.35	s	○	0.00~655.35	
PD.19	PID output filtering time	0.00	0.00~655.35	s	○	0.00~655.35	
PD.20	Process closed-loop ratio P2	20.00	0.00~655.35	/	○	0.00~655.35	
PD.21	Process closed-loop integral I2	1.00	0.00~655.35	s	○	0.00~655.35	
PD.22	Process closed-loop differential D2	0.00	0.00~655.35	s	○	0.00~655.35	
PD.23	PID parameter switching condition	0	0~2	/	○	0: not switch 1: XI terminal switching 2: automatic switching according to deviation	
PD.24	PID parameter switching deviation 1	20.00	0.00%~P9.26	%	○	0.00%~P9.26	
PD.25	PID parameter	80.00	P9.25~100.00%	%	○	P9.25~100.00%	

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
	switching deviation 2						
PD.26	PID initial value	0.00	0.00%~100.00%	%	○	0.00%~100.00%	
PD.27	Keeping time of PID initial value	0.00	0.00s~655.35s	s	○	0.00s~655.35s	
PD.28	Maximum positive value of twice output deviations	20.00	0.01%~100.00%	%	○	0.01%~100.00%	
PD.29	Maximum negative value of twice output deviations	20.00	0.01%~100.00%	%	○	0.01%~100.00%	
PD.30	PID shutdown operation	0	0~1	/	○	0: stop operation is not performed 1: downtime operation	
PD.31	PID feedback overrun threshold	100.00	50.00%~100.00 %	%	○	50.00%~100.00%	
PD.32	PID feedback overrun alarm delay time	0	0~65535	s	○	0: not detect 1~65535	
PD.33	PID switching speed	0.00	0.00%~100.00%	%	○	0.00%~100.00%	
<b>C0 group: monitoring parameters</b>							
C0.00	Speed command	0	0~27648	rpm	*	0~27648	
C0.01	Speed feedback	0	0~27648	rpm	*	0~27648	
C0.02	Current feedback	0	0 - maximum current	A A	*	0 - maximum current	
C0.03	Bus voltage:	0	0~999	V	*	0~999	
C0.04	IGBT temperature	0.0	0~100.0	℃	*	0~100.0	
C0.05	Motor temperature	0.0	0~100.0	℃	*	0~100.0	
C0.06	System state word	0	0~FFFF	/	*	0~FFFF	
C0.07	Decimal fault code	0	0~65535	/	*	0~65535	
C0.08	Binary fault code	0	0~65535	/	*	0~65535	
C0.09	Debug output 1	0		/	*		
C0.10	Debug output 2	0		/	*		
C0.11	AI1 input	0.000	0~10.000	/	*	0~10.000	
C0.12	AI2 input	0.000	0~10.000	/	*	0~10.000	
C0.13	AI3 input	0.000	0~10.000	/	*	0~10.000	
C0.14	Process closed loop given rotating speed	0		Rpm	*		
C0.15	Runing frequency	0.0		Hz	*		
C0.16	Output current	0.0		A	*		
C0.17	Output torque	0		/	*		
C0.18	Output power	0.0		Kw	*		



Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
C0.19	Output voltage	0.0		V	*		
C0.20	Setting torque (reserved)	0		/	*		
C0.21	Running state (reserved)	0		/	*		
C0.22	Setting frequency of upper computer (reserved)	0.0		/	*		
C0.23	Terminal input state	0.00		1	*		
C0.24	Terminal output state	0.00		1	*		
C0.25	Z position of the first encoder	0			*		
C0.26	Position of the first encoder	0			*		
C0.27	Counting lower four digits of pulse input	0			*		
C0.28	Counting high four digits of pulse input	0			*		
C0.29	Z position of the second encoder	0			*		
C0.30	Position of the second encoder	0.0			*		
C0.31	Encoder gear ratio 0	0.0			*		
C0.32	Encoder gear ratio 1	0			*		
C0.33	Encoder gear ratio 2	0			*		
C0.34	Encoder gear ratio 3	0			*		
C0.35	Encoder gear ratio 4	0			*		
C0.36	Position following deviation				*		
C0.37	Software version				*		
C0.38	Power code				*		
C0.39	Barcode information 0				*		
C0.40	Barcode information 1				*		
C0.41	Barcode information 2				*		
C0.42	Barcode information 3				*		
C0.43	PID given				*		
C0.44	PID feedback				*		
C0.45	The first fault				*		

Number of function code	Name of function code	Factory value	Setting range	Unit	Attribute	Option of function code	User setting
C0.46	The second fault				*		
C0.47	The third fault				*		
C0.48	The fourth fault				*		
C0.49	The fifth fault				*		
C0.50	Current fault current				*		
C0.51	Current fault voltage				*		
C0.52	PLC current segment number				*		
C0.53	PLC cycle times				*		
C0.54	Time 1				*		
C0.55	Running time of current speed				*		
C0.56	Non-standard version number						
C0.57	Encoder feedback pulse frequency						
C0.58	Input pulse frequency						
C0.59	Self-learning fault code						

## Chapter 6 Detailed Explanation of Parameters

### 6.1 P0 group: basic function parameters

P0.00

control method

0~4

This parameter specifies the control method of the drive to the different types of motors (synchronous motor or asynchronous motor). The user must set this parameter according to the specific motor type and encoder feedback.

**0:** synchronous inductive vector

For closed-loop control, the encoder feedback signal must be available and the feedback is normal. It is suitable for the places where system working modes are: position control (P0.01=1), speed control (P0.01=2) and torque control (P0.01=3). Only one synchronous motor can be driven by one drive.

**1:** synchronous non-inductive vector.

open loop control, no encoder feedback signal, suitable for high performance vector control occasions. Only one synchronous motor can be driven by one drive.

**2:** asynchronous inductive vector.

For closed-loop control, the encoder feedback signal must be available and the feedback is normal. It is suitable for the places where system working modes are: position control (P0.01=1), speed control (P0.01=2) and torque control (P0.01=3). Only one asynchronous motor can be driven by one drive.

**3:** asynchronous non-inductive vector 1

Open loop control, no encoder feedback signal; Only one asynchronous motor can be driven by one drive.

**4:** asynchronous non-inductive vector 2

Open loop control, no encoder feedback signal, one asynchronous motor is driven by one drive.

**Note:** 1. When the system working mode is position loop, it must use the inductive control;

2. The speed loop proportional gain and integral constant parameters are invalid only in the control mode of asynchronous non-inductive vector 1.

P0.01

System working mode

0~3

**1:** position loop.

The driver works in the position loop. At this time, the control mode must be inductive control. It is suitable for receiving the pulse command of the upper computer. It is generally used for occasions where the position requirements are relatively high and precise positioning is required, such as CNC machine tools and printing machines.

**2:** speed loop.

The driver works in the speed loop and receives the speed command (pulse frequency, analog quantity, communication given speed command), which is generally used in occasions where speed accuracy is required.

**3:** torque ring.

The drive works in the torque ring and outputs the torque according to the setting torque command. The output rotating speed is automatically matched to the load speed, but the upper speed limit is limited by the maximum speed (P0.03). When the load speed is greater than the maximum setting speed, the output torque shall be set differently.

P0.02

Special machine code

0~4

This parameter is set for the special machine code.

P0.03

Maximum rotating speed

0~30000

The maximum rotating speed is the maximum speed at which the drive allows the motor to operate, and the command runs according to the speed when exceeding the speed. In practical applications, it is set according to the maximum speed of the motor to protect the maximum rotating speed of the motor used without exceeding the specifications. For example: this parameter is set as 1500 rpm; when the speed command is set to 2000 rpm, the actual running speed of the drive shall be limited to 1500 rpm to protect the motor from damage due to overspeed.

P0.04

Enable selection

0~2

This parameter specifies three given modes of the drive enable signal, which are set according to the actual needs of the user.

**0:** RS485 enable.

The enable signal is given by means of RS485 communication to control the start and stop of the drive.

**1:** terminal given.

The corresponding function is set to the enable function code through one of the terminals of the multi-function terminals X1-X7, and the enable signal is given by the on/off state of the terminal and the COM terminal of the drive to control the start and stop of the drive.

**2:** keyboard enable

After entering the JOG menu, long press <</ENTER key to give the enable signal and control the start of the drive; and long press again under the enable so as to stop the drive.

P0.05

Speed command selection

0~9

This parameter specifies the source mode of the speed loop command, which is set according to user requirements.

**0:** RS485.

Make the drive establish communication with the upper computer in RS485 mode, and give the speed command through communication. 1: keyboard given.

The speed command is given by the keyboard. The speed is set by P0.06. Press the keyboard  $\wedge$  and  $\vee$  keys to modify the speed command in the factory default JOG function interface. The current modification bit can be changed by the < ENTER key.

**Note:** the speed command modified by the  $\wedge$  and  $\vee$  keys is maintained during the stop, and returns to the initial setting value of P0.06 after power failure.

**2:** AI1 given.

The analog signal received through the AI1 port is used as the speed command, and 0 -10V (4mA~20mA) corresponds to the speed 0~P0.03.

**3:** AI2 given.

The analog signal received through the AI2 port is used as the speed command, and 0 -10V (4mA~20mA) corresponds to the speed 0~P0.03.

**4:** AI3 given

The analog signal received through the AI3 port is used as the speed command, and -10v to 10V corresponds to the speed -P0.03 to P0.03.

**5:** terminal given.

The speed command can be given through the multi-function terminal (for details, please refer to the description of function codes No. 18 and No. 19 of X1~X7 terminal function).

**6:** multi-speed given.

The speed command can be given by multi-speed mode, select any four terminals of X1~X7, and set the corresponding parameter function code to 7, 8, 9, 10, and the four-terminal terminal state combination gives 16-speed. For specific usage, please refer to the function code of the X1~X7 terminal function No. 7~10.

**7:** pulse given

The speed command is given by the received pulse frequency.

**8:** process PID speed given.

The speed command is given by the process PID function (please refer to the PD group parameter description for details).

**9:** simple PLC speed given.

The speed command is given by the simple PLC function (please refer to the PC group parameter function description for details).

P0.06	Keyboard running speed command	-3000~3000
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The drive works in the speed loop, and the speed command selection (P0.05=1) is the keyboard timing. The speed command reference value is set by this parameter.

P0.07	Initial value of terminal given rotating speed	-3000~3000
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When the speed command is selected as the terminal timing (P0.05=5), the parameter setting value is the initial value of the terminal given speed.

P0.08	Terminal given speed modification rate	0.1~6553.5
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When the speed command is selected as the terminal timing (P0.05=5), the multi-function terminal is defined as the terminal given speed increment/decrement, and the parameter value is the rate of increment/decrement modification.

P0.09	Terminal given rotating speed attribute	0000~1111
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This parameter specifies the properties of the terminal given speed.

**Ones:** whether the shutdown is allowed to be modified.

**0:** allow; in the stop state, the speed is allowed to be modified when the terminal given increment/decrement terminal is effective.

**1:** not allowed. In the stop state, the speed is allowed to be modified when the terminal given increment/decrement terminal is effective.

**Tens:** running and modified rotating speed increment stop processing

**0:** maintain. The rotating speed increment modified through the terminal given increment/decrement is kept after the shutdown.

**1:** not keep. The rotating speed increment modified through the terminal given increment/decrement is not kept after the shutdown.

**Hundreds:** power down processing

**0:** power down storage: the rotating speed modified by the terminal given increment/decrement terminal is stored after power down. When the power is turned on again, the given speed is the last modified speed.

**1:** power down and not storage.

The speed modified by the terminal given increment/decrement terminal is not stored after power failure.

When the power is turned on again, the speed command is the initial value of the terminal given speed.

P0.10	Speed command reverse	0~1
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This parameter can modify the rotation direction of the motor.

**0:** the speed command direction is unchanged.

Operate the motor in the default direction of rotation.

**1:** the speed command direction is reversed.

Reverse the running direction of the motor, the operation direction of motor can be changed by changing the motor wire sequence, or by setting this function code.

**Note:** this parameter shall change to the default value when the factory default value is restored. The user may forget the modifying direction and re-invert the motor when re-commissioning. Therefore, it is recommended that the user uses the default value and changes the motor rotation direction by changing the motor wire sequence.

P0.11	Torque limit selection	0~3
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This parameter determines the limiting method of the torque and is set according to user requirements.

**0:** the parameter is used as a limiter.

The parameter setting values of P0.13 and P0.14 are used as the positive torque limit and the negative torque limit respectively. For the specific correspondence, please refer to the P0.13 and P0.14 parameter descriptions.

**1:** The AI1 signal is used as a limiter.

The analog signal received through the AI1 port is used as the torque limiter, and 0~10v (4mA~20mA) corresponds to 0~the maximum output current of the driver.

**2:** The AI2 signal is used as a limiter.

The analog signal received through the AI2 port is used as the torque limiter, and 0~10v (4mA~20mA) corresponds to 0~the maximum output current of the driver.

**3:** the AI3 signal is used as a limiter.

The analog signal received through the AI3 port is used as the torque limiter, and 0~10v corresponds to 0~the maximum output current of the driver.

**Note:** The maximum current of different power drivers is viewed in Chapter 1 (1.3 Product Series).

P0.12	Output power correction factor	0~200
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When the output power differs from the expected value, the output power can be corrected by adjusting the percentage to achieve the display value desired by the user.

P0.13	Positive torque limiter	0.0~300.0
P0.14	Negative torque limiter	0.0~300.0

The P0.13~P0.14 parameters respectively limit the maximum forward torque and the maximum negative torque output by the drive, and the setting is calculated according to the percentage of the rated current of the motor.

**Note:** when using a synchronous motor, calculate the percentage of P1.03 (synchronous motor rated current); Calculate according to the percentage of P2.05 (asynchronous motor rated current) when using an asynchronous motor.

P0.15	Torque ring command selection	0~3
-------	-------------------------------	-----

0: RS485 command.

1: AI1 signal is used as a torque command.

2: AI2 signal is used as the torque command.

3: the AI3 signal is used as a torque command.

P0.16	Parking mode	0~1
-------	--------------	-----

This parameter specifies the parking mode of the drive.

0: free parking.

After the drive receives the parking command, it turns off the enable and stops output, and the motor stops freely according to the load inertia.

1: deceleration stop.

After the drive receives the stop command, it decelerates and stops at the specified deceleration time.

P0.17	Keyboard default display	0~C0.XX
-------	--------------------------	---------

This parameter is the default monitoring interface display parameter selection. The user can select the driver information monitored by the default interface. The function code 0~XX corresponds to the parameter content of C0.00~C0.XX.

**For example:** when this parameter is set to 2, the default monitoring interface displays the output current, which is the content of the C0.02 parameter.

P0.18	Parameter recovery/save	0~2
-------	-------------------------	-----

0: no operation.

1: save all parameters.

Save the modified parameters to the memory. This function is mainly used to save the parameters modified by communication.

2: restore factory values.

Restore the user parameters to the factory setting value of the drive (motor parameters are not restored).

**Note:** the parameters modified by the upper computer shall not be saved automatically after the power is turned off. The parameters modified by the driver keyboard shall be saved automatically after power down.

P0.19	Allow enable and power on	0~1
-------	---------------------------	-----

0: Not allow enable and power on      1: allow enable and power on;

**Warning:** Under normal circumstances, the user is not recommended to select the allowable enable power-on, because the enable terminal is effective if the equipment is not prepared or other non-professional operators are unclear; and after the power-on relay sucks, the motor starts running; and it may result in accidents.

P0.20

Speed lower limit function selection

0~1

0: invalid. The speed lower limit function is invalid.

1: valid. The speed lower limit function is valid, and the lower speed limit is set by the P0.21 parameter.

P0.21

Lower limit speed setting

0~3000

When the speed lower limit function is effective (P0.20=1) when being opened, in the running state, when the drive speed command is lower than the lower limit speed setting value, the drive operates according to the lower limit speed setting value.

P0.22

Output power filter coefficient

1~600

When the driver output power display value fluctuates greatly, adjusting the parameter can make the power display tend to be stable. The larger the value is set, the more stable the power display is.

P0.23

Motor overload protection time

10~65535

The motor overload protection time is the protection time for preventing the motor from being damaged for a long time under the overload condition; after the overload protection point is reached, the drive alarms and stops outputting. It can be set according to the actual overload capacity of the motor and the load capacity of the drive.

P0.24

Motor temperature alarm point

40~200

This parameter limits the maximum temperature at which the motor can be operated. When the motor temperature detection value is greater than the motor protection temperature setting value, the drive reports a motor overheat fault and stops the output to protect the motor from being damaged because of overheating.

P0.25

Motor temperature sensor selection

0~1

The selection of the motor temperature sensor is selected according to the specification and model of the user motor temperature sensor.

0: KTY84-130. (Hardware circuit defaults this type of sensor)

1: PT100.

P0.26

Overvoltage stall protection allowing

0~1

0: not allowed.

The overvoltage stall protection function does not work when the bus voltage of the drive is higher than the overvoltage stall protection point during running.

1: allowed.

The overvoltage stall protection function works when the bus voltage of the drive is higher than the overvoltage stall protection point during running.

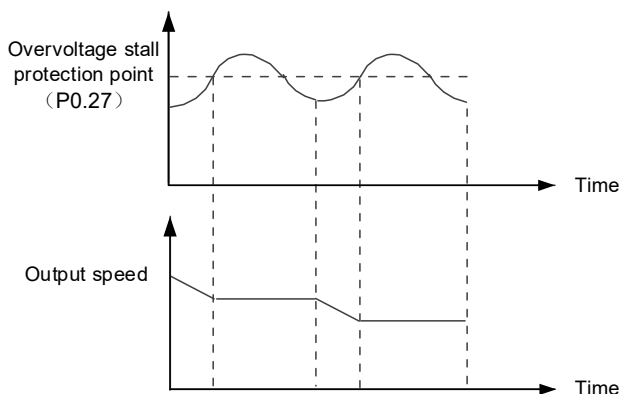
P0.27

Overvoltage stall protection point

0.0~6553.5

This parameter defines the overvoltage stall protection point. The overvoltage stall protection function refers to the comparison between the bus voltage detected during the deceleration operation of the drive and the overvoltage stall protection point. If exceeding the overvoltage stall protection point, the output speed of the drive stops decreasing. When it is detected again that the bus voltage is lower than the overvoltage stall protection point, the deceleration operation is performed; and it is as shown in the figure below.





### Overvoltage stall protection

P0.28

Random super password verification

0~9999

In some special application occasions, if it needs to modify the manufacturer parameters to reach the user requirements, the user can contact the manufacturer and provide a random dynamic super password. After obtaining the dynamic verification code provided by the manufacturer, the manufacturer can guide to debug the related parameters.

P0.29

Machine authorization code

0000~9999

Manufacturer protection parameters.

P0.30

Overcurrent stall protection allowing

0~1

0: not allowed.

1: running.

P0.31

Overcurrent stall protection point

0~100

This parameter defines the overcurrent stall protection point. The overcurrent stall protection function refers to the comparison between the output current detected by the drive during operation and the overcurrent stall protection point. If the output current is greater than the current value corresponding to the protection point setting, the output speed of the drive stops acting; when the output current is detected to be lower than the current value corresponding to the protection point setting, the rotating speed is recovered and acts according to the original method. The setting range 0~100 of this parameter corresponds to the maximum current of the drive from 0% to 100%. For example, the maximum current of a 15KW drive is 54A (viewed in the 1.3 product series). When P0.31=80 is set, the current corresponding to the overcurrent stall protection point is:  $80\% \times 52A = 41.6A$ .

P0.32

Undervoltage recovery self-start function selection

0~2

0: fault free parking, turn off enable

When the bus voltage is lower than the undervoltage threshold, the drive reports an undervoltage fault, and

the system automatically turns off the enable signal and stops freely according to the load inertia.

1: stop according to the setting mode, turn off enable

When the bus voltage is lower than the undervoltage threshold, the drive reports an undervoltage fault, the system stops according to the set parking mode and turns off the enable signal.

2: stop according to the setting mode, not turn off enable

When the bus voltage is lower than the undervoltage threshold, the drive reports an undervoltage fault. The system stops according to the set stop mode, and does not turn off the enable; when the undervoltage recovers, the system is enabled.

P0.33	Power failure to judge voltage	0.0~800.0
P0.34	Power failure maintaining voltage	0.0~1000.0
P0.35	Power failure protection rotating speed	0~30000

The function of the group determines the action process of the motor which is suddenly powered off during high-speed operation. When the drive is running, if the bus voltage is lower than the power-off determination voltage (the set value of P0.33), it is determined that the power supply is abnormally powered off, and the function of the group takes effect; After the power is cut off, the motor stops according to the original setting stop mode. If the bus voltage is higher than the power-off maintenance voltage (setting value of P0.34), the rotating speed of the motor during the stop is controlled by the automatic adjustment mode so that the bus voltage remains at the power-off maintenance voltage until the motor running speed is lower than the power-off protection speed (setting value of P0.35), the system turns off the enable and stops according to the setting mode.

Note: the power is cut off to judge that the voltage setting value cannot be less than 390V, and the power-off maintenance voltage cannot be higher than 780V.

P0.36	Software compilation time (year)	
P0.37	Software compilation time (month, day)	
P0.38	Software compilation time (hours, minutes)	

P0.36~P0.38 is the software compilation time.

P0.39	Encoder feedback pulse frequency filtering coefficient	0~65535
-------	--	---------

This parameter is the encoder feedback pulse frequency filtering coefficient. If the setting is larger, the pulse frequency display is more stable.

P0.40	Voltage regulation ratio	0.00~100.00
P0.41	Voltage regulation integral	0~65535

Power-off voltage regulation and low-voltage automatic speed-down adjustment parameters;

P0.42	Low voltage automatic speed reduction adjustment comparison voltage	0.0~510.0
-------	---	-----------

The parameter range is 0.0~510.0V. This function is valid when the parameter value is greater than the setting value of P0.33. When this function is effect and the bus voltage is lower than the setting value, the drive keeps the voltage constant by automatically reducing the speed.

P0.43	Input pulse frequency filter coefficient	0.5~6553.5
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This parameter is the input pulse frequency display filtering coefficient. If the setting is larger, the pulse frequency display is more stable.

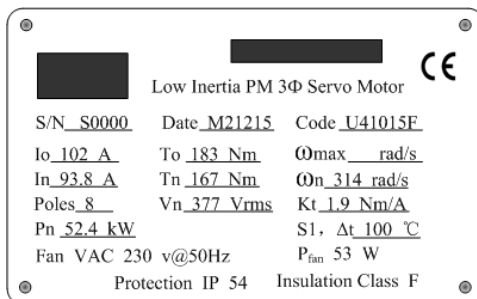
## 6.2 P1 group: motor parameters

P1.00	Rated power of synchronous motor	0.1~300.0
P1.01	Rated voltage of synchronous motor	0~1400
P1.02	Rated rotating speed of synchronous motor	0~30000
P1.03	Rated voltage of synchronous motor	0.1~1000.0
P1.04	Pole pair of synchronous motor	1~99

P1.00~P1.04 are synchronous motor parameters. Before self-learning, it is necessary to input the motor parameters on the motor nameplate.

For example, set the motor parameters according to the following synchronous motor nameplate.

P1.00=52.4 (Pn 52.4 A)  
 P1.00=52.4 (Pn 52.4 A)  
 P1.01=377 (Vn 377 Vrms)  
 P1.01=377 (Vn 377 Vrms)  
 P1.02=3000 ( $\omega_n$  314 rad/s)  
 P1.02=3000 ( $\omega_n$  314 rad/s)  
 P1.03=93.8 (In 93.8 A)  
 P1.03=93.8 (In 93.8 A)  
 P1.04=4 (Poles 8)  
 P1.04=4 (Poles 8)



**Note:** please set according to the motor nameplate parameters. The accurate motor parameter self-learning comes from the correct motor parameter setting. In order to ensure good control performance, please configure the motor according to the drive adapter motor. If the power difference between the synchronous motor power and the drive adapter motor is too large, it shall affect the control effect directly.

P1.05	Stator phase resistance of synchronous motor	0.001~4.000
P1.06	Permanent magnet flux linkage of synchronous motor	1~4000
P1.07	D-axis inductance of synchronous motor	0.00~80.00
P1.08	Q-axis inductance of synchronous motor	0.00~80.00
P1.09	Lifting coefficients of synchronous non-inductive torque	0~300
P1.10	Synchronous maximum D-axis current	0.0~1000.0

P1.05~P1.10 are the main motor parameters affecting the drive control. The parameters of this group are manually set except P1.09. The other parameters are automatically saved in the drive after the motor self-learning until the next modification or self-learning setting again.

P1.11	Synchronous non-inductive start mode	0~2
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The parameters of this group specify the start mode of the drive in the synchronous non-inductive control mode.

**0:** direct 0-speed start.

Start from 0 start speed. It is applicable for the occasions where the load allows slight reverse when being started;

**1:** rotating speed tracking start.

The drive firstly judges the speed and direction of the synchronous motor, and then it is started by the rotating speed of the tracked motor; and a smooth and non-impact start for the rotating motor is implemented.

**2:** start with initial position recognition.

Before the motor runs, the drive firstly recognizes the initial angle of the motor, and then it is started accurately and smoothly. To ensure a good starting effect, the motor shall be kept relatively stationary state before starting, and it is suitable for occasions where the motor is not allowed to reverse.

P1.12	Allow MTPA	0~1
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**0:** Not allow MTPA

**1:** allow MTPA.

P1.13	Salient pole rate type of synchronous motor	0~1
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This parameter is the selection of the motor salient pole rate, which is generally set according to the motor salient pole rate type before the motor self-learning.

**0:** the salient pole rate is greater than 1.

**1:** the salient pole rate is less than 1.

P1.14	Initial position identification strength	2~6
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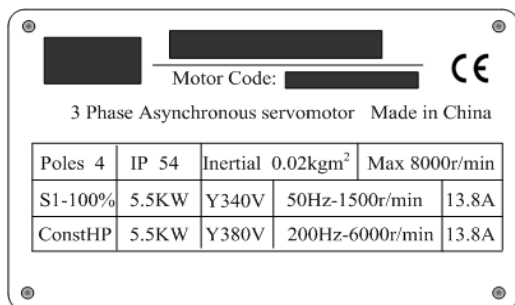
The initial position recognition strength refers to the identification strength when the synchronous non-inductive starting mode is selected to start at the initial position (P1.11=2). When the initial position recognition strength is smaller, the noise generated by the drive when recognizing the initial position of the motor is stronger; when the initial position recognition strength is greater, the noise generated when the recognition is made is smaller.

### 6.3 P2 group: synchronous motor parameters

P2.00	Rated voltage of asynchronous motor	1~1140
P2.01	Rated power of asynchronous motor	0.4~6553.5
P2.02	Rated frequency of asynchronous motor	0.0~6553.5
P2.03	Pole pair of asynchronous motor	1~100
P2.04	Rated rotating speed of asynchronous motor	2~65535
P2.05	Rated current of asynchronous motor	0.5~6553.5

P2.00~P2.05 are asynchronous motor parameters. Before self-learning, it is necessary to input the motor parameters on the motor nameplate.

For example, set the motor parameters according to the following asynchronous motor nameplate.



- P2.00=340 (S1-100%/ Y340V)
- P2.00=340 (S1-100%/ Y340V)
- P2.01=5.5 (S1-100%/ 5.5KW)
- P2.01=5.5 (S1-100%/ 5.5KW)
- P2.02=50 (S1-100%/ 50Hz-1500r/min)
- P2.02=50 (S1-100%/ 50Hz-1500r/min)
- P2.03=2 (Poles 4)
- P2.03=2 (Poles 4)
- P2.04=1500 (S1-100%/ 50Hz-1500r/min)
- P2.04=1500 (S1-100%/ 50Hz-1500r/min)
- P2.05=13.8 (S1-100%/ 13.8A)
- P2.05=13.8 (S1-100%/ 13.8A)

**Note:** please set according to the motor nameplate parameters. The accurate motor parameter self-learning comes from the correct motor parameter setting. In order to ensure good control performance, please configure the motor according to the drive adapter motor. If the power difference between the asynchronous motor power and the drive adapter motor is too large, it shall affect the control effect directly.

P2.06	No-load current of asynchronous motor	0.5~6553.5
P2.07	Stator resistance of asynchronous motor	0.002~65.535
P2.08	Rotor resistance of asynchronous motor	0.02~655.35
P2.09	Rotor resistance of asynchronous motor	0.002~65.535
P2.10	Mutual inductance of asynchronous motor	0.02~655.35
P2.11	Full resistance of asynchronous motor	0.002~65.535

P2.06~P2.11 are the main parameters affecting the drive control. The parameters of this group are automatically saved in the drive after the motor self-learning until the next modification or self-learning again.

P2.12	Oscillation suppression allowing of asynchronous motor	0~1
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0: not allow oscillation suppression

1: allow oscillation suppression.

P2.13	Oscillation suppression factor of asynchronous motor	1~100
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Select this gain to be 0 when the motor has no oscillation. This value is appropriately increased only when the motor is obviously oscillating and cannot be operated normally. When the value is larger, the suppression effect on the oscillation is more obvious. The gain selection method is as small as possible while effectively suppressing the oscillation.

P2.14	Starting mode of asynchronous motor	0~2
P2.15	Starting frequency of asynchronous motor	0.00~60.00
P2.16	Starting frequency keeping time of asynchronous motor	0.0~3600.0

P2.17	Rotating speed tracking current of asynchronous motor	0.1~100.0
P2.18	Rotating speed tracking search time of asynchronous	0.02~200.0
P2.19	DC braking current of asynchronous motor	0.0~200.0
P2.20	DC braking start frequency of asynchronous motor	0.00~300.00
P2.21	DC brake keeping time of asynchronous motor	0.00~30.00

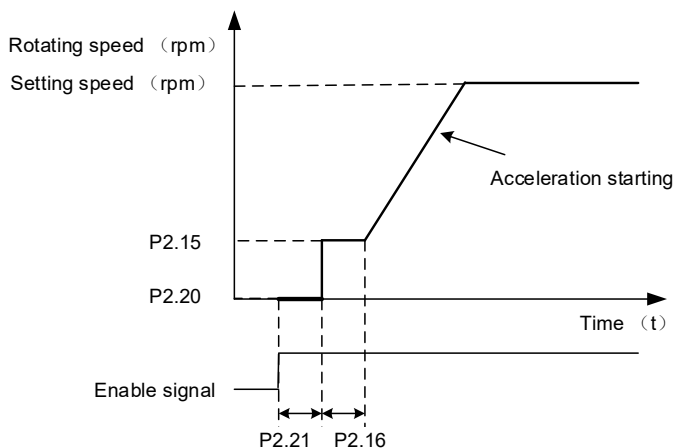
The parameters of this group specify how the drive is activated for asynchronous motor control.

**0:** start frequency starting.

Starting from the setting start frequency (P2.15) of asynchronous motor, after maintaining time of the asynchronous motor start frequency (P2.16), it is accelerated to the setting rotating speed. If the motor is rotating during starting, firstly brake the motor speed to the speed corresponding to the asynchronous motor start frequency and then start again.

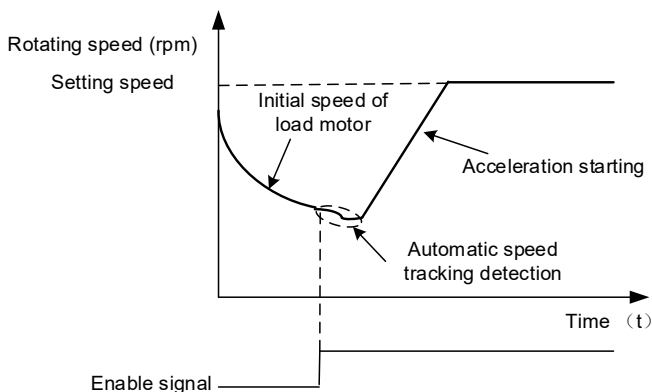
**1:** DC brake start.

it is started from the motor DC braking start frequency (P2.20), and then it is started from the start frequency after the brake P2.21 time of the asynchronous motor DC braking current (P2.19);



**2:** rotating speed tracking start.

The drive firstly judges the speed and direction of the asynchronous motor, and then it is started by the rotating speed of the tracked motor; and a smooth and non-impact start for the rotating motor is implemented.



P2.22 Slip compensation gain of asynchronous motor 0.0~300.0

When the control mode is the asynchronous motor non-inductive vector 1 mode, the actual speed and the setting speed have a slip when the load changes. The actual motor speed can be close to the setting speed through setting the parameters.

P2.23 Power generation state slip limiter 0~65535

P2.24 Motorized state slip limiter 0~65535

The P2.23~P2.24 parameters limit the maximum slip of the motor in the power generation state and the electric state. If the parameter is set too large, overpressure shall easily occur during deceleration; and if the parameter is too small, it shall affect the braking speed.

### 6.4 P3 group: interface parameters

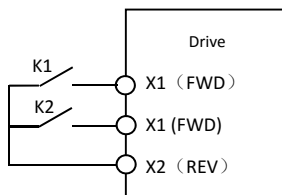
P3.00 Terminal operation control mode 0~4

This parameter defines five different ways to control the operation of the drive by an external terminal, and it is valid in the mode that the enable selection is the terminal enable (P0.04=1).

0: two-wire type 1.

The corresponding function code of the X1 terminal is set as 3 and 4, and the forward and reverse rotation of the motor is determined through the terminal. For example: the drive operation is controlled by the X1 and X2 terminals; set P3.01=3, P3.02=4; external switches corresponding to X1, and X2 are K1 and K2.

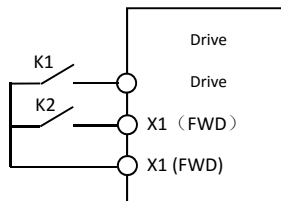
K2 (X2)	K1 (X1)	Running command
0	0	Stop
0	1	Forward
1	0	Reverse
1	1	Stop



**1:** two-wire type 2.

The corresponding function code of the X1 terminal is set as 3 and 4, and the running and direction of the motor is determined through the terminal. For example: the drive operation is controlled by the X1 and X2 terminals; set P3.01=3, P3.02=4; external switches corresponding to X1, and X2 are K1 and K2.

K2 (X2)	K1 (X1)	Running command
0	0	Stop;
0	1	Forward
1	0	Stop;
1	1	Reverse

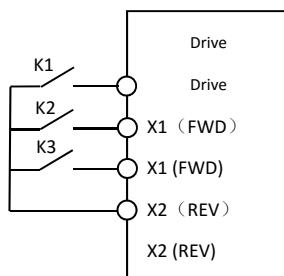


**2:** three-wire type 1.

After the function code of the multi-function terminal X1 is set as 23, the terminal is a three-wire enable control, and the forward and reverse directions are determined by the terminal states of the multi-function terminal X1 function code setting as 3 and 4 respectively.

**For example:** X1 and X2 respectively control the forward and reverse directions of the motor, and the X3 controls the three-wire type enable. The corresponding parameters are set to P3.01=3, P3.02=4, and P3.03=23.

K3 (X3)	K2 (X2)	K1 (X1)	Running command
0	0	0	Stop;
0	0	1	Stop;
0	1	0	Stop;
0	1	1	Stop;
1	0	0	Maintain
1	0	1	Forward
1	1	0	Reverse
1	1	1	Maintain



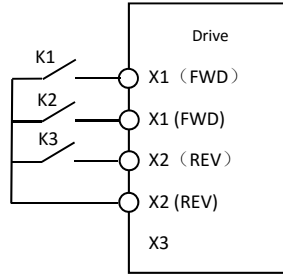
**3:** three-wire type 2.

After the function code of the multi-function terminal X1 is set as 23, the terminal is a three-wire enable control, and the running and direction are determined by the terminal states of the multi-function terminal X1 function code setting as 3 and 4 respectively.

**For example:** X1 and X2 respectively control the running and direction of the motor, and the X3 controls the three-wire type enable. The corresponding parameters are set to P3.01=3, P3.02=4, and P3.03=23.



K3 (X3)	K2 (X2)	K1 (X1)	Running command
0	0	0	Stop;
0	0	1	Stop;
0	1	0	Stop;
0	1	1	Stop;
1	0	0	Maintain
1	0	1	Forward
1	1	0	Maintain
1	1	1	Reverse

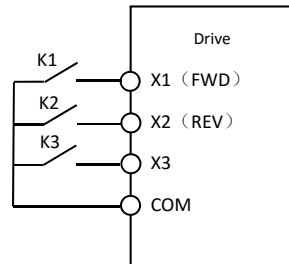


**4:** three-wire type 3

After the function code of the multi-function terminal X1 is set as 23, the terminal is a three-wire enable control, and the running, state and direction are determined by the terminal states of the multi-function terminal X1 function code setting as 3 and 4 respectively.

**For example:** X1 and X2 respectively control the running and direction of the motor, and the X3 controls the three-wire type enable. The corresponding parameters are set to P3.01=3, P3.02=4, and P3.03=23.

K3 (X3)	K2 (X2)	K1 (X1)	Running command
0	0	0	Stop;
0	0	1	Stop;
0	1	0	Stop;
0	1	1	Stop;
1	0	0	Zero-speed operation
1	0	1	Forward
1	1	0	Reverse
1	1	1	Zero-speed operation



**Note:** in the above table, 0 shows invalid and 1 shows valid.

P3.01	X1 terminal function	0~30
P3.02	X2 terminal function	0~30
P3.03	X3 terminal function	0~30
P3.04	X4 terminal function	0~30
P3.05	X5 terminal function	0~30

P3.06	X6 terminal function	0~30
P3.07	X7 terminal function	0~30

P3.01~P3.07 specify the functions of the X1~X7 terminals, and the customer can define functions of each terminal according to the actual application.

**0:** no function

**1:** enable

When the user wants to control the start and stop of the drive through the terminal, the enable selection can be set to terminal control (P0.04=1), and then any terminal function can be specified as enabled (for example, the user wants to start and stop through X1 control, then P3.01=1) can be set; the start and stop of the drive can be controlled through the on/off state of this terminal.

**2:** direction reverse.

Reverse the running direction of the motor. When the user needs to change the running direction of the motor, the function of the specified terminal can be set to reverse the direction. When the terminal is invalid, the motor runs according to the default running direction. When the terminal is valid, the motor runs according to the reverse running direction.

**3:** enable + positive direction command (three-wire FWD).

The specified terminal is set as the function code. When the terminal is valid, the motor runs in the positive direction. When it is invalid, the motor stops running. This function code is used as the FWD function during three-wire control.

**4:** enable + negative direction command (three-wire REV).

The specified terminal is set as the function code. When the terminal is valid, the motor runs in the negative direction. When it is invalid, the motor stops running. This function code is used as the REV function during three-wire control.

**5:** external fault

The specified terminal is set as the function code. When the terminal is valid, the drive reports an external fault alarm until it is reset when the terminal state is invalid and there is a fault reset signal.

**6:** external fault reset

When the drive reports an external fault, the function of the specified terminal can be set to the external fault alarm reset function, and the external fault alarm is reset when the terminal is valid.

**7:** multi-speed selection 0

**8:** multi-speed selection 1.

**9:** multi-speed selection 2.

**10:** multi-speed selection 3.

When the speed command source is multi-speed speed given (P0.05=6), the 16-speed speed can be given by the state combination of the four multi-function terminals. The corresponding setting parameter of multi-speed 1~ multi-speed 16 speed is PC.03~PC.18.

**For example:** the X1, X2, X3, and X4 terminals are set as: multi-speed selection 0, multi-speed selection 1, multi-speed selection 2, multi-speed selection 3, for example, P3.01=7, P3.02=8, P3.03=9, P3.04=10. It is as shown in the following table (1 in the table is valid, 0 is invalid):

X4	X3	X2	X1	Corresponding speed section	Speed setting
Multi-speed selection 3	Multi-speed selection 2	Multi-speed selection 1	Multi-speed selection 0		
0	0	0	0	Multi-speed selection1	PC.03
0	0	0	1	Multi-speed selection2	PC.04
0	0	1	0	Multi-speed selection3	PC.05
0	0	1	1	Multi-speed selection4	PC.06
0	1	0	0	Multi-speed selection5	PC.07
0	1	0	1	Multi-speed selection6	PC.08
0	1	1	0	Multi-speed selection7	PC.09
0	1	1	1	Multi-speed selection8	PC.10
1	0	0	0	Multi-speed selection9	PC.11
1	0	0	1	Multi-speed selection10	PC.12
1	0	1	0	Multi-speed selection11	PC.13
1	0	1	1	Multi-speed selection12	PC.14
1	1	0	0	Multi-speed selection13	PC.15
1	1	0	1	Multi-speed selection14	PC.16
1	1	1	0	Multi-speed selection15	PC.17
1	1	1	1	Multi-speed selection16	PC.18

**11:** spindle positioning.

When the terminal is valid, the drive is positioned according to the specified positioning mode.

**12:** cut the position loop.

When this terminal is valid, the working mode of the drive system is switched to the position loop from the other rings.

**13: process PID integral suspension**

When this terminal is valid, the PID integral action is paused, but the proportional and derivative adjustments still take effect.

**14: process PID terminal switching**

When the terminal is valid, the PID regulator defaults to the process closed loop ratio P1, the process closed loop integral I1 and the process closed loop differential D1; When the terminal is valid and the PID switching condition is terminal switching (PD.23=1), the PID regulator is the process closed loop ratio P2, the process closed loop integral I2 and the process closed loop differential D2.

**15: PID forced speed switching**

When this terminal is valid, the PID speed is forcibly switched to the speed set by PD.33.

**16: simple PLC current segment timing clear**

When the terminal defining this function is valid, the timing of the current segment of the PLC is cleared, and the PLC runs at the speed of the current section until it is timed and runs again from the current section when the terminal is invalid.

**17: PLC reset**

When the terminal of this function is valid, the PLC resets to the effective speed of the first section to run until the PLC is timed and runs again from the speed of the section speed when the terminal is invalid.

**Note:** When the multi-speed running time is zero, if the PLC reset terminal is valid, the PLC runs at the first speed.

**18: terminal given speed increasing****19: terminal given speed decreasing**

When the speed loop command is selected as the terminal timing (P0.05=5), the defined terminal function is that the terminal given speed is incremented and the terminal given speed is decremented. When the corresponding terminal is valid, the speed is incremented or decremented. The initial value of the terminal given speed is the setting value of P0.07, and the speed incrementing modification speed is the setting value of P0.08, and the terminal setting attribute is set by P0.09.

**20: terminal given speed increment clear**

When the terminal is valid, the speed that is incremented or decremented by the terminal is cleared.

**21: normal inching turning**

When the enable option is terminal enable, the terminal is the normal inching turning function when it is effective.

**22: reverse inching turning**

When the enable option is terminal enable, the terminal is the reverse inching turning function when it is effective.

**23: three-wire control**

When the terminal function is set as this function code, the terminal is a three-wire control terminal. For details, please refer to the P3.00 parameter description.

**24: zero servo**

When the terminal is valid, the command received by the drive is zero.

**25: emergency stop**

When this terminal is effective, the drive turns off the enable.

**26:** positioning selection 1

**27:** Positioning position selection 2.

**28:** positioning position selection 3.

The function code 26~28 determines the positioning position selection. The X1~X7 terminals can be freely defined as the corresponding positioning positions of PA.01 and PA.07~PA.13 given by the function code combination. For example: X1 is defined as positioning position selection 1 (P3.01=26), X2 is defined as positioning position selection 2 (P3.02=27), and X3 is defined as positioning position selection 3 (P3.03=28). The relationship between the terminal state and positioning position selection is as shown in the following table (1 in the table indicates that the terminal is valid, and 0 indicates that the terminal is invalid).

Terminal state corresponds to the selected position	Orientation position selection 3	Orientation position selection 2	Orientation position selection 1
	X3	X2	X1
Orientation position 1 (PA.01)	0	0	0
Orientation position 2 (PA.07)	0	0	1
Orientation position 3 (PA.08)	0	1	0
Orientation position 4 (PA.09)	0	1	1
Orientation position 5 (PA.10)	1	0	0
Orientation position 6 (PA.11)	1	0	1
Orientation position 7 (PA.12)	1	1	0
Orientation position 8 (PA.13)	1	1	1

**29:** positioning point acquisition

Positioning position can be determined by manual setting and terminal acquisition.

1. Manual setting: under the stop state, manually rotate the motor shaft to the desired positioning position, read the position value of the corresponding positioning encoder, and then set it to the corresponding positioning position parameter.

2. Terminal acquisition: Under the stop state, set any of the terminals X1~X7 as the function code, so that when the terminal is valid, the current position is automatically set in the current corresponding positioning position parameter.

**30:** input pulse clear

When the terminal is valid, the pulse number received by the drive is reset.

**31:** terminal given speed is prohibited to reverse

When P0.05=5 (terminal setting speed), this terminal is valid. The speed range modified by the addition and subtraction terminal is 0~max speed (P0.03), but it can still perform reverse rotation by the parameter (P0.10) or reverse running command.

**32:** the second encoder of position loop cutting

Under the zero speed or stop state, the rising edge of the terminal triggers to cut the second encoder, and the falling edge cuts back to the motor encoder.

P3.08	Y1 terminal output function selection	0~16
P3.09	Y2 terminal output function selection	0~16
P3.10	Output function selection of relay 1	0~16
P3.11	Output function selection of relay 2	0~16
P3.12	Output function selection of relay 3	0~16

For the relay output state, please refer to Chapter 3 3.8 Control Circuit Terminal Function.

**0:** no function

**1:** ready.

When the drive is powered on normally, the signal is output when detecting no fault.

**2:** completion of slow power-on;

When the drive is powered on normally, the signal is output when the relay is sucked.

**3:** running.

The signal is output when the drive is in the enable state.

**4:** the speed reaches the upper limit (reserved).

**5:** the speed reaches the lower limit (reserved).

**6:** release (reserved).

**7:** acceleration process.

The signal is output when the drive is in the accelerated running state.

**8:** deceleration process.

The signal is output when the drive is in the decelerated running state.

**9:** fault output

The signal is output when the drive is in the fault state.

**10:** positioning completed output

When the positioning function is used, the signal is output when the positioning is completed.

**11:** speed reaching output (reserved)

**12:** speed loop / position loop switching state output

The signal is output when the speed loop switches the value position loop.

**13:** simple PLC stage running completion output

When the running of simple PLC at each stage is completed, the signal is output and the signal width is 500ms.

**14:** simple PLC cycle running completion output

When the running of simple PLC at each period is completed, the signal is output and the signal width is 500ms.

**15:** communication control output

Output signal when communication control.

**16:** arrive at zero speed

The signal is output when the drive running speed reaches zero speed.

**17:** position reaching

When the deviation between the actual position and the set position is less than P9.04 (position reaches the detection window) and continues to reach the setting time of PA.14, the signal is output.

P3.13	X terminal logic inversion	0~127
-------	----------------------------	-------

Bit0~bit7 determine the logic of X1~X7 terminal. When the state logic of X1~X7 terminal is logic default, it is valid when being closed with the COM terminal, and the disconnection is invalid; The parameter can be reversed by setting this parameter; and it is valid when disconnected with the COM terminal, and it is invalid when closed to the COM terminal. A total of 7 binary combinations of bit0~bit6 determine the logic inversion of each terminal. The rules are as follows: 0 shows that the terminal state is not inverted, and 1 shows that the terminal state is inverted.

X7 (bit6)	X6 (bit5)	X5 (bit4)	X4 (bit3)	X3 (bit2)	X2 (bit1)	X1 (bit0)	P3.24setting
0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1
0	0	0	0	0	1	0	2
0	0	0	0	0	1	1	3
0	0	0	0	1	0	0	4
0	0	0	0	1	0	1	5
0	0	0	0	1	1	0	6
0	0	0	0	1	1	1	7
0	0	0	1	0	0	0	8
0	0	0	1	0	0	1	9
...	...	...	...	...	...	...	...
0	0	1	0	0	0	0	16
...	...	...	...	...	...	...	...
0	1	0	0	0	0	0	32
...	...	...	...	...	...	...	...
1	0	0	0	0	0	0	64
...	...	...	...	...	...	...	...
1	1	1	1	1	1	1	127

P3.14	X1 input filtering times	0~10
-------	--------------------------	------

If the digital input terminal is interfered by the signal, this value is set as a larger value; the larger the setting value, the lower the sensitivity of the X1 terminal input and the stronger the terminal anti-interference ability.

P3.15	Enable selection of terminal cut position loop	0~1
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**0:** not allow enable

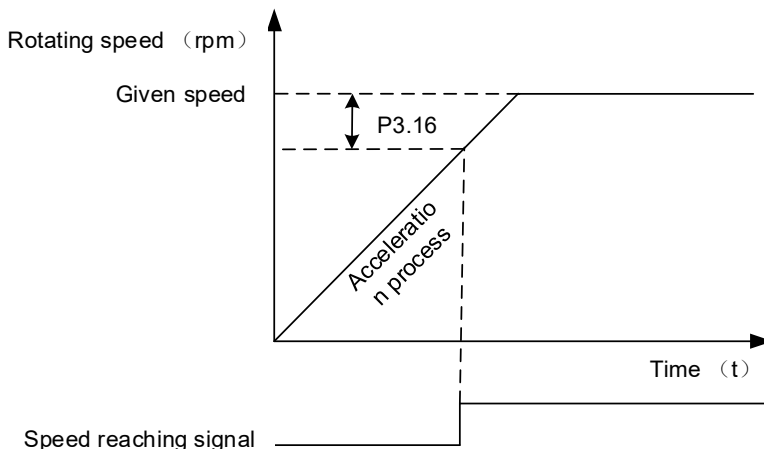
Through the X1~X7 terminal function, there is no enable when switching to the position loop from the torque ring or speed loop.

1 enable.

Through the X1~X7 terminal function, there is enable when switching to the position loop from the torque ring or speed loop.

P3.16	Detection threshold of speed reaching signal	0~65535
-------	--	---------

When the running speed reaches a given speed minus the range of the value, the output speed reaches the signal. It is as shown below:



## 6.5 P4 group: analog input and output parameters

P4.00	AI1 filter time constant	0. 0~100.0
-------	--------------------------	------------

The larger the AI1 filter time constant setting, the smoother the command received by the AI1 port, and the slower the command response.

P4.01	AI1 zero bias	-200.00~200.00
-------	---------------	----------------

When the AI1 port has a zero bias, the zero bias can be adjusted by modifying the value. This parameter is set to 100.00% corresponding to 10.00V. When adjusting the zero bias, the external analog quantity can be given the minimum firstly. At this time, the value received by the corresponding analog quantity port is read from the monitoring parameter, and then the value is proportionally input to the parameter to eliminate the zero bias. For example: When the external analog quantity is given minimum, the value read from C0.11 is positive 0.234v, then P4.01 is set to positive 2.34% ( $P4.01=C0.11/10*100\%$ ), the value of C0.11 is observed; at this time, it is changed to 0.000, indicating that the zero bias has been adjusted to the appropriate point.



**Note:** The monitoring parameter C0.11 corresponds to the input value of AI1, C0.12 corresponds to the input value of AI2, and C0.13 corresponds to the input value of AI3.

P4.02	AI1 gain	0.00~200.00
-------	----------	-------------

The correspondence between the analog value of the AI1 input and the specified amount can be adjusted by the AI1 gain. For example: The analog signal used by the user is only 0~8v, and the user hopes that the maximum speed corresponding to 8v, then  $P3.03=125.00\%$  ( $P3.03=10/8*100\%$ ).

P4.03	AI2 filter time constant	0.0~100.0
P4.04	AI2 zero bias	-200.00~200.00
P4.05	AI2 gain	0.00~200.00

Same as AI1.

P4.07	AI3 filter time constant	0.0~100.0
P4.08	AI3 zero bias	-200.00~200.00
P4.09	AI3 gain	0.00~200.00

Same as AI1.

P4.10	AO1 function selection	0~20
-------	------------------------	------

**0:** speed command.

When AO1 is used as the output speed command function, the output 0v~10v corresponds to 0rpm~ the maximum speed, which increases linearly.

**1:** speed feedback.

When AO1 is used as the output speed feedback function, the output 0v~10v corresponds to 0rpm~ the maximum speed, which increases linearly.

**2:** Q axis current command.

When AO1 is used as the output Q-axis current command function, the output 0v~10v corresponds to 0~the maximum current of the drive.

**3:** Q-axis current feedback.

When AO1 is used as the output Q-axis current feedback function, the output 0v~10v corresponds to 0~the maximum current of the drive.

**4:** bus voltage.

When AO1 is used as the output bus voltage function, the output 0v~10v corresponds to 0~1400v.

**5~10:** reserved.

P4.11	AO1 gain	0.0~200.0
-------	----------	-----------

The correspondence between the analog output signal and the reference amount can be set by adjusting this parameter. For example: The output function of AO1 port is speed feedback (P4.10=1). When the drive runs to the maximum speed and the gain of AO1 port is 100%, the maximum output voltage of AO1 is 10v. If the user hopes to run at the highest speed, the output voltage of AO1 port corresponds to 8v, P4.11=80% can be set.

P4.12	AO1 zero bias	-32768~32767
-------	---------------	--------------

When the output analog quantity of the AO1 port is not zero in the given zero state, the analog signal can be output to zero in the zero state by modifying this parameter.

P4.13	AO2 function selection	0~20
P4.14	AO2 function gain	0.0~200.0
P4.15	AO2 zero bias	-32768~32767

Same as the AO1 port parameter description.

## 6.6 P5 group: encoder parameters

P5.00	Signal type selection of motor feedback encoder	0~1
-------	---	-----

This parameter specifies the feedback signal type of the motor encoder.

**0:** photoelectric encoder

The feedback signal of the motor encoder is a square wave type encoder, that is, a photoelectric encoder.

**1:** resolver

The motor feedback encoder is a resolver encoder.

P5.01	Sinusoidal signal zero bias	-32768~32767
P5.02	Cosine signal zero bias	-32768~32767

The P5.01 and P5.02 parameters are used for correcting the zero bias of the sine and cosine signals.

P5.03	Resolver amplitude correction factor	0~65535
-------	--------------------------------------	---------

When the amplitude of the received resolver signal deviates from the ideal value, it can be corrected by this parameter.

P5.04	Resolver anomaly detection threshold	0~65535
-------	--------------------------------------	---------

The drive alarms when the detected resolver signal is less than the threshold (encoder break fault Err 7).

P5.05	Initial deflection angle of synchronous motor	0~65535
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It is used for adjusting the initial angle of the motor.

P5.06	Resolver pole logarithm	1~99
-------	-------------------------	------

1~99 In the case of inductive control, the user needs to correctly set the number of pole pairs of the used encoder.

P5.07	Resolver phase sequence exchange	0~1
-------	----------------------------------	-----

When the encoder is accessed into the feedback interface of the drive encoder, it is possible that the phase sequence of the encoder is incorrect. This parameter is used for changing the phase sequence of the encoder feedback signal.

**0:** not exchanged.

**1:** exchange.

**Note:** If the phase sequence of the encoder is incorrect after motor self-learning in the inductive mode, please modify this parameter to change the phase sequence of the encoder (automatically change).

P5.08	Line number of first photoelectric encoder	4~65535
-------	--	---------

The number of lines of the first photoelectric encoder is set.

P5.09	Gear ratio molecule of the first photoelectric encoder	1~65535
P5.10	Gear ratio denominator of the first photoelectric encoder	1~65535

P5.09 and P5.10 determine the gear ratio of the first photoelectric encoder, which is set according to user requirements.

P5.11	Direction of the first photoelectric encoder	0~1
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This parameter can be used for setting the direction of the encoder.

P5.12	Line number of second photoelectric encoder	4~65535
P5.13	Gear ratio molecule of the second photoelectric encoder	1~65535
P5.14	Gear ratio denominator of the second photoelectric	1~65535
P5.15	Direction of the second photoelectric encoder	0~1

The meaning is the same as the parameter description of the first photoelectric encoder.

P5.16	Angle compensation coefficient	10~10000
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The angle compensation coefficient for encoder compensates;

## 6.7 P6 group: pulse input / encoder output parameters

P6.00	Pulse input type	0~2
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**0:** orthogonal.




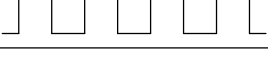



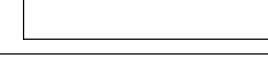

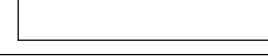
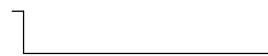

It shows that only the two-phase quadrature pulse signal given by the upper computer is received.

**1:** pulse + direction.

It shows that only the pulse signal + direction signal is received.

**2:** CW+CCW.

It shows that only the CW+CCW signal can be received.

Form of pulse command	Rotation command of motor	Reverse command of motor
A、B Text	PLUS  SIGN 	PLUS  SIGN 
Pulse + direction	PLUS  SIGN 	PLUS  SIGN 
CW+CCW	PLUS  SIGN 	SIGN  PLUS 

P6.01	Pulse input direction	0~1
-------	-----------------------	-----

0: unchanged.

The command direction of the input pulse is not changed.

1: reverse.

The command direction of the input pulse is reversed.

P6.02	Speed pulse input gear ratio molecule	0~65535
P6.03	Speed pulse input gear ratio denominator	0~65535

The system works in the speed loop, P6.02 and P6.03 determine the sub-frequency of the speed pulse input (speed pulse electronic gear ratio), the relationship between the speed pulse electronic gear ratio and the motor speed.

Order: n is the motor speed;

C is the line number of motor encoder;

F is the pulse frequency;

G1 speed pulse input electronic gear ratio.

$$\text{So: } n=60 \times F \times G1 \quad (C \times 4)$$

$$G1=P6.02/P6.03$$

$$G1=P6.02/P6.03$$

**For example:** The upper computer gives a pulse of 500KHz, the drive encoder is selected as the first photoelectric encoder, and the number of lines is set to 2500 lines. Then the corresponding speed is calculated as follows:

$$n=60 \times F \times G1 / (C \times 4)$$

$$n=60 \times F \times G1 / (C \times 4)$$

$$=60 \times 500000 \times G1 / (2500 \times 4)$$

$$=60 \times 500000 \times G1 / (2500 \times 4)$$

$$=3000 \times G1$$

$$=3000 \times G1$$

When P6.02: P6.03=1:1, n=3000 (rpm)

P6.04	Speed pulse input filtering	0~65535
-------	-----------------------------	---------

The larger the parameter setting, the smoother the speed pulse command received by the drive, but the larger the command lag.

P6.05	Encoder feedback output pulse lines	4~65535
-------	-------------------------------------	---------

This parameter is the encoder feedback output pulse line number, which determines the number of pulses that the motor turns to the encoder feedback output.

P6.06	Encoder feedback output pulse Z pulse bias	0~65535
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The encoder feeds back and outputs the offset of the Z signal.

P6.07	Encoder feedback output pulse method	0~2
-------	--------------------------------------	-----

0: direct output of the first photoelectric encoder

The first photoelectric encoder signal is directly output.

1: direct output of the second photoelectric encoder

The second photoelectric encoder signal is directly output.

2: resolver encoder pulse output.

The resolver encoder pulse is output.

## 6.8 P7 group: speed loop parameters

P7.00	Speed loop gain	0.0~1000.0
P7.01	Speed loop integral time constant	0.0~6553.5

The speed dynamic response characteristic of the control can be adjusted by setting the gain of the speed regulator and the integral time constant. The dynamic response of the speed loop can be accelerated by increasing the speed loop gain or decreasing the integral time constant. If the proportional gain is too large or the integration time is too small, the system can oscillate.

### Suggested adjustment method:

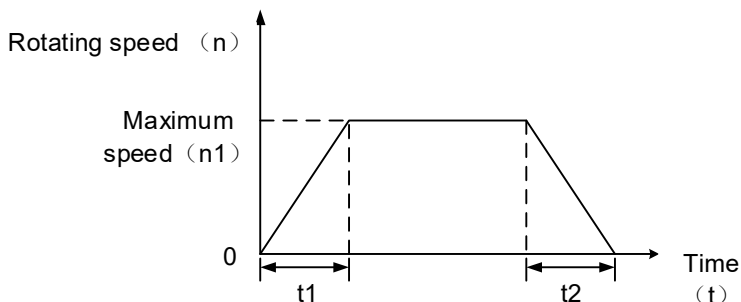
If the factory parameters cannot meet the requirements, fine-tuning can be carried out based on the factory value parameter: the proportional gain is increased firstly to ensure that the system does not oscillate; and then the integral time is reduced, so that the system has no static difference, and it must ensure that the speed feedback and speed command are equal.

**Note:** P7.00 and P7.01 are invalid in the asynchronous non-inductive vector 1 control mode.

P7.02	Acceleration time	0.00~120.00
P7.03	Deceleration time	0.00~120.00

P7.02 is the speed loop acceleration time, which refers to the time from the zero speed to the maximum speed when the drive works in the speed loop, as shown in Figure t1.

P7.03 is the speed loop deceleration time, which refers to the time decelerating from the highest speed to zero speed when the speed loop is working, as shown in Figure t2.



Speed loop acceleration and deceleration time curve

P7.04

Motor inertia

0~65535

The larger the motor inertia setting value, the higher the gain, the stronger the rigidity, and the faster the speed response, but the motor shall vibrate if it is too high. When debugging the rigidity, the user debugs the speed loop proportional gain parameter (P7.00) firstly. If the rigidity is still insufficient after adjusting to the highest, the speed loop proportional gain can be reduced firstly, and then the motor inertia value is appropriately increased.

**Note:** in general, the user does not need to adjust this parameter, and the rigidity can be enhanced by this value when the speed loop ratio is insufficient.

P7.05

Weak magnetic gain

0~800

This parameter determines the degree of weak magnet; generally, it is the factory default value, which is not modified by the user.

P7.06

Speed command filter time constant

0~100

The larger the setting, the smoother the speed command and the slower the speed command response.

P7.07

Speed feedback filtering times

1~200

The greater the number of filtering times, the more stable the speed feedback.

P7.08

Acceleration time 1

0.00~120.00

P7.09

Deceleration time 1

0.00~120.00

P7.10

Acceleration time 2

0.00~120.00

P7.11

Deceleration time 2

0.00~120.00

P7.12

Acceleration time 3

0.00~120.00

P7.13

Deceleration time 3

0.00~120.00

Same as P7.02~P7.03 parameter description.

## 6.9 P8 group: current loop parameters

P8.00

Voltage utilization rate

84~120

This parameter mainly affects the weak magnetic zone of motor control. Generally, users are not allowed to modify this parameter by themselves. If there is any need to modify, please contact the manufacturer.

P8.01

Current loop gain

0.0~100.0

P8.02

Current loop integral time constant

0.0~6553.5

The current loop ratio and the current loop integral constant determine the rigidity of the current loop. The user automatically calculates and saves the calculation result after self-learning of the correct input motor parameters. Modifying this parameter has a great influence on the system control effect. Generally, the user is not allowed to modify the parameters of the group. If necessary, please contact the manufacturer for support.

P8.03	Debug mode control word	0~65535
P8.04	Debug input 1	0~65535
P8.05	Debug input 2	0~65535

Manufacturer debugging parameters.

P8.06	High speed current loop gain	0.0~200.0
P8.07	High speed current loop integral time constant	0.0~6553.5

The parameters of P8.06 and P8.07 are high-speed current loop PI. The parameters of this group are automatically adjusted with the PI strength after the high-speed PI switching is turned on.

P8.08	High speed current loop PI switching	0~1
-------	--------------------------------------	-----

0: not switch.

The current loop PI is not switched to the high speed current loop PI during the high speed operation.

1: switch.

The current loop PI is switched to the high speed current loop PI during the high speed operation.

P8.09	High speed current loop PI strength	50~150
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The larger the parameter setting is, the stronger the PI is switched to the high-speed current loop, and conversely, the weaker.

P8.10	Decoupling compensation gain	0~100
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## 6.10 P9 group: position loop parameters

P9.00	Position loop gain	0.0~6553.5
-------	--------------------	------------

The higher the position loop gain, the stronger the position loop rigidity and the faster the position loop response, and the higher position loop will produce overshoot.

P9.01	Position loop speed limiter	0~65535
-------	-----------------------------	---------

This parameter limits the maximum speed that allows the drive to operate at the position loop. When the speed command of the position loop drive is higher than this value, it runs according to the value.

P9.02	Position loop acceleration time	0.00~655.35
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P9.03	Position loop deceleration time	0.00~655.35
-------	---------------------------------	-------------

The position loop acceleration time refers to the time when the drive under the position loop runs from zero speed to the position loop speed limit value;

The position loop deceleration time refers to the time when the position loop drive is operated from the position loop speed limit value to zero speed.

P9.04	Position reaching detection window	0~65535
-------	------------------------------------	---------

When the deviation between the actual position and the command position is less than the setting value and the maintaining time reaches the PA.14 set time, the position reaching signal is output.

P9.05	Position loop pulse input gear ratio molecule	1~65535
-------	---	---------

P9.06	Position loop pulse input gear ratio denominator	1~65535
-------	--	---------

In the working mode of the position loop system, the P9.05 and P9.06 parameters can be used for modifying the sub-frequency (electronic gear) of the position loop pulse command to achieve more convenient matching of various pulse sources to meet the control resolution of different users.

Order: G is the position loop pulse input electronic gear ratio,  $G=P9.05/P9.06$ ;

N is the rotation number of the motor;

C is the number of motor encoder lines;

P is the number of input command pulse.

So:  $P \times G = N \times C \times 4$

**For example:** the user requests that control resolution is 10000 pulses to rotate the motor for two circles, and the number of motor encoder lines is 2500 lines. So:

$$N=2, C=2500, P=10000$$

$$N=2, C=2500, P=10000$$

$$G = N \times C \times 4 / P$$

$$G = N \times C \times 4 / P$$

$$= 2 \times 2500 \times 4 / 10000$$

$$= 2 \times 2500 \times 4 / 10000$$

$$= 2 / 1$$

$$= 2 / 1$$

Therefore, P9.05 is set to 2, and P9.06 is set to 1, which can meet user needs.

P9.07	Position feedforward gain	0.00~200.00
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The higher the position loop feedforward gain, the higher the high-speed response characteristic of the position loop, but the position loop is easy to generate oscillation.

P9.08	Position feedforward filtering time	0.000~2.000
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The larger the setting value, the higher the cutoff frequency of the position feedforward low-pass filter.

P9.09	Position command filtering	0~65535
-------	----------------------------	---------

The higher the setting value, the smoother the position command; it shall result in a position command lag, but the input pulse shall not be lost.

P9.10	Position loop output filtering time	0.000~65.535
-------	-------------------------------------	--------------

The output command of the position loop is filtered; the larger the setting, the smoother the output command.

P9.11	Position loop feedback encoder selection	0~1
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**0:** motor end encoder

The position feedback encoder is a motor end encoder.

**1:** the second photoelectric encoder The position feedback encoder is the second photoelectric encoder.

P9.12	Pulse input gear ratio molecule of the second encoder	1~65535
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P9.13	Pulse input gear ratio denominator of the second encoder	1~65535
-------	--	---------

When P9.11=1 (the second photoelectric encoder is used as position loop feedback), the position loop input pulse gear ratio coefficient is calculated in the same method as P9.05 and P9.06.



P9.14

Transmission ratio filter coefficient of the second encoder

0.000~65.535

The filter coefficient of the second encoder and the second encoder are adopted when using the second encoder position loop. The larger the setting, the smoother the output command.

## 6.11 PA group: positioning parameters

PA.00

Positioning encoder selection

0~2

his parameter determines the type of encoder when positioning, and it is set according to the type of encoder matching with the motor of the user.

0: the first photoelectric encoder

1: resolver

2: the second photoelectric encoder

PA.01

Positioning position 1

0~65535

Please refer to P3.01~P3.07 parameter No. 26~28 function code description.

PA.02

Positioning searching speed

0~65535

0: Direct positioning

When the current running speed is  $\leq$  P9.01 (position loop speed limiter) setting value, the positioning action is directly executed from the current running speed; If the current running speed is greater than the setting value of P9.01 (position loop speed limiter), it is decelerated to P9.01 firstly (position loop speed limiter); and after setting the speed, the positioning action is performed.

1: 1~65535

When the current running speed is greater than the setting value, the positioning is performed after the speed is firstly decelerated to the search speed; if the current running speed is less than or equal to the search speed, the positioning action is directly performed.

PA.03

Positioning deceleration time

0.00~655.35

The positioning deceleration time refers to the time when the position loop speed limiter is decelerated the zero speed during position.

PA.04

Position loop positioning gain

0.0~6553.5

The gain of the position loop after starting positioning has the same meaning as the P9.00 parameter.

PA.05

Direct positioning of maximum speed

1~1500

If the running speed when starting the positioning action is less than the setting value, the running track is planned according to the shortest distance.

Note: if the value is set too large, there may be an overshoot oscillation occurring because the planned distance is too short.

PA.06

Positioning direction

0~2

This parameter determines the direction of positioning:

0: original running direction.

When the drive performs the positioning function, it is positioned according to the original running direction of the motor.

1: positive direction.

When the drive performs the positioning function, it is positioned according to the positive direction.  
 2. negative direction.

When the drive performs the positioning function, it is positioned according to the negative direction.

PA.07	Positioning position 2	0~65535
PA.08	Positioning position 3	0~65535
PA.09	Positioning position 4	0~65535
PA.10	Positioning position 5	0~65535
PA.11	Positioning position 6	0~65535
PA.12	Positioning position 7	0~65535
PA.13	Positioning position 8	0~65535

Please refer to P3.01~P3.07 parameter No. 26~29 function code description.

PA.14	Positioning completion signal output delay	0~65535
-------	--	---------

This parameter determines the delay time of the output signal after the positioning is completed. When the positioning action is completed, the time delay signal is output.

PA.15	Inertia self-learning circle	0~20
PA.16	Inertia self-learning time	0.0~10.0
PA.17	Inertia self-learning operation	0~65535

PA.15~PA.17 is the motor inertia self-learning parameter, and the motor must be able to operate normally before the inertia self-learning.

In the motor inertia self-learning, the operation steps are as follows, firstly set the PA.15, PA.16 parameters, then change the PA.17 to 6666, long press the OK button to enter the motor inertia self-learning state.

**Note:** 1. When debugging the machine, the motor self-learning must be performed firstly, and then the manual test operation is performed to ensure that the motor can rotate normally before the motor inertia self-learning.

2. Before the motor inertia self-learning, it must be ensured that the equipment can be quickly reversed to avoid damage to the equipment.
3. Pay special attention that the inertia obtained by self-learning of the motor inertia cannot be saved automatically, and it will be saved by performing P0.18=1 manually.

PA.18	Speed feedforward (position loop takes effect)	0.00~250.00
-------	--	-------------

Speed feedforward is used for reducing the position following error effectively. The great speed feedforward can produce overshoot, which can be increased to improve the dynamic response of the system.

PA.19	Speed feedforward filtering (position loop takes effect)	0.0~100.0
-------	--	-----------

The speed feedforward is filtered to make the speed feedforward smoother.

## 6.12 PB group: communication parameters

PB.00

RS485 local address

1~253

0: reserved.

1~253: the communication address of this drive is specified, and the machine receives the command's communication address from the upper computer.

PB.01

RS485 baud rate

0~5

This parameter is used for setting the data transmission rate between the upper computer and the drive. The baud rate set by the upper computer and the drive must be the same. Otherwise, the communication cannot be performed normally. The higher the baud rate, the faster the communication speed. Select the corresponding baud rate corresponding function code as follows:

0: 4800BPS.

1: 9600BPS.

2: 19200BPS.

3: 38400BPS

4: 57600BPS

5: 115200BPS

PB.02

Keyboard download permission

0~1

0: not allow to download.

1: allow download.

This function is temporarily unavailable.

PB.03

Communication data format

0~289

LED ones: Data bit

0: 8 data bits;

1: 7 data bits

LED tens: Parity check bit

0: no parity

1: odd parity

2: even parity

LED hundreds: stop bit

0: 1 stop bit

1: two stop bits

PB.04

485 communication timeout

0~65535

0: the communication timeout is invalid.

1~65535: when the communication abnormal time exceeds this value, the drive reports a communication timeout fault and stops running.

PB.05

485 communication response delay

0~65535

This parameter is the response delay time setting of 485 communication.

## 6.13 PC group: simple PLC parameters

PC.00	Simple PLC operation mode	0~3
-------	---------------------------	-----

0: stop after a single run.

The PLC stops after one cycle of operation.

1: maintain the final value after a single run.

After running for one cycle, the PLC maintains the value of the final running speed to run.

2: continuous cycle.

The PLC circulates and runs according to the period.

3: limited cycle.

The PLC stops after running and finishing the finite number of cycles (P4.71 setting value).

PC.01	Simple PLC power-down memory selection	00~11
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Ones: power-down memory selection

0: no memory 1: power-down memory

Tens: stop and keep selection

0: not keep 1: keep

PC.02	The first speed source selection	0~5
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0: multi-speed 1;

The speed source of multi-speed 1 comes from the setting value of the PC.03 parameter itself.

1: 485 communication given.

The speed source of multi-speed 1 comes from the given value of 485 communication.

2: keyboard given.

The speed source of multi-speed 1 comes from the setting value of the keyboard given.

3: AI1.

3: AI2.

The speed source of multi-speed 1 comes from the rotating speed command of AI1.

4: AI2.

4: AI2.

The speed source of multi-speed 1 comes from the rotating speed command of AI2.

5: AI3.

5: AI3.

The speed source of multi-speed 1 comes from the rotating speed command of AI3.

PC.03	Multi-speed 1	-32768~32767
PC.04	Multi-speed 2	-32768~32767
PC.05	Multi-speed 3	-32768~32767
PC.06	Multi-speed 4	-32768~32767
PC.07	Multi-speed 5	-32768~32767
PC.08	Multi-speed 6	-32768~32767

PC.09	Multi-speed 7	-32768~32767
PC.10	Multi-speed 8	-32768~32767
PC.11	Multi-speed 8	-32768~32767
PC.12	Multi-speed 10	-32768~32767
PC.13	Multi-speed 11	-32768~32767
PC.14	Multi-speed 12	-32768~32767
PC.15	Multi-speed 13	-32768~32767
PC.16	Multi-speed 14	-32768~32767
PC.17	Multi-speed 15	-32768~32767
PC.18	Multi-speed 16	-32768~32767

The PC.03~PC.18 parameters are set for multi-speed 1~ multi-speed 16-speed.

PC.19	Simple PLC 1st speed running time	0.0~6553.5
PC.20	Simple PLC 1st speed acceleration and deceleration time selection	0~3
PC.21	Simple PLC 2st speed running time	0.0~6553.5
PC.22	Simple PLC 2st speed acceleration and deceleration time selection	0~3
PC.23	Simple PLC 3st speed running time	0.0~6553.5
PC.24	Simple PLC 3st speed acceleration and deceleration time selection	0~3
PC.25	Simple PLC 4st speed running time	0.0~6553.5
PC.26	Simple PLC 4st speed acceleration and deceleration time selection	0~3
PC.27	Simple PLC 5st speed running time	0.0~6553.5
PC.28	Simple PLC 5st speed acceleration and deceleration time selection	0~3
PC.29	Simple PLC 6st speed running time	0.0~6553.5
PC.30	Simple PLC 6st speed acceleration and deceleration time selection	0~3
PC.31	Simple PLC 7st speed running time	0.0~6553.5
PC.32	Simple PLC 7st speed acceleration and deceleration time selection	0~3
PC.33	Simple PLC 8st speed running time	0.0~6553.5
PC.34	Simple PLC 8st speed acceleration and deceleration time selection	0~3
PC.35	Simple PLC 9st speed running time	0.0~6553.5
PC.36	Simple PLC 9st speed acceleration and deceleration time selection	0~3
PC.37	Simple PLC 10st speed running time	0.0~6553.5
PC.38	Simple PLC 10st speed acceleration and deceleration time selection	0~3

PC.39	Simple PLC 11t speed running time	0.0~6553.5
PC.40	Simple PLC 11st speed acceleration and deceleration time selection	0~3
PC.41	Simple PLC 12t speed running time	0.0~6553.5
PC.42	Simple PLC 12st speed acceleration and deceleration time selection	0~3
PC.43	Simple PLC 13t speed running time	0.0~6553.5
PC.44	Simple PLC 13st speed acceleration and deceleration time selection	0~3
PC.45	Simple PLC 14st speed running time	0.0~6553.5
PC.46	Simple PLC 14st speed acceleration and deceleration time selection	0~3
PC.47	Simple PLC 15st speed running time	0.0~6553.5
PC.48	Simple PLC 15st speed acceleration and deceleration time selection	0~3
PC.49	Simple PLC 16st speed running time	0.0~6553.5
PC.50	Simple PLC 16st speed acceleration and deceleration time selection	0~3

PC.19~PC.50 respectively correspond to PC. 03~PC.18, 16-speed running time and acceleration/deceleration selection, wherein the running time unit can be selected by PC.51; The selection of the X-stage acceleration/deceleration time of the simple PLC corresponds to the following:

- 0: acceleration time / deceleration time (P7.02/P7.03).
- 1: acceleration time 1 / deceleration time 1 (P7.08/P7.09).
- 2: acceleration time 2 / deceleration time 2 (P7.10/P7.11).
- 3: acceleration time 3 / deceleration time 3 (P7.12/P7.13).

PC.51	Simple PLC running time unit	0~1
-------	------------------------------	-----

0: S (second).

1: H (hour).

PC.52	PLC limited number of cycles	1~65535
-------	------------------------------	---------

When the simple PLC operation mode is the limited number of cycle, it is valid; the setting value of this parameter specifies the limited number of cycles of PLC, and the PLC stops after running the number of cycles.

PC.53	Jog speed	-8000~8000
PC.54	Jog acceleration time	0.00~120.00
PC.55	Jog deceleration time	0.00~120.00

The PC.53~PC.55 parameters respectively specify the jog speed, jog acceleration time and jog deceleration time caused by the drive jog function. In the jog function, the enable mode must be the terminal enable (P0.04). =1); the forward and reverse jog are performed by defining the multi-function terminal.

The jog acceleration time is the time required to accelerate from zero speed to the maximum speed in the jog control.

The jog deceleration time is the time required to decelerate from the highest speed to zero speed in the jog control.

## 6.14 PD group: process PID parameters

PD.00	Process closed loop enable	0~1
-------	----------------------------	-----

Reserved.

PD.01	PID given source selection	0~3
-------	----------------------------	-----

0: keyboard setting.

The process closed loop keyboard setting (PD.03) is used as the given source of the PID.

1: AI1.

The analog signal received by the AI1 port is used as the given source of the PID, and 0~10v (4~20mA) corresponds to 0.00%~100.00%.

2: AI2.

The analog signal received by the AI2 port is used as the given source of the PID. 0~10v (4~20mA) corresponds to 0.00%~100.00%.

3: AI3.

The analog signal received by the AI3 port is used as the given source of the PID. 0~10v corresponds to 0.00%~100.00%.

PD.02	PID feedback source selection	0~3
-------	-------------------------------	-----

0 communication given.

The 485 communication given value (PD.03) is used as the feedback source for the PID.

1: AI1.

The analog signal received by the AI1 port is used as the feedback source of the PID, and 0~10v (4~20mA) corresponds to 0.00%~100.00%.

2: AI2.

The analog signal received by the AI2 port is used as the feedback source of the PID, and 0~10v (4~20mA) corresponds to 0.00%~100.00%.

3: AI3.

The analog signal received by the AI3 port is used as the feedback source of the PID, and 0~10v corresponds to 0.00%~100.00%.

PD.03	Process closed-loop keyboard setting	0.00%~100.00%
-------	--------------------------------------	---------------

When the PID given source is selected as the process closed loop keyboard setting (PD.01=0), this parameter determines the PID given value.

PD.04	Process closed-loop ratio P1	0.00~655.35
-------	------------------------------	-------------

This parameter determines the adjustment strength of the PID. The larger the setting value, the larger the adjustment strength. When this parameter is set to 200.00%, the PID adjustment amplitude is maximum (ignoring the function of the process closed loop integral I1 and the process closed loop differential D1).

PD.05	Process closed-loop integral I1	0.00~655.35
-------	---------------------------------	-------------

This parameter determines how fast the PID regulator adjusts the integral of the PID feedback amount and the given amount of deviation. The process closed-loop integral I1 time means that when the deviation between the PID feedback amount and the given amount is maximum, the integral regulator (ignoring the

function of the closed-loop ratio P1 and the closed-loop differential D1 of the process) is continuously adjusted after this time, and the adjustment amount reaches the maximum speed (P0.03). The shorter the process closed loop integration time I1, the greater the adjustment strength.

PD.06	Process closed-loop differential D1	0.00~655.35
-------	-------------------------------------	-------------

This parameter determines the strength of the regulator of the PID to adjust the change rate of the deviation of the feedback amount and the given amount. The process closed-loop differential time D1 means that if the feedback amount changes by 100% during this time, the adjustment amount of the differential regulator is the maximum speed (P0.03) (ignoring the function of the process closed-loop ratio P1 and the process closed-loop integral I1). The longer the process closed-loop differential time D1, the greater the adjustment strength.

PD.07	Sampling time	1~65535
-------	---------------	---------

The longer the sampling time, the greater the hysteresis of the PID system.

PD.08	Deviation limit	0.00~655.35
-------	-----------------	-------------

When the PID feedback deviation is within this range, the PID stops adjusting.

PD.09	PID adjustment limit selection	0~1
-------	--------------------------------	-----

**0**: positive polarity

When the feedback signal is greater than the PID given value, the drive speed is required to drop in order to balance the PID regulator. Such as the tension control of the winding;

**1**: negative polarity

When the feedback signal is greater than the PID given value, the drive speed is required to rise in order to balance the PID regulator. Such as the tension control of the unwinding.

PD.10	PID output upper limit	PD.11~100.00%
-------	------------------------	---------------

This parameter defines the upper limit of the PID output.  $P0.03 \times PD.10$  is the output upper limit speed of the PID.

PD.11	PID output lower limit	-100.00%~PD.10
-------	------------------------	----------------

This parameter defines the lower limit of the PID output.  $P0.03 \times PD.11$  is the output lower limit speed of the PID.

PD.12	PID feedback disconnection detection threshold value	0.00%~100.00%
-------	--	---------------

PD.13	PID feedback disconnection detection time	0.0~6553.5
-------	---	------------

When the PID feedback is less than the PID feedback disconnection detection threshold, and the PID feedback disconnection detection time is reached, the drive alarms.

PD.14	PID adjustment selection	0~65535
-------	--------------------------	---------

0bit: integral pause XI terminal control

**0**: invalid 1: valid

1bit: whether to stop integration when the output reaches the limit value;

**0**: stop 1: not stop

2bit: whether the output allows to reverse

**0**: allowed 1: not allowed



PD.15	PID feedback range	0~65535
PD.16	Differential limiter	0.00%~100.00%

reserved.

PD.17	PID given change time	0.00~655.35
-------	-----------------------	-------------

PID given change time refers to the time required for the actual PID value changed from 0.0% to 100.0%. When the PID given changes, the actual PID given value does not respond immediately. Moreover, it changes linearly according to a given change time to prevent abrupt change in the given amount.

PD.18	PID feedback filter time	0.00~655.35
-------	--------------------------	-------------

The PID feedback is filtered to eliminate the abrupt change. The longer the filtering time, the smoother the feedback signal.

PD.19	PID output filtering time	0.00~655.35
-------	---------------------------	-------------

The PID output is filtered to eliminate the abrupt change. The longer the filtering time, the smoother the output signal.

PD.20	Process closed-loop ratio P2	0.00~655.35
-------	------------------------------	-------------

PD.21	Process closed-loop integral I2	0.00~655.35
-------	---------------------------------	-------------

PD.22	Process closed-loop differential D2	0.00~655.35
-------	-------------------------------------	-------------

Same as PD.14~PD.16 parameter description.

PD.23	PID parameter switching condition	0~2
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PD.24	PID parameter switching deviation 1	0.00%~PD.25
-------	-------------------------------------	-------------

PD.25	PID parameter switching deviation 2	PD.24~100.00%
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In some occasions, a group of PIDs may not be able to satisfy the whole running process; at this time, multiple sets of PID parameters may be required for selection. PD.23 specifies the PID parameter switching conditions as follows:

**0**: not switch.

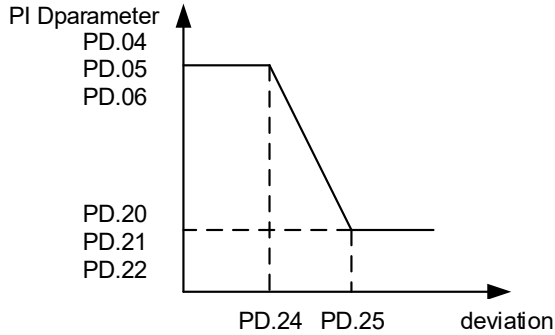
The PID parameter defaults to the process closed loop ratio P1, the process closed loop integral I1 and the process closed loop differential D1;

**1**: XI terminal switching.

When the XI multi-function terminal function code is set to 15 (process PID terminal switching), when the terminal is valid, the PID parameter is switched to the process closed-loop ratio P2, the process closed-loop integral I2 and the process closed-loop differential D2 from the default parameter.

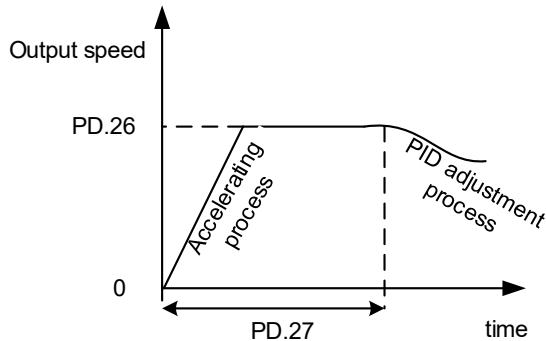
**2**: automatic switching according to deviation

When the PID given and feedback deviation is less than the PID parameter switching deviation 1 (PD.24), the PID adjustment parameters are PD.04, PD.05, PD.06; When the given and feedback deviation is greater than the PID parameter switching deviation 2 (PD.25), the PID adjustment parameters are PD.20, PD.21, PD.22. When the given and feedback deviation is between the PID parameter switch 1 and the PID parameter switch 2, the two sets of PID parameters are linearly changed.



PD.26	PID initial value	0.00%~100.00%
PD.27	Keeping time of PID initial value	0.00~655.35

When the PID is running, the drive runs at the PID initial value firstly and the duration is the PID initial value maintaining time (PD.27), and then enters the normal PID adjustment process.



PD.28	Maximum positive value of twice output deviations	0.01%~100.00%
PD.29	Maximum negative value of twice output deviations	0.01%~100.00%

This function is used for limiting the difference between the two outputs (2ms/beat) of the PID output, thus suppressing the PID output from changing too fast. PD.28 and PD.29 correspond to the maximum output deviation at the forward and reverse rotation respectively.

PD.30	PID shutdown operation	0~1
-------	------------------------	-----

0: shutdown without operation.

1: shutdown operation.

PD.31	PID feedback overrun threshold	0.00%~100.00%
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PD.32

PID feedback overrun alarm delay time

0~65535

When the PID feedback exceeds the threshold and the PID feedback overrun alarm delay time (PD.32) is maintained, the drive alarms.

PD.33

PID switching speed

0.00%~100.00%

This function is available in some occasions where the PID condition process may not meet the application requirements and needs to be switched to a certain speed. When using this function, the function code of the specified multi-function terminal needs to be set to 15. When the terminal is valid, it is switched to the PD.33 speed setting value (0.00%~100% corresponds to 0~P0.03).

## Chapter 7 Troubleshooting

### 7.1 List of Fault and Alarm Information

VA serial servo drive is equipped with complete protection functions to provide efficient protection while utilizing its performance sufficiently. Some failure instructions may be displayed during operation. Compare the instructions with the following table and C.0.07, C.0.08 parameters value to analyze, decide the causes and solve failures.

For damages on units or questions that can't be resolved, please contact with local distributors/agents, service centers or manufacturer for solutions.

Fault No.	C0.07 Display	C0.08 Display	Fault description	Possible causes	Corrective actions
Err 1	1	1	Peripheral protection	External fault terminal in effect	Check external fault terminal status
Err 2	2	2	Servo driver overload protection	The input voltage is too low	Check Input power
				Fast start of motor in high speed rotation	Start the motor after it stops rotating
				Overloading for a long time	Shorten overload time and reduce load
				Power selection of servo drive is small	Replace with the appropriate type of servo drive
Err 3	3	4	Motor overload protection	The input voltage is too low	Check Input power
				Motor stall or load change seriously	Prevent motor plugging and reduce load mutation
				Ordinary motor runs at low speed and heavy load for a long time	Increase running speed
Err 4	4	8	IGBT overheat (analog)	The output current is too large	Check whether the motor and output wiring are short-circuited, whether the ground is short-circuited, whether the load is too heavy
				DC terminal voltage is too high	Check the power supply of the power grid, check whether the large inertia load has no energy consumption, brake fast stop
				The internal connector of servo drive is loose	Please ask professional and technical personnel for maintenance
Err 5	5	16	IGBT overheat (switch type)	The output current is too large	Check whether the motor and output wiring are short-circuited, whether the ground is short-circuited, whether the load is too heavy
				DC terminal voltage is too high	Check the power supply of the power grid, check whether the large inertia load has no energy consumption, brake fast stop

Fault No.	C0.07 Display	C0.08 Display	Fault description	Possible causes	Corrective actions
				The internal connector of servo drive is loose	Please ask professional and technical personnel for maintenance
Err 6	6	32	Motor overheating (PTC)	Motor temperature signal reaches the alarm setting value	Enhanced ventilation and heat dissipation
				Abnormal resistance of thermistor	Check the thermistor
				Motor sensor protection threshold in setting improper	Adjust the motor sensor protection threshold
Err 7	7	64	Encoder break	Encoder is connected incorrectly	Change encoder wiring
				Encoder no signal output	Check encoder and power supply.
				Encoder wire broken	Repair the broken line
				Function code set wrong	Confirm that the relevant function code of servo driver encoder is set correctly
Err 8	8	128	Overcurrent protection	Grid voltage depression	Check Input power
				The moment of inertia of the load is too large	Use appropriate energy consumption brake components
				Motor parameter setting is not normal	Set motor parameters correctly
				Deceleration time is too short	Extend deceleration time
				Power selection of servo drive is small	Replace with the appropriate type of servo drive
				Current loop parameter setting is abnormal	
Err 9	9	256	Module failure	Output current is too large	Check whether the motor and output wiring are short-circuited, whether the ground is short-circuited, whether the load is too heavy
				Bus voltage is too high	Check the power supply of the power grid, check whether the large inertia load has no energy consumption, brake fast stop
				Internal connector of servo drive is loose	Please ask professional and technical personnel for maintenance
Err 10	10	512	Overvoltage	motor shorted to the ground	Check motor wiring
				Abnormal input power voltage	Check Input power
				The motor is spinning , fast	Start the motor after it stops

Fault No.	C0.07 Display	C0.08 Display	Fault description	Possible causes	Corrective actions
				start again	rotating
				The moment of inertia of the load is too large	Use appropriate energy consumption brake components
				Deceleration time is too short	Extend deceleration time
				Input power abnormal	Check Input power
Err 11	11	1024	Power supply undervoltage	The power supply voltage is lower than the minimum working voltage of the equipment	Check Input power
				Internal switching power supply abnormal	Seek technical services
Err 12	12	2048	Abnormal relay snap-in	Internal connector of servo drive is loose	Please ask professional and technical personnel for maintenance
				Abnormal buffer circuit on power	Seek technical services
Err 13	13	4096	EEPROM Abnormal	EEPROM Read and write abnormal	Seek technical services
Err 14	14	8192	Application error	Application is not authorized	Seek technical services
Err 15	15	16384	PID Feedback of bolt	Detection setting of PID feedback broken wire is not correct or PID feedback broken wire	Check the PID feedback disconnect, check the threshold and check out time Check whether the PID feedback signal is broken
Err 16	16	/	PID Feedback transfinite	PID feedback is out of bounds	Check whether the actual feedback value size exceeds the set allowable range
Err 17	17	/	485 Communication timeout	Incorrect communication Settings or abnormal communication signal	Check the communication Settings and communication wiring, and check whether the timeout parameter is reasonable
Err 18	18	/	The position feedback is inconsistent with the speed running direction	The position feedback is inconsistent with the speed running direction	Adjust the phase sequence of the second encoder line or invert the direction of the second encoder through parameters
FAIL	/	/	Self-learning fault	Self-learning fault	Check parameter Settings or consulting services

**Note:** when the drive fails, the drive interface will display the Err XX alarm. When the faults corresponding to C0.07 and C0.08 are not described by the same fault, it indicates that there are multiple faults at the same time. For example: when the drive fails, C0.07=2.C0.08=134, then C0.07=2 indicates the drive overload protection, and C0.08=134 does not only refer to the drive overload protection fault, indicates that there are multiple faults; at this time, it can be considered that C0.08=134=2 (the current fault code of C0.07 corresponds to the C0.08 fault code of the same fault description) +4+128, that is, the drive has the overload protection fault of the drive, the motor overload protection fault and overcurrent protection.

## Appendix A Modbus Communication Protocol

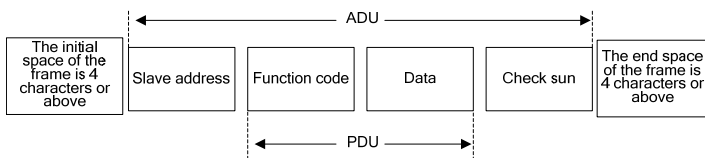
### 1. Support Protocol

Support Modbus protocol, RTU format, Broadcast address 0, slave address “1–247”, “248–255” for reservation.

### 2. Interface mode

RS485: Asynchronous, half duplex, the least significant bit is sent first. Low byte is after the high byte.

### 3. Protocol Format



Attached Figure2 Protocol Format

ADU (Application Data Unit) check is the CRC16 check of the first three parts of ADU and obtained through exchange of high byte and low byte.

### 4. Function Interpretation

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x03
Initial address of register	2	0x0000 ~ 0xFFFF
Number of registers	2	0x0001 ~ 0x0010
Response:		
Function code	1	0x03
Read bytes	1	2*Number of registers
Read contents	2*Number of registers	

- ◆ Function 0x03 reads parameters and status words of multiple function code parameters.
- ◆ Function 0x06 rewrites single function code or control parameter and save it upon power failure (not save).

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x06

Register address	2	0x0000 ~ 0xFFFF
Register data	2	0x0000 ~ 0xFFFF
Response:		
Function code	1	0x06
Register address	2	0x0000~ 0xFFFF
Register data	2	0x0000 ~ 0xFFFF

☞ **Note:** In communication, 0x06 writes RAM instead of EEPROM, and the data will not be saved after the parameter is written in

## 5. Servo drive Register Address Distribution

Address Space	Meaning
Functional parameter address	See parameter table
Control register address	0x8000
Open loop digital frequency given	0x8001
Status register address	0x810B, read attachment-2
Fault register address	0x0003, read attachment-3

▼ Register of drive control word (address: 0X8000)

Bit	Meaning	Bit	Meaning
0bit	0: Stop 1: Running	8bit	0: non-action 1: Relay 1Output
1bit	Reserve	9bit	0: non-action 1: Relay 2Output
2bit	0: non-action 1: Fault resetting	10bit	0: non-action 1: Relay 3Output
3bit	Reserve	11bit	0: non-action 1: PID Switching speed
4bit	Reserve	12bit	Reserve
5bit	Reserve	13bit	Reserve
6bit	0: non-action 1: Y1Output	14bit	Reserve
7bit	0: non-action 1: Y2Output	15bit	Reserve

▼ The drive status word 1 (0x810B) bit is defined as follows:



Attachment table-2

Bit	Meaning	Bit	Meaning
0	0: Driver stop    1: Drive operation	5~6	Select the given mode of running command: 0: Operation panel setting, 1: Terminal of a given, 2: Upper computer setting
3	0: Positive drive rotation    1: Drive reversal		
4	0: Key unlocked    1: Key locked	8~15	0: Normal    Others: Fault code
注: bit1、2、7 Reserve			

▼ Register of drive fault word (address: 0X0003H)

Attachment table-3

Bit	Meaning
0bit	External fault
1bit	Drive overload
2bit	Motor overload
3bit	IGBT overheat (analog type)
4bit	IGBT overheat (switch type)
5bit	Motor Overheat ( PTC )
6bit	Encoder break
7bit	Overcurrent
8bit	Module failure
9bit	Over-voltage
10bit	Power supply under voltage
11bit	Abnormal relay snap-in
12bit	EEPROM Abnormal
13bit	
14bit	
15bit	

## 6. CRC16 Function

```
unsigned int  crc16(unsigned char *data,unsigned char length)
```

```
{
    int i,crc_result=0xffff;
    while(length-->0)
    {
        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;
}
}
return (crc_result==((crc_result&0xff) <<8) | (crc_result>>8)) ; //Exchange CRC16 check sum and bytes at higher
and lower orders
}

```

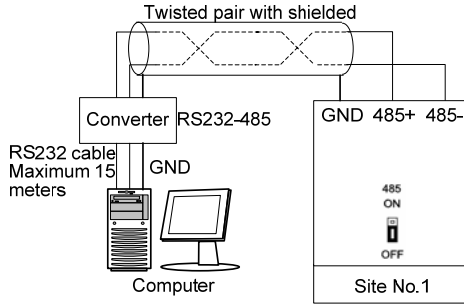
## 7. Case Study of Modbus Communication Control

Run the command as follows:						
	Address	Function code	Register Address	Register Contents		Check Sum
Request	0x01	0x06	0x8000	0x0001		0x61CA
Response	0x01	0x06	0x8000	0x0001		0x61CA
The stop command is as follows:						
	Address	Function code	Register Address	Register Contents		Check Sum
Request	0x01	0x06	0x8000	0x0000		0XF1CA
Response	0x01	0x06	0x8000	0x0000		0XF1CA
Set 50HZ running frequency command:						
	Address	Function code	Register Address	Register Contents		Check Sum
Request	0x01	0x06	0x8001	0x1388		0XFC9C
Response	0x01	0x06	0x8001	0x1388		0XFC9C
Read the running status of drive 1# :						
	Address	Function code	Register Address	Number of registers/ number of bytes read	Register Contents	Check Sum
Request	0x01	0x03	0x810B	0x0001	Nothing	0XDDF4
Response	0x01	0x03	无	0x02	0x0000	0xB844
Read the running status of drive 1# :						
	Address	Function code	Register Address	Number of registers/ number of bytes read	Register Contents	Check Sum
Request	0x01	0x03	0x0003	0x0001	Nothing	0x740A
Response	0x01	0x03	无	0x02	0x0000	0XB844

☞ Note:Parameters modified through communication are not saved when power is off. If it is necessary to save, it is necessary to perform a save operation before power is off

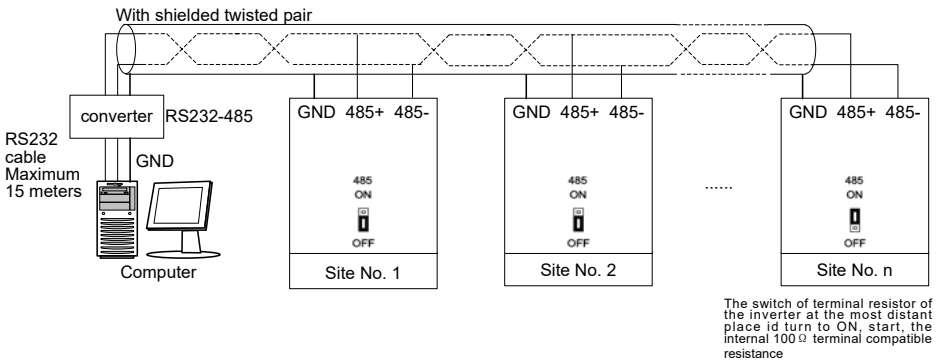
## 8. Communication Network Construction

- ◆ Connecting one driver to the computer



Attached Figure3 Connecting One Inverter to the Computer

- ◆ Connecting multiple driver to the computer



Attached Figure4 Connecting Multiple Inverters to the Computer

## Appendix B Register Address

Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address
P0.00	88	58	P5.03	66	42	PC.32	274	112
P0.01	14	E	P5.04	69	45	PC.33	275	113
P0.02	19	13	P5.05	79	4F	PC.34	276	114
P0.03	10	A	P5.06	80	50	PC.35	277	115
P0.04	103	67	P5.07	105	69	PC.36	278	116
P0.05	114	72	P5.08	310	136	PC.37	279	117
P0.06	113	71	P5.09	311	137	PC.38	280	118
P0.07	354	162	P5.10	312	138	PC.39	281	119
P0.08	355	163	P5.11	316	13C	PC.40	282	11A
P0.09	356	164	P5.12	317	13D	PC.41	283	11B
P0.10	47	2F	P5.13	318	13E	PC.42	284	11C
P0.11	30	1E	P5.14	319	13F	PC.43	285	11D
P0.12	155	9B	P5.15	320	140	PC.44	286	11E
P0.13	27	1B	P5.16	437	1B5	PC.45	287	11F
P0.14	28	1C	P6.00	324	144	PC.46	288	120
P0.15	29	1D	P6.01	334	14E	PC.47	289	121
P0.16	115	73	P6.02	335	14F	PC.48	290	122
P0.17	112	70	P6.03	336	150	PC.49	291	123
P0.18	180	B4	P6.04	337	151	PC.50	292	124
P0.19	119	77	P6.05	322	142	PC.51	293	125
P0.20	157	9D	P6.06	323	143	PC.52	299	12B
P0.21	158	9E	P6.07	325	145	PC.53	360	168
P0.22	159	9F	P7.00	53	35	PC.54	361	169
P0.23	93	5D	P7.01	54	36	PC.55	362	16A
P0.24	101	65	P7.02	20	14	PD.00	203	CB
P0.25	153	99	P7.03	21	15	PD.01	226	E2
P0.26	16	10	P7.04	100	64	PD.02	227	E3
P0.27	17	11	P7.05	83	53	PD.03	202	CA
P0.28	308	134	P7.06	18	12	PD.04	181	B5
P0.29	343	157	P7.07	326	146	PD.05	182	B6
P0.30	414	19E	P7.08	255	FF	PD.06	183	B7
P0.31	416	1A0	P7.09	256	100	PD.07	205	CD
P0.32	358	166	P7.10	257	101	PD.08	204	CC

Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address
P0.33	417	1A1	P7.11	258	102	PD.09	220	DC
P0.34	418	1A2	P7.12	259	103	PD.10	221	DD
P0.35	419	1A3	P7.13	260	104	PD.11	222	DE
P0.36	150	96	P8.00	85	55	PD.12	223	DF
P0.37	151	97	P8.01	95	5F	PD.13	224	E0
P0.38	152	98	P8.02	96	60	PD.14	225	E1
P0.39	427	1AB	P8.03	62	3E	PD.15	230	E6
P0.40	429	1AD	P8.04	67	43	PD.16	231	E7
P0.41	430	1AE	P8.05	68	44	PD.17	232	E8
P0.42	431	1AF	P8.06	407	197	PD.18	233	E9
P0.43	435	1B3	P8.07	408	198	PD.19	234	EA
P1.00	99	63	P8.08	409	199	PD.20	235	EB
P1.01	104	68	P8.09	415	19F	PD.21	236	EC
P1.02	90	5A	P8.10	422	1A6	PD.22	237	ED
P1.03	65	41	P9.00	327	147	PD.23	238	EE
P1.04	56	38	P9.01	328	148	PD.24	239	EF
P1.05	57	39	P9.02	329	149	PD.25	240	F0
P1.06	59	3B	P9.03	330	14A	PD.26	241	F1
P1.07	86	56	P9.04	333	14D	PD.27	242	F2
P1.08	87	57	P9.05	338	152	PD.28	243	F3
P1.09	89	59	P9.06	339	153	PD.29	244	F4
P1.10	84	54	P9.07	376	178	PD.30	245	F5
P1.11	91	5B	P9.08	381	17D	PD.31	249	F9
P1.12	123	7B	P9.09	383	17F	PD.32	250	FA
P1.13	128	80	P9.10	399	18F	PD.33	251	FB
P1.14	156	9C	P9.11	321	141	C0.00	129	81
P2.00	160	A0	P9.12	432	1B0	C0.01	5	5
P2.01	161	A1	P9.13	433	1B1	C0.02	4	4
P2.02	162	A2	P9.14	434	1B2	C0.03	6	6
P2.03	163	A3	PA.00	219	DB	C0.04	7	7
P2.04	164	A4	PA.01	331	14B	C0.05	9	9
P2.05	165	A5	PA.02	332	14C	C0.06	2	2
P2.06	166	A6	PA.03	340	154	C0.07	111	6F
P2.07	167	A7	PA.04	341	155	C0.08	3	3
P2.08	168	A8	PA.05	368	170	C0.09	81	51
P2.09	169	A9	PA.06	367	16F	C0.10	82	52

Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address
P2.10	170	AA	PA.07	369	171	C0.11	198	C6
P2.11	309	199	PA.08	370	172	C0.12	199	C7
P2.12	171	AB	PA.09	371	173	C0.13	200	C8
P2.13	172	AC	PA.10	372	174	C0.14	201	C9
P2.14	301	191	PA.11	373	175	C0.15	189	BD
P2.15	302	192	PA.12	374	176	C0.16	190	BE
P2.16	303	193	PA.13	375	177	C0.17	191	BF
P2.17	173	AD	PA.14	401	191	C0.18	192	C0
P2.18	300	190	PA.15	345	159	C0.19	193	C1
P2.19	304	194	PA.16	346	15A	C0.20	194	C2
P2.20	305	195	PA.17	347	15B	C0.21	195	C3
P2.21	306	196	PA.18	348	15C	C0.22	187	BB
P2.22	307	197	PA.19	349	15D	C0.23	206	CE
P2.23	420	1A4	PB.00	1	1	C0.24	208	D0
P2.24	421	1A5	PB.01	125	7D	C0.25	211	D3
P3.00	353	161	PB.02	127	7F	C0.26	342	156
P3.01	40	28	PB.03	229	E5	C0.27	209	D1
P3.02	41	29	PB.04	228	E4	C0.28	210	D2
P3.03	42	2A	PB.05	403	193	C0.29	217	D9
P3.04	43	2B	PC.00	294	126	C0.30	216	D8
P3.05	44	2C	PC.01	295	127	C0.31	212	D4
P3.06	45	2D	PC.02	296	128	C0.32	213	D5
P3.07	46	2E	PC.03	136	88	C0.33	214	D6
P3.08	106	6A	PC.04	137	89	C0.34	215	D7
P3.09	107	6B	PC.05	138	8A	C0.35	216	D8
P3.10	108	6C	PC.06	139	8B	C0.36	382	17E
P3.11	109	6D	PC.07	140	8C	C0.37	510	1FE
P3.12	110	6E	PC.08	141	8D	C0.38	121	79
P3.13	126	7E	PC.09	142	8E	C0.39	377	179
P3.14	248	F8	PC.10	143	8F	C0.40	378	17A
P3.15	400	190	PC.11	144	90	C0.41	379	17B
P3.16	402	192	PC.12	145	91	C0.42	380	17C
P4.00	32	20	PC.13	146	92	C0.43	246	F6
P4.01	33	21	PC.14	147	93	C0.44	247	F7
P4.02	116	74	PC.15	148	94	C0.45	174	AE
P4.03	35	23	PC.16	149	95	C0.46	175	AF
P4.04	36	24	PC.17	154	9A	C0.47	176	B0
P4.05	117	75	PC.18	297	129	C0.48	177	B1

Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address	Parameter NO.	Decimal address	Hexadecimal address
P4.06	37	25	PC.19	261	105	C0.49	178	B2
P4.07	38	26	PC.20	262	106	C0.50	252	FC
P4.08	39	27	PC.21	263	107	C0.51	253	FD
P4.09	118	76	PC.22	264	108	C0.52	298	12A
P4.10	134	86	PC.23	265	109	C0.53	365	16D
P4.11	130	82	PC.24	266	10A	C0.54	363	16B
P4.12	131	83	PC.25	267	10B	C0.55	364	16C
P4.13	135	87	PC.26	268	10C	C0.56	425	1A9
P4.14	132	84	PC.27	269	10D	C0.57	426	1AA
P4.15	133	85	PC.28	270	10E	C0.58	428	1AC
P5.00	313	139	PC.29	271	10F	C0.59	436	1B4
P5.01	60	3C	PC.30	272	110			
P5.02	61	3D	PC.31	273	111			