Preface

Thank you for purchasing EA100 series servo drive.

EA100 is a high performance general-purpose servo drive, which can be widely used in the numerically controlled machine tools, printing and packaging machinery, textile machinery, robot automatic production line and other automation fields.

Since SINEE is committed to the development and improvement of products and products documents, this manual will be updated without notice.

Safety Information

Danger: The label indicates that a failure to follow instructions can result in serious injury or even death.

Caution: The label indicates that a failure to follow instructions can result in moderate or slight injury and device damage.

Please read this chapter carefully before system installation, debugging and maintenance and always follow the safety precautions below during operation. SINEE will not undertake any damage or loss caused by a failure to follow the instructions.

Safety Precautions

Before Installation:

Danger
1. Do not install servo drive if its package is wetted or any its component is missing or broken. 2. Do not install servo drive if the label information on its package is not identical to that on servo drive.

Caution
1. Be careful when carrying or transporting servo drive so as to avoid damage! 2. Do not use servo drive if it is damaged or any component is missing so as to avoid injury! 3. Do not touch the parts of control system with bare hands so as to avoid ESD!

During Installation:

Danger
1. Installation base shall be metal or other non-flammable material so as to prevent fire risk.

Caution
1. Ensure that no cable strips or screws are dropped servo drive so as to avoid damage to servo drive. 2. Install servo drive at a place with less vibration and no direct sunlight. 3. Consider the installation space for cooling purpose when servo drive is installed in a closed cabinet or space.

Wiring:

Danger
1.Wiring must be performed by authorized and qualified personnel so as to avoid unexpected accidents. 2.A circuit breaker must be installed between servo drive and the mains so as to prevent fire risk. 3.Ensure that power is off before wiring, and ground inverter in accordance with the applicable wiring standard so as to avoid electric shock. 4.Grounding terminal must be grounded reliably so as to avoid electric shock and fire risk.

Caution
1. Never connect input power supply cable to output terminals U, V or W of servo drive. Pay attention to terminal symbols and connect to the terminals correctly so as to prevent risks of damaging servo drive. 2. Be sure that wiring meets EMC requirements and local safety standards. Cable should be in recommended sizes so as to prevent accident risk. 3.Do not connect braking resistor to DC bus terminals + and – so as to prevent fire risk. 4.Tighten terminals with a screwdriver of specified torque so as to prevent fire risk. 5.Do not connect a phase-shifting capacitor or an LC/RC noise filter to output circuits. 6.Do not connect a solenoid switch or an electromagnetic contactor to output circuits. Otherwise, it will trigger the action of the overcurrent protection circuit or even damage the internal parts of servo drive. 7.Do not disconnect internal cable of servo drive, or else this can possibly damage the internal parts of servo drive.

Before Power-on:

Danger

1.Verify that input voltage is identical to the rated voltage of servo drive, input terminals L1, L2 and L3 and output terminals U, V or W are correctly connected, there are no short circuit phenomena for the wiring of servo drive and its peripheral circuits, and all wires are in good connection. Otherwise, this may result in servo drive damage.

2.Never perform voltage withstanding test on servo drive, because it has been done at the factory. Otherwise, this may result in accident.

Caution

1.The front cover of inverter must be closed before inverter is powered on. Otherwise, it may result in an electric shock.

2. The wiring of all peripherals must be conducted in accordance with the guidance of this manual. Otherwise, it may result in an electric hazard.

After Power-on:

Danger

1. Do not touch servo drive or its peripheral circuits with wet hands to avoid the electric shock.

2. If the indicator is off or the keypad does not display any information after power-on, please cut off the power supply immediately. Never touch any terminal of L1, L2 or L3 of servo drive or the connecting terminals with hands or a screw driver, or else an electric shock accident may occur. Contact our customer service personnel immediately after cutting off the power.

3. After being powered on, servo drive will automatically check the safety of the external strong circuit automatically. Therefore, do not touch wiring terminal U, V or W of servo drive or the wiring terminal of the motor with bare hands, otherwise it will result in electric shock.

Caution

1.If you need to check parameter settings, be careful of personal safety when the motor is running so as to avoid accidents.

2.Do not change default parameter setting without approval to avoid damage.

During Operation:

Danger

1. Never touch cooling fan, heat sink or discharge resistor with bare hands for checking temperature, which may result in burning!

2. Only qualified technicians are allowed to detect signal during operation so as to prevent personal injury or device damage.

Caution

1.Prevent any foreign items from being dropped into the device during operation, so as to avoid damage to the device.

2. Do not control the start/stop of servo drive by ON/OFF of the contactor so as to avoid damage to the device.

3.Do not contact the rotating shaft of the motor on running so as to prevent personal injury..

Maintenance:

Danger

1.Maintain and inspect the device only after servo drive is powered off to avoid electric shock.

2. Maintain and inspect servo drive only after its main circuit is powered off and CHARGE indicator is off. Otherwise, the residual electric charge of capacitor may result in personal injury.

3. Maintenance and inspection can be performed by well-trained technicians only, so as to avoid personal injury or device damage.

4. Parameter setting is required if inverter has been replaced. Plug-in & plug-out should be performed after power-off.

Attentions

Varistor or Power Factor Improvement Capacitor on Inverter Output
Servo drive outputs PWM wave. Do not use servo drive, if a power factor improvement capacitor or a lightning varistor is on output side, which may easily result in transient overcurrent of servo drive, or even damage servo drive.

Surge Protection
A surge protection device is installed in servo drive to prevent it from induction lightning stroke on a certain degree. Additional protection devices are required in front of servo drive in the places where thunder and lightning occur frequently.

Altitude and Derating
When servo drive is used in an area at an altitude of over 1,000m, the cooling effect will degrade, so it must be derated. For details, please consult SINEE.

Attentions at Servo Drive Scrapping
Burning the electrolytic capacitors of the mains and PCB may result in explosion and burning plastic parts may generate toxic gas. Please handle them as industrial wastes when servo drive is scrapped.

CONTENT

1 Product Information

1.1 Verifying Product

Check and verify the product:

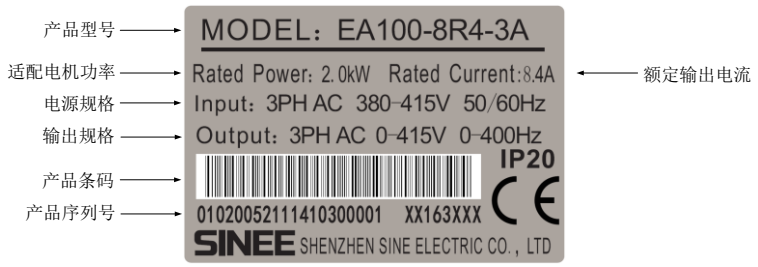
Item	Method
Check if they are identical to the purchase order.	Check the nameplate at the side of inverter.
Any damage.	Check the overall appearance to see if they are damaged in transportation.
Any loosened screws or other fastening parts.	Check with a screw driver if necessary.

If you find any quality problem, please contact SINEE Direct Sale Department or the distributor.

1.2 Model Numbering Scheme and Nameplate

1.2.1 Nameplate

- **EA100 series servo drive**

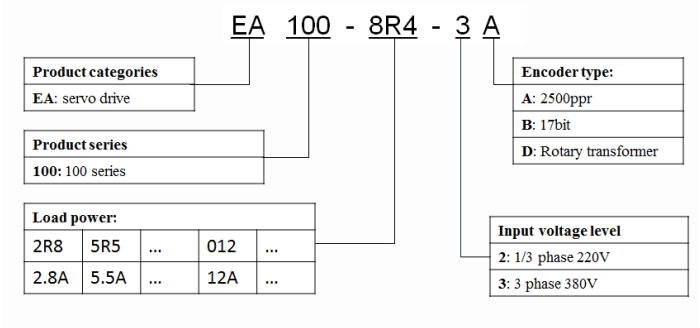


- **SER series servo motor**

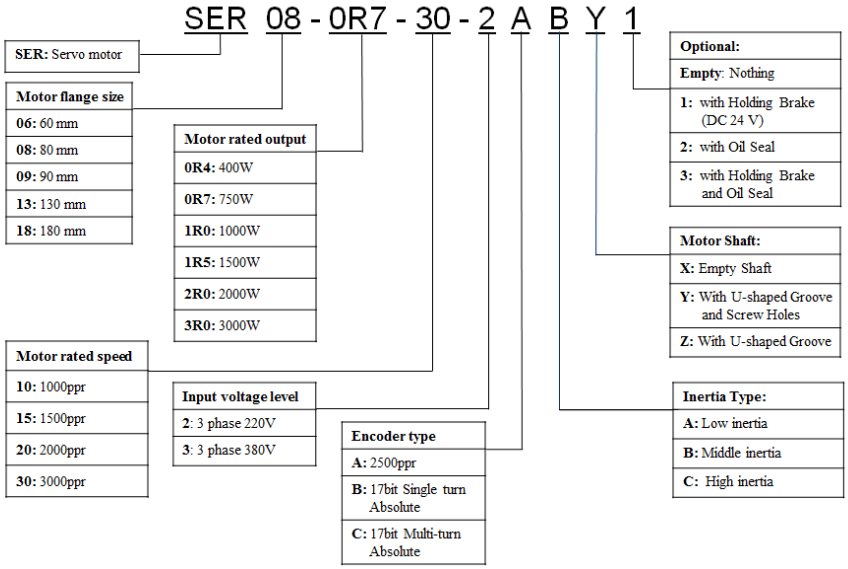
NOTE： The actual product nameplate may be different from as shown in the figure.

1.2.2 Model Numbering Scheme

Servo drive:



Servo motor:



1.3 Model Number List

Servo Drives				Matched Servo Motors	
Model of servo drives	Input voltage	Rated output current	Size	Model of servo motors	Motor power
EA100-2R8-2A	1/3 phase AC 220V	2.8A	SIZE A	SER06-0R4-30-2AAY□	400W
EA100-5R5-2A		5.5A		SER08-0R7-30-2AAY□	750W
EA100-7R6-2A		7.6A	SIZE B	SER13-1R0-20-2ABY□	1000W
EA100-010-2A	3 phase AC 220V	10.0A		SER13-1R5-20-2ABY□	1500W
EA100-5R4-3A	3 phase AC 380V	5.4A		SER13-1R5-20-3ABY□	1500W
EA100-8R4-3A		8.4A		SER13-2R0-20-3ABY□	2000W
EA100-012-3A		12.0A		SER13-3R0-20-3ABY□	3000W
EA100-018-3B		18.0A	SIZE C	SER18-4R5-15-3BBZ□	4500W
EA100-021-3B		21.0A		SER18-5R6-15-3BBZ□	5600W
EA100-030-3B		30.0A		SER18-7R5-15-3BBZ□	7500W

1.4 Servo Drive Control Mode

The drive can provide multiple control modes for users, please refers to as follows:

Type	Control mode and function parameter	Display	Specification
Single mode	Position mode P1-00=1	P	Drive accepts position command to control motor Running at target position. Position command input by terminal, signal is pulse.
	Speed mode P1-00=0	S	Drive accepts speed command to control motor running to targer speed. Speed command can be provided by internal register (3 groups) or analog voltage input terminal, and confirm which use at present based on DI.
	Torque mode P1-00=2	T	Drive accepts torque command to control motor running to target torque. Torque command can be provided by internal register (3 groups) or analog voltage input terminal, and confirm which use at present based on DI.
Mixed mode	Speed and Position switch mode P1-00=3	S-P	S and P can switch by DI terminal.
	Torque and Position Switch mode P1-00=5	T-P	T and P can switch by DI terminal.
	Speed and Torque switch mode P1-00=4	S-T	S and T can switch by DI terminal.

2 Installation

2.1 Caution

Please pay special attention to the following:

- The cable between servo drive and servo motor should stay relaxed, not tense.
- If the cable between servo drive and servo motor is more than 20 meters, please Strengthen UVW connection and encoder connection.
- When the servo driver is fixed, the installation direction must be in accordance with the regulations, and each fixed screw must be locked.
- For the determination of concentric with the servo motor shaft and equipment shaft, to prevent the radial stress when motor running.
- Four fixed screws of the servo motor must be locked according to the prescribed torque.
- In order to make the cooling effect better, when install AC servo drives, the upper and lower, left and right and adjacent items and baffle (wall) must keep enough space, otherwise it will cause fault.
- When the servo driver is installed, it can not be dumped. The air suction and exhaust holes are not blocked, otherwise, the fault can be caused.

2.2 Storage ambient conditions

Please put the product in its packing box before installation. If the drive is not used, in order to enable the product to meet the company's scope of warranty and future maintenance, be sure to pay attention to the following conditions:

Item	Description
Storage temperature	-20℃～+65℃（high temperature: 80℃ 72hours）
Storage humidity	Relative humidity of 0% to 95% with no condensation
Vibration	Below 49m/s ²
Impact	Below 490m/s ²

2.3 Installation ambient conditions

2.3.1 EA100 servo drive using ambient conditions:

Item	Description
Dust and gas	No dust, free of corrosive gas or liquid.
Ambient humidity	Relative humidity 20%～90%（no condensation）
Ambient temperature	0℃～+45℃
Vibration	Below 4.9m/s ²
Impact	Below 49m/s ²
Elevation	Below 1000m,please derating above 1000m

2.3.2 SER series servo motor using ambient conditions:

Item	Description
Ambient humidity	Relative humidity20%～80% (no condensation)
Ambient temperature	0℃～+40℃
Vibration	Below 4.9m/s ²
Impact	Below 49m/s ²
Elevation	Below 1000m,please derating above 1000m

- Do not use motor in closed ambient. Closed ambient will lead to high temperature of motor, shorten the service life.

2.3.3 Other caution

In addition to the above ambient conditions, regardless of the drive or motor, when selecting the installation site, please observe the following precautions,otherwise, may make the product can not meet the company's warranty coverage and future maintenance:

- No high temperature.
- No water drops, steam, dust and oil dust.
- No corrosive or flammable gas or liquid.
- No floating fiber or metal particles.
- Installation base shall be solid and free from vibration.
- No electromagnetic interference and away from interference source.

2.4 Servo Drive Installation Direction and Space

Servo drive and servo motor appearance size and weight specifications, please refer to the chapter 10.

2.4.1 Method

Please ensure the installation direction and walls are vertical. To use natural convection or fan for cooling of the servo drive. Through the mounting hole, the servo driver is firmly fixed on the mounting surface.

When installing, please turn the servo drive front (the operator's actual mounting face) to the operator, and make it perpendicular to the wall.

2.4.2 Cooling

In order to ensure the air convection, please refer to Figure 2-1, around the servo drive with enough space.

In order not to make the ambient temperature of the servo drive partial excessive phenomenon, so that to maintain a uniform temperature of electric cabinet, please install cooling fan above servo drive in electric cabinet.

2.4.3 Ground

Make sure the ground terminal is grounded, otherwise, there may be a risk of electric shock or interference arising from false action.

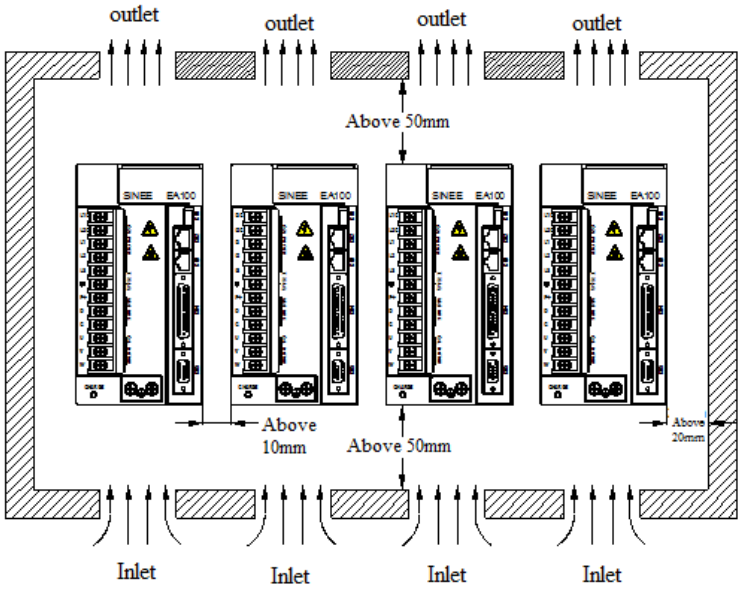


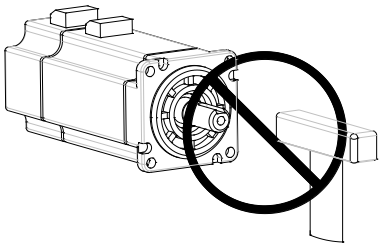
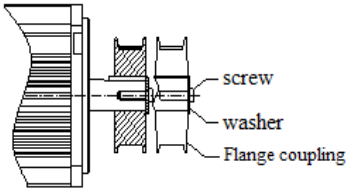
Figure 2-1 Servo Drive Installation Direction and Space

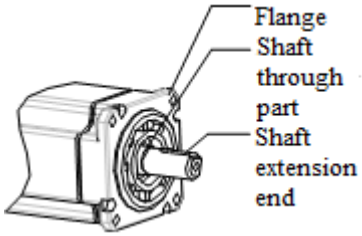
2.5 Servo Motor Installation Direction and Space

2.5.1 Motor installation

SER series servo motor must be installed in a dry and solid platform, please keep good ventilation and heat radiation effect, and keep a good grounding.

2.5.2 Installation diagram

Item	Description
Anti-rust solution	Wipe clean servo motor shaft extension ends of the "anti rust agent" before installation, and then do the relevant anti rust treatment
Encoder note	● Installation to prohibit the impact of the shaft extension end, otherwise it will cause internal encoder fragmentation. 
Pulley installation	● When installing the pulleys in the servo motor shaft with keyway ,please use screw on the shaft end. In order to install pulley, at first, the double headed nail is inserted into the screw hole of the shaft, washer is used on the surface of the coupling end and a nut gradually locked into the pulley. ● About the servo motor shaft with keyway, use the screw holes of shaft end to install. About the shaft of no keyway, adopt the wear coupling or similar method. ● When removing the pulley, adopt pulley removal device to prevent shaft subjected to impact. ● In order to ensure safety, a protective cover or similar device shall be installed in the rotating area. 

Item	Description
Centering	● In connection with the machine, please use the coupling, as well as the axis of the servo motor and mechanical axis to keep in a straight line, the circumference radial pulsation of the shaft coupling should not be greater than 0.03mm. If the centering is not sufficient, it will produce vibration, it can damage the bearings and encoders etc.
Installation direction	● The servo motor can be installed in horizontal direction or vertical direction, do not install slant, otherwise it may cause motor bearing wear.
Oil solution	When using at the place of water droplets drop , please confirm the servo motor on the basis of the protection level (except the shaft through part). When using for the site of oil droplets will drop to the shaft through part, please specify the use of oil seal with the servo motor. The servo motor operating conditions with oil seal: ● Please ensure the oil level is lower than the oil seal lip when using. ● Please use when oil seal can keep oil splash in a good condition. ● In the servo motor vertical installation, please pay attention not to use oil seal.  Shaft through part: Refers to the gap of motor shaft from the end surface of the protruding part
Stress condition of cable	Don't make cable excessive bending or tension is applied to it, especially the core wire of the encoder signal line is 0.12 mm or0.22 mm, very fine, so in wiring and using, please don't make the stretching tight.
Connector parts solution	**For connector parts, please note the following:** ● The connector, please confirm there is no garbage or metal debris and other foreign bodies in connector. ● The connector connects to the servo motor please first from one side of the servo motor circuit cable and cable main grounding wire must reliable connection. If first connected one side of the encoder cable, the encoder may be fault caused by the potential difference between the PE. ● The connection, please confirm the correct pin arrangement. ● The connector is made of resin. Do not apply impact to prevent damage to the connector. ● When cable maintain connection to handle, please hold the servo motor main body. If only seize the cable handling, may be damaged or broken cable or connector. ● If you need to bend the cable, you should pay full attention to the wiring , do not make the connector part of the pressure or tension, or may cause the connector damage or poor contact.

2.6 Circuit breakers and fuse recommendations

If there is a drive to install the leakage circuit breaker to be used as the leakage fault protection, to prevent leakage circuit breakers malfunction, please select the model about the sense of current in the 200mA above and the action time of 0.1 seconds above.
Fuse, please use the fast fuse model, its rated current should be based on the drive capacity of about 1.5 times.

Strongly recommended: The fuse and circuit breakers recognized by UL/CSA .

2.7 Brake resistance selection

When the motor's output torque and speed in the direction of the opposite, the energy will be transmitted back to the drive from the load. This energy will be poured into the bus bar so that the voltage value of the bus inside the drive is increased, and the magnitude of the recharge energy depends on the inertia of the motor and the load. If the system inertia small, may through drive internal capacitors to absorb recharge energy, but if the system inertia is large, more than the energy that capacity absorb, voltage value may rise too high, causing the drive stop or even damage, so when the voltage rises to a certain value, recharge energy must by a braking resistor to consume.

The following table 2-1 lists commonly used SER series servo motor rotor inertia and EA100 drive internal capacitive absorption ability, and retrogradation energy calculation formula.

Table 2-1 SER series servo motor rotor inertia and retrogradation capacity absorbed

Model	Motor	rotor inertia $J(\times 10^{-4} kg \cdot m^2)$	Retrogradation from rated speed to motionless without load Eo (J)	Capacity maximum retrogradation Ec (j)
EA100-2R8-2□	SER06-0R4-30-2□AY	0.3	1.48	16
EA100-5R5-2□	SER08-0R7-30-2□AY	1.01	4.99	24
EA100-7R6-2□	SER13-1R0-10-2□BY	17.14	9.42	41
EA100-7R6-2□	SER13-1R0-20-2□BY	8.71	19.1	41
EA100-010-2□	SER13-1R5-20-2□BY	12.08	26.5	41
EA100-5R4-3□	SER13-1R5-20-3□BY	12.08	26.5	34
EA100-8R4-3□	SER13-2R0-20-3□BY	17.14	37.67	49.6
EA100-012-3□	SER13-3R0-20-3□BY	25.58	56.22	49.6
EA100-018-3B	SER13-4R5-15-3BBZ	35.37	43.73	61.2
EA100-021-3B	SER13-5R6-15-3BBZ	45.51	56.26	91.8
EA100-026-3B	SER13-7R5-15-3BBZ	79.89	98.76	91.8
retrogradation energy calculation formula: $E_0 = J \bullet v^2 / 182(J)$ v：rpm，motor maximum speed				
The motor rotor inertia of servo motor with brake is same with servo motor without brake's.				

2.7.1 Built-in brake resistance

There is brake resistance in EA100 series drive, suitable for the general situation of the load inertia. About EA100 series built-in brake resistance specifications, please refer to Table 2-2.

Table2-2 EA100 drive built-in brake resistance allowable minimum external brake resistance

Model	Brake resistance(built in)		Retrogradation treated by built in brake resistance	Allowable minimum external brake resistance
	Resistor(P8-18)	Capacity(P8-19)		
EA100-2R8-2□	50Ω	100W	50W	50Ω
EA100-5R5-2□	50Ω	100W	50W	50Ω
EA100-7R6-2□	50Ω	100W	50W	40Ω
EA100-010-2□	50Ω	100W	50W	40Ω
EA100-5R4-3□	50Ω	100W	50W	50Ω
EA100-8R4-3□	50Ω	100W	50W	50Ω
EA100-012-3□	50Ω	100W	50W	45Ω
EA100-018-3B	40Ω	200W	90W	30Ω
EA100-021-3B	40Ω	200W	90W	30Ω
EA100-026-3B	40Ω	200W	90W	25Ω

2.7.2 External brake resistance capacity calculation

When the retrogradation capacity exceeded retrogradation capacity internal brake resistance can dealt with, should use external braking resistance.

According to the calculation formula of retrogradation , assuming the load inertia is N times the inertia of the rotor of the motor, motor from the rated speed to 0, retrogradation is (N+1) *Eo, the action cycle is T, then

Power of braking resistance

$$= \frac{2((N+1) \times E_0 - E_C)}{T}$$

2.7.3 Note when using external braking resistance

- When using external braking resistor, resistor connected to the P+ and C terminal, at the same time must remove the short circuit piece installing between P+ and D, makes P and D two terminals in the open state.
- The external braking resistance cannot be less than reported in table 2-2, otherwise it might damage the drive.
- Please make the external resistor braking resistor value and the capacity set to the function parameters of drive correctly, otherwise it will affect the execution of the function.
  P8-18 (brake resistance), P8-19 (brake resistance capacity).
- In the natural environment, when the braking resistor can handle retrogradation capacity (average) below the rated capacity, resistance temperature will rise to 120℃ above(in the continuous braking condition). For security, please use the forced cooling system, to reduce the temperature of the brake resistor; or recommend the use of braking resistor with thermo switch. The load characteristics on braking resistance, please refer to the manufacturer.

Note：

1) Please make the external braking resistor same with the internal braking resistor, otherwise, may lead to drive damaged.

2) When using external braking resistance, if don't remove the short circuit piece which is between P and D, it may lea to drive damaged.

2.8 EMI Filters

All of the electronic equipment (including servo drives) in normal operation, will produce some high frequency or low frequency noise, and through the conduction or radiation interference peripheral equipment. If you can match the appropriate EMI filter and the correct installation method, the interference will be reduced to a minimum.

When the servo driver and EMI filter are installed, we can follow the installation and wiring of the contents of the manual, we can be sure that it can meet the following specifications:

1. EN61000-6-4（2001）
2. EN61800-3 （2004） PDS of category C2
3. EN55011+A2（2007） Class A Group 1

2.8.1 EMI Filter installation caution

In order to ensure that the EMI filter can achieve maximum effect of inhibit the servo drive interference, in addition to the servo drive according to the contents of the manual installation and wiring, still need to pay attention to the followings:

1) Servo drive and EMI filter must be installed on the same piece of well grounded metal plane.
2) Servo drive and EMI filter, please try to install the servo drive above the EMI filter .
3) All wiring will be as short as possible.
4) Metal shell of servo drive and EMI filter must be reliably connected with the metal ,surface, and the contact area between the two should be as large as possible.

2.8.2 Selection of motor cable and installation notes

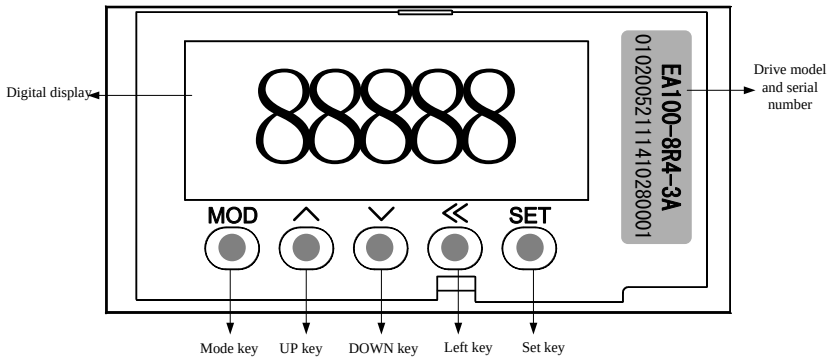
The selection and installation of the motor line is correct or not, it's related to the EMI filter can play the greatest effect of servo drive interference suppression.

Please note the followings:

1) The cable with isolation copper mesh (Double isolation layer is preferred).
2) The isolated copper mesh on both ends of motor line to ground in the shortest distance and the maximum contact area.
3) Motor line isolation copper mesh connects metal plane correctly, isolated copper mesh on both sides of motor line should be fixed with U-shaped metal piping supports and metal plane.

3 Display & Operation

3.1 Display and key operation Exterior



3.2 Display and operation mode

There are 5 display and operation mode for EA100 servo drive

Mode	Function
Monitor mode	Monitoring the value of parameter code
Parameter group selection mode	Choose parameter group to be monitored or set
Parameter code selection mode	Choose parameter code to be monitored or set
Setting Mode	Setting the value of the selected parameter code
Fault and alarm mode	Display fault and alarm information

3.3 Parameter setting Description

1) When the drive is powered on, the digital tube display the default monitor code for one second, then work in monitor mode.
2) In monitor mode, pressing UP or DOWN key to change the monitored parameter code, then press the SET key to monitor selected parameter code. If there is no key operation, it will monitor selected parameter code automatically after one minute.
3) In monitor mode, if the monitored parameter is 32 bit or displaying a more than 5 digits binary number, press the left key to switch the display for high bit and low bit. When displaying high bit, the digital tube decimal point of the highest bit is lit.
4) In monitor mode, press MOD to enter the parameter set selection mode, then press UP / DOWN key to switch the parameter set, press the MOD key to exit the parameter set selection mode back to monitor mode.
5) In parameter group selection mode, pressing left key, the flashing character shift left. It is easy to choose parameter group number. Press SET key to enter parameter code selection mode, press MOD key to exit parameter code selection mode and back to parameter group selection mode.
6) In parameter code selection mode, pressing UP or DOWN key can change the value of last two code to change parameter code, then press the SET key immediately to enter the parameter setting mode and display the value of the parameter code.
7) In the parameter setting mode, use UP / DOWN key to set parameter. When pressing left key the blinking character will shift left, it is easily and quickly to modify the value of the parameter high bit.
8) After setting the value, press SET key to store or execute a command.
9) After setting the value, the digital tube will display the status information of the parameter, for example, displaying -End-. Then automatically back to parameter code selection mode.
10) In parameter setting mode, press MODE key or no key operation in one minute will cancel the modification of parameter value, and back to parameter code selection mode.
11) When servo alarm, pressing MODE key for one second, it will show the current alarm code; pressing any key again to exit the alarm code displayed.

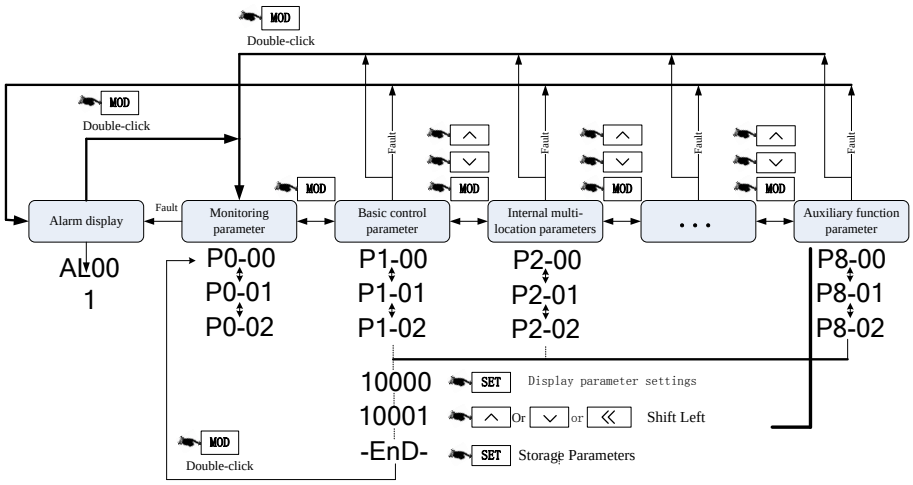


Figure 3-1 Panel Operation flowchart

3.4 Status Display

There are following states:

Display symbol	Content note
-End-	The set value is stored correctly.
Po-0n	This parameter must be rebooting to be effective.
Sru0n	Parameter cannot be set when servo starting
Err-r	Read - only parameters, which cannot be modified
EESud	This parameter is reserved and cannot be modified.

3.5 Monitor display

Press the MOD key twice or no key operation more than one minute, servo drive will automatically enter monitor display group function code P0---, in monitor mode, you can press UP or DOWN key to change the monitoring code.

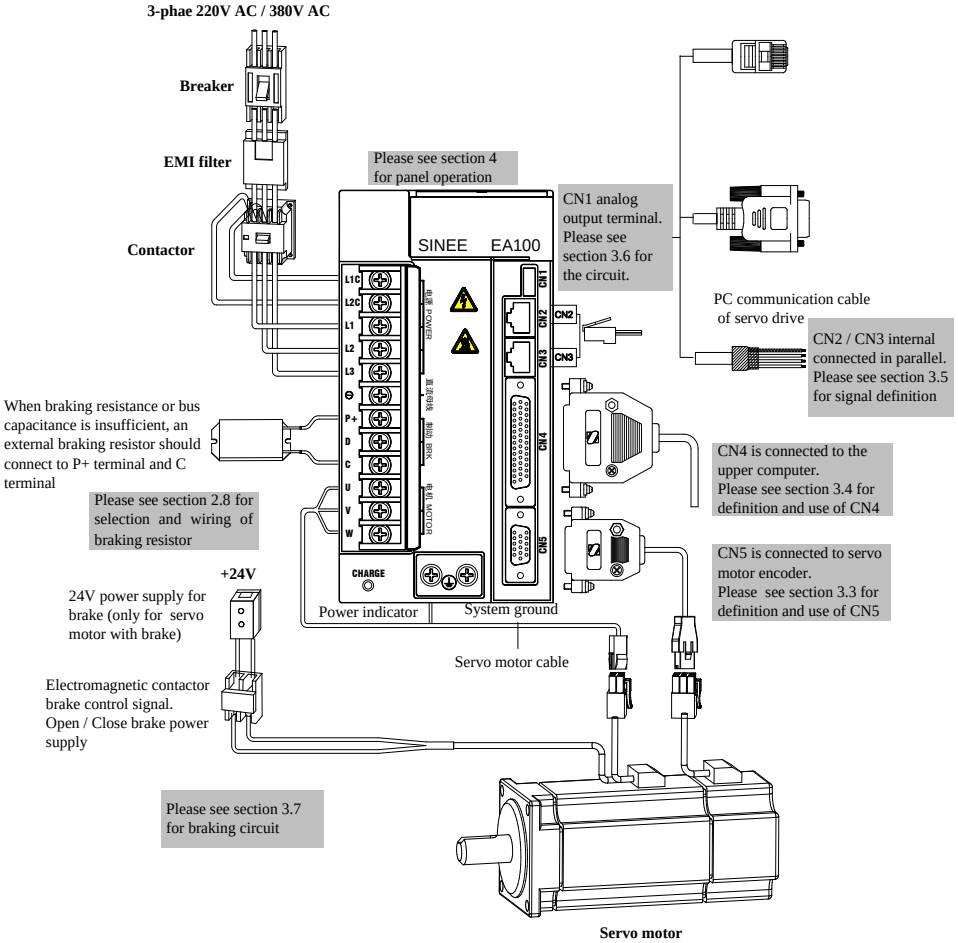
Example	Describe
P0-00	Press SET key to display the motor speed
P0-01	Press SET key to display the motor load rate
P0-02	Press SET key to display current electric angle
P0-30	Press SET key to display received external pulse frequency

3.6 Fault and alarm display

Example	Describe
AL0nn	When there is a fault in the drive, it will be shown in the panel and displaying fault code "Al0" and "NN". "NN" ranges from 01 to FFH. Pressing operation key for other display, but the decimal point of the lowest digital tube will be flashing, until it is cleared, there are no fault or displaying AL--- when warning
ALEnn	When the drive alarms, it will be shown in the panel and displaying warning code "AlE" and "NN". Pressing operation key for other display, but the decimal point of the lowest digital tube will be flashing, until the alarm is cleared.

4 Wiring

4.1 Peripheral connection

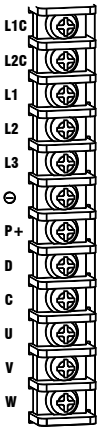


Remark：

1) The servo drive is connected to the industry power supply directly, and there is no power isolation like transformer. To prevent electric shock of servo system, please put a fuse or molded case circuit breaker in the input power supply.
2) Do not install electromagnetic contactor between the drive and the motor, which can damage the drive.
3) Please note the power supply capacity when connect to external control power supply or 24V power supply, especially when the power supply is connected to several drives or brakes. If power supply capacity is not enough, the output current will also be not enough, which can lead to the damage of drive or brake. Please note that the brake power supply is 24V DC, whose capacity should be consistent brake power. Please refer to describe of servo motor for related brake power.
4) Check the servo motor output U, V, W terminal wiring phase. The motor will not run or run out of control and then alarm, or even damaged by incorrect wiring.
5) When using external resistor, P+ and D terminal should be open, and the external brake resistor should be connected to P+, C terminal. When using internal brake resistor, P+ and D terminal should be shorted and P+ and C terminal should be open.
6) In 1-phase 220V wiring, the main power supply terminal is L1, L2 terminal, and L3 should be empty.
7) CN2 and CN3 are same defined communication terminals, so that you can use any one of them.

4.2 Main circuit wiring

Main circuit (strong electric part) terminals and screw size are shown below.



SIZE	Main circuit terminal	
	Screw Size	Tightening torque
SIZE A	M4	2.5N.m
SIZE B	M4	2.5N.m
SIZE C	M4	2.5N.m

SIZE	PE ground terminal	
	Screw Size	Tightening torque
SIZE A	M4	2.5N.m
SIZE B	M4	2.5N.m
SIZE C	M4	2.5N.m

4.2.1 Main circuit (strong electric) terminal Introduction

Table 4-1 servo drive main circuit terminal

Terminals markings	Terminal name	Terminal Function	
L1C, L2C	Control power supply input terminals	1-phase input which is consistent with the main circuit power supply voltage level	
L1, L2, L3	Main circuit AC power input terminals	EA100-2R8-2☐ EA100-5R5-2☐ EA100-7R6-2☐	L1, L2 1-phase 220V input L1, L2, L3 3-phase 220V input
		EA100-010-2☐	L1, L2, L3 3-phase 220V input
		EA100-5R4-3☐ EA100-☐☐☐-3☐ EA100-026-3☐	3-phase 380V input
P+,D,C	External braking resistor connection terminals	Default connection between D and P +. When the braking is insufficient, please keep P +, D circuit open, and connect an external braking resistor between the P + and C.	
P+, ⊖	DC bus terminal	DC bus terminal of servo drive. It can be shared when multi-parallel.	
U,V,W	Servo motor terminals	Connection terminals of the servo motor and they are connected to U, V, W of the motor	
PE	Ground	One ground terminal for EA100-2R8-2A and EA100-5R5-2A; Two ground terminals for other power drives. It is connected to the ground terminal of power supply and the ground terminal of motor.	

4.2.2 Power Wiring

Servo drive power connection is divided into 1-phase and 2-phase. 1-phase only for the drives with output current 7.6A and less than 7.6A

1-phase power supply wiring (rated output current ⩽ 7.6A)

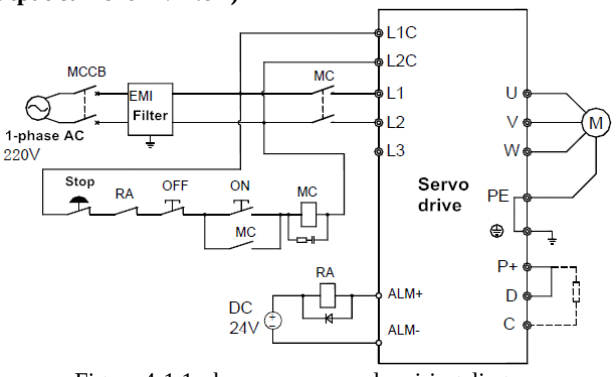


Figure 4-1 1-phase power supply wiring diagram

3-phase power supply wiring (all series are applicable)

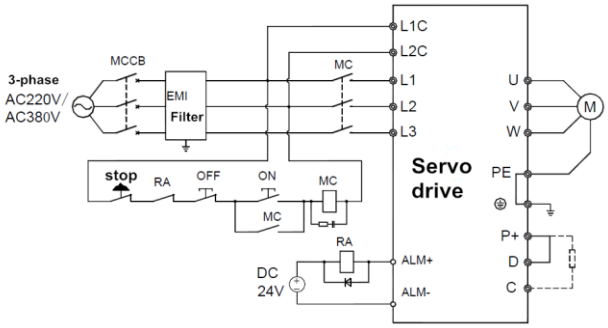


Figure 4-2 3-phase power supply wiring diagram

Remark:

1: If you do not want to cut off the main circuit power supply when a failure occurs, RA relay is not necessary.

2: L1C, L2C can be connected to P +, - terminals instead of external power supply.

- Power on timing

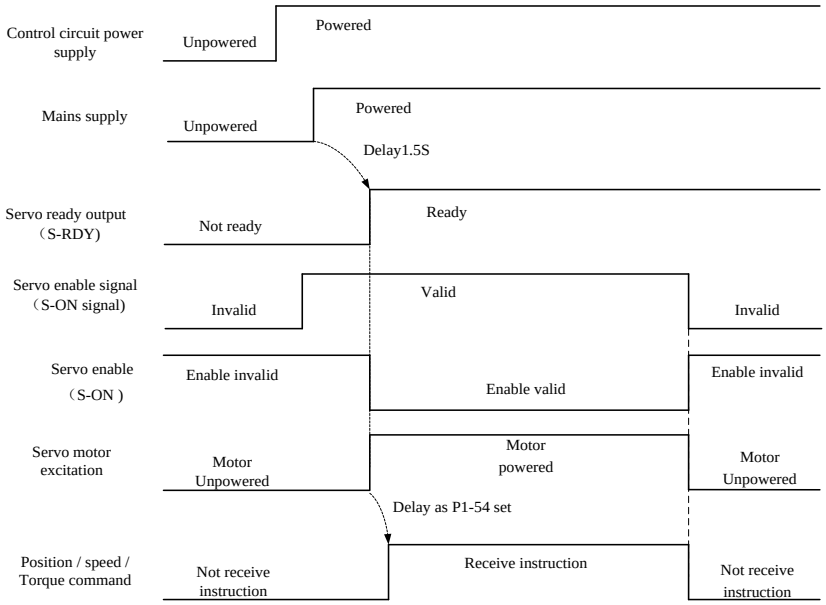


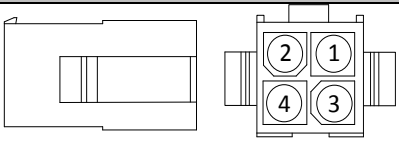
Figure 4-3 power-on timing chart

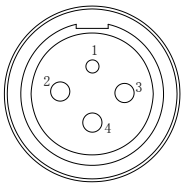
Please refer to figure 3-1 and 3-2 for power wiring and wire as followed sequence.

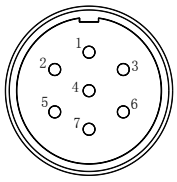
1) Control power circuit L1C, L2C must be powered on before the main circuit or at the same time as the main circuit power supply. If only the power control circuit is powered on, the servo ready signal (S-RDY) will be invalid.
2) The main circuit power input terminals should be connected to the mains supply by electromagnetic contactor (3-phase: L1, L2, L3, 1 phase: L1, L2).
3) After the main circuit power supply is powered on and a 1.5-second delay, servo ready signal (SRDY) will be valid, then it can accept the servo enable (S-ON) signal. When detecting the servo enable signal is valid, the motor will be activated, and running. When detecting the servo enable is invalid or alarmed, output of drive will be off, and the motor is in a free state.
4) When the servo enable and the mains supply are powered on at the same time, the motor will be activated after 1.5 second.
5) Frequently turning on or off of the main circuit power supply may damage the soft start circuit and dynamic braking circuit. The frequency of tuning on or off should be less than 5 times one hour, and 30 times one day. When the drive or motor is overheating, after the solving the problem, the main circuit should be powered on again after 30 minutes cooling.
6) The input power cable cannot connect to the output terminals U, V, W, which can damage the servo drive.
7) The braking resistor is absolutely prohibited to be connected to the DC bus P +, ⊖ terminals, which may lead a fire.
8) After the power is turned off, there may be residual voltage in the servo drive internal capacitance, confirm the CHARGE indicator on the servo drive panel is off before other operation.

4.2.3 Connector specification of motor power cables

Table 4-2 motor servo motor power cable connection terminals

<table>
<tr><th>Connector shape and model</th><th>Terminal pinout</th><th>Motor flange size</th></tr>
<tr>
<td> 
Shell model：C4140HM-2X2P</td>
<td>4PIN AMP Plug（without brake）
<table><tr><th>Pin</th><th>Define</th></tr><tr><td>1</td><td>U</td></tr><tr><td>2</td><td>V</td></tr><tr><td>3</td><td>W</td></tr><tr><td>4</td><td>PE</td></tr></table></td>
<td>60
80
86</td>
</tr>
</table>

<table>
<tr><th>Connector shape and model</th><th>Terminal pinout</th><th>Motor flange size</th></tr>
<tr><td>Plug model：C4140F-TP-H</td><td></td><td></td></tr>
<tr><td> 

Model：YD28K4TS</td><td>Aviation plug（without brake）
<table><tr><th>Pin</th><th>Define</th></tr><tr><td>1</td><td>PE</td></tr><tr><td>2</td><td>U</td></tr><tr><td>3</td><td>V</td></tr><tr><td>4</td><td>W</td></tr></table></td><td>130</td></tr>
<tr><td> 

Model：YD28K7TS</td><td>Aviation plug（with brake）
<table><tr><th>Pin</th><th>Define</th></tr><tr><td>1</td><td>PE</td></tr><tr><td>2</td><td>24V（brake）</td></tr><tr><td>3</td><td>0V（brake）</td></tr><tr><td>4</td><td>not used</td></tr><tr><td>5</td><td>U</td></tr><tr><td>6</td><td>V</td></tr><tr><td>7</td><td>W</td></tr></table></td><td>130</td></tr>
</table>

Note: Due to the product improvement, the aviation plug model may be changed.

4.2.4 Specifications of recommended cable for main circuit connection

<table>
<tr><th>Model</th><th>L1C,L2C</th><th>L1,L2,L3</th><th>P+,C</th><th>U,V,W</th><th>PE</th></tr>
<tr><td>EA100-2R8-2□</td><td rowspan="12">0.5mm^2</td><td rowspan="2">1.0mm^2</td><td rowspan="2">1.0mm^2</td><td rowspan="2">1.0mm^2</td><td rowspan="12">2.5mm^2 above</td></tr>
<tr><td>EA100-5R5-2□</td></tr>
<tr><td>EA100-7R6-2□</td><td rowspan="2">2.0mm^2</td><td rowspan="2">2.0mm^2</td><td rowspan="2">2.0mm^2</td></tr>
<tr><td>EA100-010-2□</td></tr>
<tr><td>EA100-5R4-3□</td><td>1.0mm^2</td><td>1.0mm^2</td><td>1.0mm^2</td></tr>
<tr><td>EA100-8R4-3□</td><td rowspan="2">2.0mm^2</td><td rowspan="2">2.0mm^2</td><td rowspan="2">2.0mm^2</td></tr>
<tr><td>EA100-012-3□</td></tr>
<tr><td>EA100-018-3B</td><td rowspan="2">4.0mm^2</td><td rowspan="2">4.0mm^2</td><td rowspan="2">4.0mm^2</td></tr>
<tr><td>EA100-021-3B</td></tr>
<tr><td>EA100-026-3B</td><td>6.0mm^2</td><td>6.0mm^2</td><td>6.0mm^2</td></tr>
</table>

4.3 CN5 encoder signal terminal

CN5 is encoder signal terminal (DB15 socket), its position is shown in Figure 3-4:

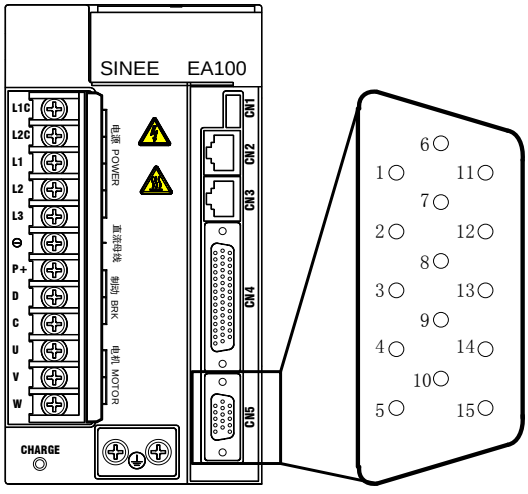


Figure 4-4 CN5 terminal positions

4.3.1 Encoder terminal definition drive-side

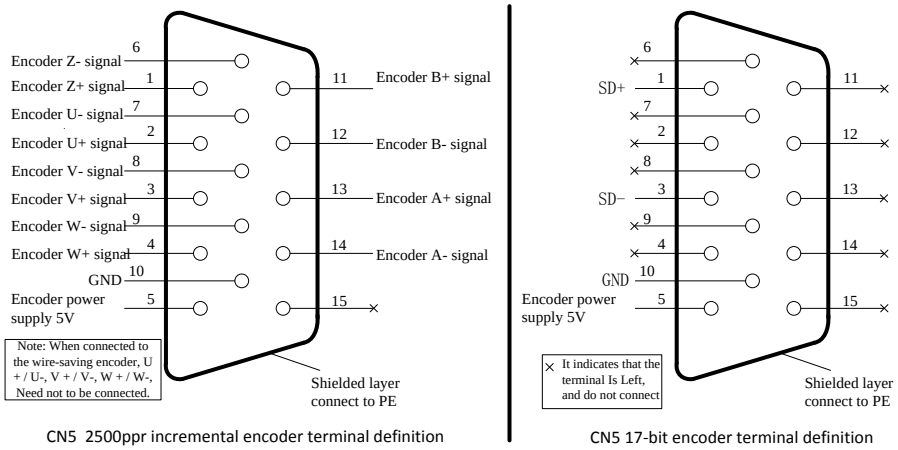


Figure 4-5 CN5 terminal pinout

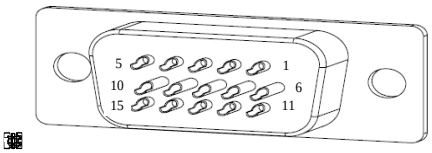
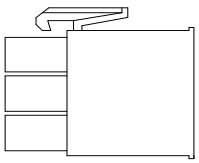
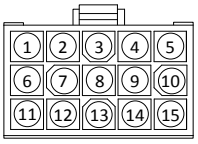
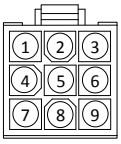
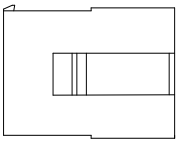
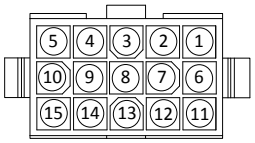
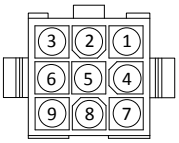


Figure 4-6 CN 5 terminal welding pinout

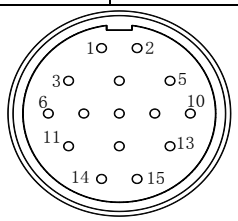
4.3.2 Encoder terminal definition of servo motor side

There are two shapes encoder terminal in the servo motor side.

- AMP plug，for motor with 60, 80 flange, the pin defined in Table 4-3a, 3b, 3c

Plugs in motor side		
Shape	2500ppr incremental encoder	17 bit encoder
	 Motor side	 Motor side
Encoder cable connector		
		
	Shell model：C4140-HM-3*5P Plug model：C4140F-TP-L	Shell model：C4140-HM-3*3P Plug model：C4140F-TP-L

- Aviation plug: for motor with 110 flange and above, the pin defined in Table 4-3a, 3b, 3c

2500ppr incremental encoder	17 bit encoder
 Terminal type：YD28K15TS	

Note: Due to the product improvement, the aviation plug model may be changed.

Table 4-3a 17-bit incremental encoder cable connection

Function Description	Drive side DB15		Servo motor side	
			AMP plug	Aviation plug
	Signal name	Pin	Pin	Pin
Encoder power supply	+5V	5	1	2
Encoder power	GND	10	2	3

Function Description	Drive side DB15		Servo motor side	
			AMP plug	Aviation plug
	Signal name	Pin	Pin	Pin
supply ground				
Positive terminal of serial signal	SD+	1	5	4
Negative terminal of serial signal	SD-	3	6	7
Shield layer PE	PE	Shell	9	1

Table 4-3b 17-bit absolute encoder cable connection

Function Description	Drive side DB15		Servo motor side	
			AMP plug	Aviation plug
	Signal name	Pin	Pin	Pin
Encoder power supply	+5V	5	1	2
Encoder power supply ground	GND	10	2	3
Positive terminal of serial signal	SD+	1	5	4
Negative terminal of serial signal	SD-	3	6	7
Positive terminal of external battery	VB+		7	14
Negative terminal of external battery	VB-		8	15
Shield layer PE	PE	Shell	9	1

Table 4-3c 2500ppr non-wire-saving encoder cable connection

Function Description	Drive side DB15		Servo motor side	
			AMP plug	Aviation plug
	Signal name	Pin	Pin	Pin
Encoder signal Z +	Z+	1	7	6
Encoder signal U +	U+	2	6	10
Encoder signal V +	V+	3	10	11
Encoder signal W +	W+	4	11	12
Encoder supply 5V	+5V	5	2	2
Encoder signal Z-	Z-	6	5	9
Encoder signal U-	U-	7	8	13
Encoder signal V-	V-	8	12	14
Encoder signal W-	W-	9	15	15
Encoder power supply ground	GND	10	3	3
Encoder signal B +	B+	11	4	5
Encoder signal B-	B-	12	14	8
Encoder signal A +	A+	13	9	4
Encoder signal A-	A-	14	13	7
Shielding layer PE	PE	Shell	1	1

Remark for servo wiring:

1) Make sure the drive and the motor shielded layer are grounded; otherwise it will cause the drive error.
2) Do not confuse GND and PE.
3) Be sure that the differential signal can match the two cables of a twisted pair. For example, A + and A- is a set of differential signal, you should use a twisted pair.
4) Encoder cable routing must be separated from the power cable routing by at least 30cm or more.

4.4 CN4 Control signal terminal

Using the DB44 socket, CN4 signal terminal provides signals for communication with upper computer.
Signals include:

- 8 programmable digital inputs
- 4 programmable digital differential output

- 2 analog inputs
- command pulse input
- ABZ encoder signal output

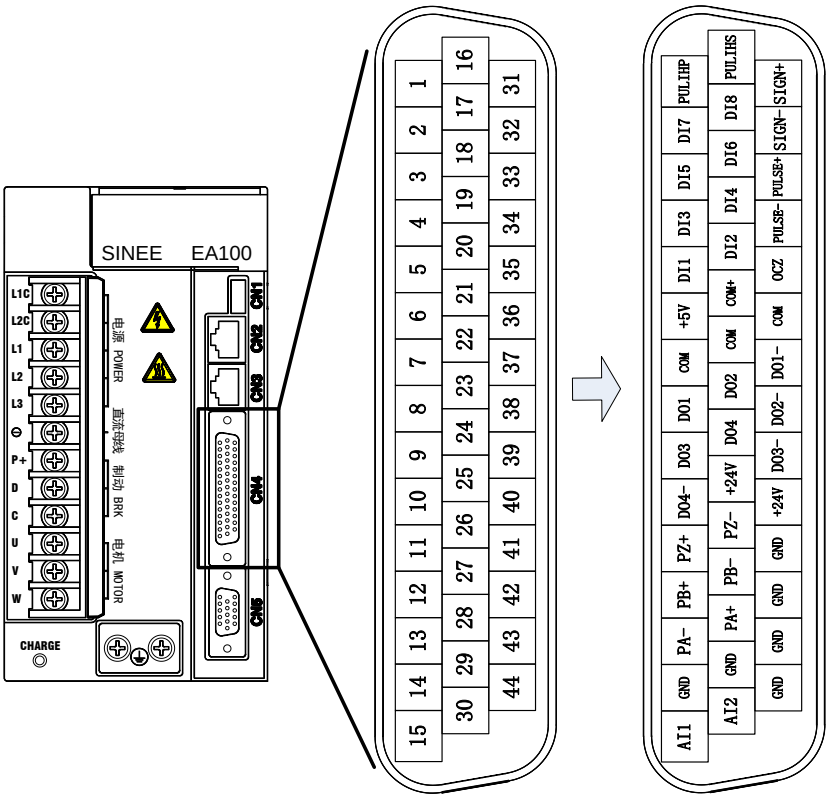


Figure 4-7 Drive control circuit terminal position and pin assignment

4.4.1 Control signal terminal pin distribution

Signal	Pin	Function description	
PULHIP	1	The positive terminal of command pulse when using 24V power supply	
DI7	2	Digital input, the default function number is 7	See section 3.4.2 and 3.4.3
DI5	3	Digital input, the default function number is 5	
DI3	4	Digital input, the default function number is 3	
DI1	5	Digital input, the default function number is 1	
+5V	6	+ 5V power supply, maximum output current 50mA.	
COM	7/22/36	Power supply ground (+ 24V)	
DO1	8	Digital output, the default function number is 1	See section 3.4.2 and 3.4.4
DO3	9	Digital output, the default function number is 8	
DO4-	10	DO4 digital output COM terminal	
PZ+	11	Z pulse positive frequency dividing output, the maximum current is 20mA.	
PB+	12	B pulse positive frequency dividing output, the maximum current is 20mA.	
PA-	13	A pulse negative frequency dividing output	
GND	14/29/41/42/43/44	Analog input signal ground	
AI1	15	Analog input, input impedance: 10kΩ, the maximum input voltage ± 12V.	
PULHIS	16	The positive terminal of command pulse when using 24V power supply	
DI8	17	Digital input, the default function number is 8	See section 3.4.2 and 3.4.3
DI6	18	Digital input, the default function number is 6	
DI4	19	Digital input, the default function number is 4	
DI2	20	Digital input, the default function number is 2	
COM+	21	Digital input common positive terminal	
DO2	23	Digital output, the default function number is 2	See section 3.4.2 and 3.4.4
DO4	24	Digital output, the default function number is 12	
+24V	25/40	Internal 24V power supply, voltage range of + 20V ~ 26V. The maximum output current is200mA.	
PZ-	26	Encoder Z pulse negative output	
PB-	27	Encoder B pulse negative output	
PA+	28	Encoder A pulse positive output. The maximum current is 20mA.	
AI2	30	Analog input. The input impedance is 10kΩ, The maximum allowable input voltage is ±12V.	
SIGN+	31	Position direction command +	
SIGN-	32	Position direction command -	
PULSE+	33	Position pulse command +	
PULSE-	34	Position pulse command -	
OCZ	35	Encoder Z pulse open collector output. The maximum allowable input current is 40mA.	
DO1-	37	COM digital output terminal of DO1	See section 3.4.2 and 3.4.4
DO2-	38	COM digital output terminal of DO2	
DO3-	39	COM digital output terminal of DO2	

4.4.2 Digital Input \ Output Terminal Description

Signal	Pin	Default function	Default function number	Corresponding function code
DI1	5	Servo motor power on enable	1	P6-02
DI2	20	Alarm fault reset	2	P6-03
DI3	4	Position control pulse deviation counter clear	3	P6-04
DI4	19	Speed instruction direction selection	4	P6-05
DI5	3	Internal instruction bit0	5	P6-06
DI6	18	Internal instruction bit1	6	P6-07
DI7	2	Internal instruction bit2	7	P6-08
DI8	17	Internal instruction bit3	8	P6-09
DO1	8	Servo ready output signal	1	P6-13
DO1-	37	The maximum allowable output current 40mA		

Signal	Pin	Default function	Default function number	Corresponding function code
DO2	23	Brake output signal The maximum allowable output current 40mA	2	P6-14
DO2-	38			
DO3	9	Rotation of the motor output signal The maximum allowable output current 40mA	8	P6-15
DO3-	39			
DO4	24	Output signal stops servomotor The maximum allowable output current 40mA	12	P6-16
DO4-	10			
+24V	25/40	Internal 24V supply voltage range + 22V ~ 26V, 200mA maximum output current		
COM	7/22/36			
COM+	21	Digital input common positive terminal（12V～24V)		

4.4.3 Digital input (DI) function definition table

Input Signal Function Description					
Set value	Name	Function	Describe	Trigger mode	Running mode
0	Disabled	Terminal invalid			
1	S-ON	Servo enable	ON- Servo motor power enable OFF- Servo motor cancel enabled	Level triggered	P S T
2	ALM-RST	Alarm and fault reset	ON- If the abnormal condition have been solved, resettable fault can be reset.	Edge triggered	P S T
3	P-CLR	Position control pulse deviation counter clear	See P1-34 for definition of trigger	Edge / level triggered	P
4	DIR-SEL	Speed command direction selection	ON- Instruction in the opposite direction OFF- Default command direction	Level triggered	S
5	CMD0	Internal instruction bit0	When works in position control mode, it is location multi-segment switching function signal; When works in speed control mode, it is speed multi-segment switching function signal;	Level triggered	P S
6	CMD1	Internal instruction bit1		Level triggered	P S
7	CMD2	Internal instruction bit2		Level triggered	P S
8	CMD3	Internal instruction bit3		Level triggered	P S
9	CTRG	Internal instruction trigger	Multi- segment position trigger condition	Edge triggered	P
10	MSEL	Control mode switching	Used for mixed control mode switch	Level triggered	P S T
11	ZCLAMP	Analog speed command zero fixed enable	ON- Zero fixed function enabled OFF- Zero fixed function disenabled	Level triggered	S
12	INHIBIT	Pulse inhibit	ON- Prohibit command pulse input OFF- Allow command pulse input	Level triggered	P
13	P-OT	Forward driving inhibit	OFF- Prohibit forward drive ON- Allow forward drive	Level triggered	P S T
14	N-OT	Reverse driving inhibit	OFF- Prohibit Reverse driving ON- Allow reverse drive	Level triggered	P S T
15,16	Not used				
17	JOGCMD+	Forward Jog	ON- Input in accordance with the given instruction OFF- Stop input running instruction	Level triggered	S
18	JOGCMD-	Reverse Jog	ON- Input in accordance with the given instruction	Level triggered	S

<table>
<tr><th colspan="6">Input Signal Function Description</th></tr>
<tr><th>Set value</th><th>Name</th><th>Function</th><th>Describe</th><th>Trigger mode</th><th>Running mode</th></tr>
<tr><td></td><td></td><td></td><td>OFF- Stop input running instruction</td><td></td><td></td></tr>
<tr><td>19</td><td>TDIR-SEL</td><td>Torque command direction selection</td><td>OFF-Default function
ON- Instruction Reverse</td><td>Level triggered</td><td>T</td></tr>
<tr><td>20</td><td>GNUM0</td><td>Electronic gear ratio numerator selection 0</td><td rowspan="2"><table><tr><th>GNUM1</th><th>GNM0</th><th>code</th></tr><tr><td>0</td><td>0</td><td>P1-27</td></tr><tr><td>0</td><td>1</td><td>P1-29</td></tr><tr><td>1</td><td>0</td><td>P1-30</td></tr><tr><td>1</td><td>1</td><td>P1-31</td></tr></table></td><td>Level triggered</td><td>P</td></tr>
<tr><td>21</td><td>GNUM1</td><td>Electronic gear ratio numerator select 1</td><td>Level triggered</td><td>P</td></tr>
<tr><td>22</td><td>ORGP</td><td>External detector input</td><td>Up eage： external detector valid
Down eage：external detector invalid</td><td>Edge triggered</td><td>P S T</td></tr>
<tr><td>23</td><td>SHOM</td><td>Origin return function</td><td>ON：Origin return function enable</td><td>Level triggered</td><td>P S T</td></tr>
<tr><td>24-99</td><td>Not used</td><td colspan="4"></td></tr>
</table>

4.4.4 Digital Output (DO) function definition table

<table>
<tr><th colspan="5">Input Signal Function Description</th></tr>
<tr><th>Set value</th><th>Set value</th><th>Set value</th><th>Set value</th><th>Set value</th></tr>
<tr><td>0</td><td>Disable</td><td colspan="3">Terminal is invalid</td></tr>
<tr><td>1</td><td>S-RDY+-</td><td>Servo ready</td><td>Valid - servo ready，can receive S-ON instruction
Invalid - Servo not ready，cannot receive S-ON instruction</td><td>P S T</td></tr>
<tr><td>2</td><td>BK+-</td><td>Brake control</td><td>Valid - Release holding brake
Invalid - Closed holding brake</td><td>P S T</td></tr>
<tr><td>3</td><td>TGON+-</td><td>Motor rotation</td><td>Valid - The motor is rotating
Invalid - The motor stop rotating</td><td>P S T</td></tr>
<tr><td>4</td><td>ZER0+-</td><td>Motor zero speed</td><td>Valid - Motor speed is zero
Invalid - Motor speed is not zero</td><td>P S T</td></tr>
<tr><td>5</td><td>V-CLS+-</td><td>Speed approaching</td><td>Valid：when works in speed control, the absolute value of the difference between the actual motor speed and the speed command is less than the value as P1-42 set.</td><td>S</td></tr>
<tr><td>6</td><td>V-CMP+-</td><td>Speed arrival</td><td>Valid：when works in speed control mode, the absolute value of the difference between the actual motor speed and the speed command is less than the value as P1-43 set.</td><td>S</td></tr>
<tr><td>7</td><td>PNEAR+-</td><td>Position approaching</td><td>Valid：when works in position control mode, the position deviation pulse number is less than positioned close approaching width as P1-32 set.</td><td>P</td></tr>
<tr><td>8</td><td>COIN+-</td><td>Position arrival</td><td>Valid：when works in position control mode, the position deviation pulse number is less than positioned close approaching width as P1-33 set.</td><td>P</td></tr>
<tr><td>9</td><td>C-LT+-</td><td>Torque limit signal</td><td>Valid - Motor torque is limited
Invalid - Motor torque is not limited</td><td>P S</td></tr>
<tr><td>10</td><td>V-LT+-</td><td>Speed limit signal</td><td>Valid - Motor speed is limited
Invalid - Motor speed is not limited</td><td>T</td></tr>
<tr><td>11</td><td>WARN+-</td><td>Warning output</td><td>Valid：Warning things occur</td><td>P S T</td></tr>
<tr><td>12</td><td>ALM+-</td><td>Fault output</td><td>Valid：Fault event occur</td><td>P S T</td></tr>
<tr><td>13</td><td>Tcmp+-</td><td>Torque arrival signal</td><td>Valid：Motor output torque reaches the set value
Invalid：Motor output torque does not reach the set value</td><td>T</td></tr>
</table>

Input Signal Function Description				
Set value	Set value	Set value	Set value	Set value
14	Home+-	Origin return signal	Valid：Origin return accomplished Invalid：Origin return not accomplished	P S T

4.4.5 Digital input wiring

The digital input terminals (DI) of EA100 servo drive adopt full bridge rectifier circuit. The current through the terminal can be positive (NPN mode), or negative (PNP mode). So the external connections of DOI ~ DI8 terminals can be very flexible.

Here is an example of DI1. The interface circuitry of DI1 ~ DI8 is the same.

1) When host device is relay output:

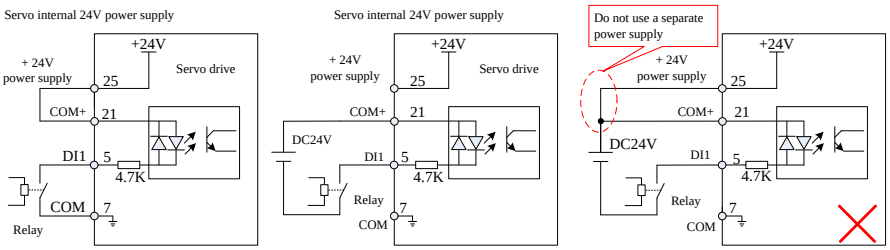


Figure 4-8 Digital input terminal when host device is relay output

Remark：Some of manual defaults are as followed：

- COM: 7pin，users can also use 22/36 pin
- GND: 14pin，users can also use 29/41/42/43/44 pin
- Servo internal +24V: 25pin，users can also use 40pin

2) When host device is NPN open collector output

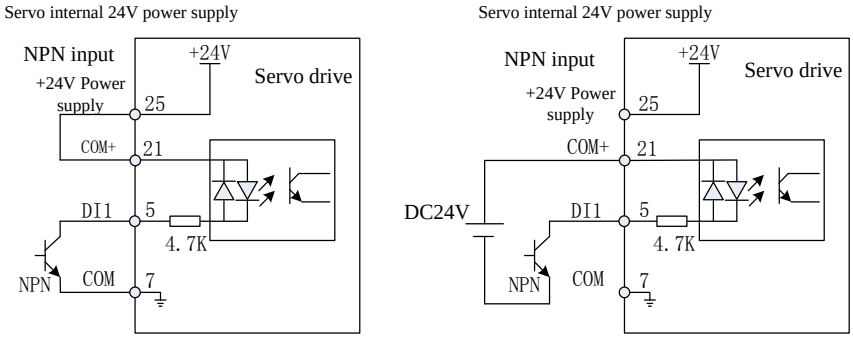


Figure 4-9 (a) Digital input terminal when host device is NPN open collector output

3）When host device is PNP open collector output：

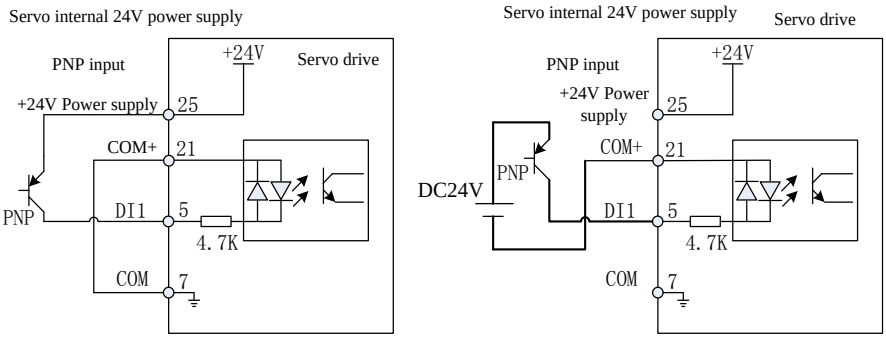


Figure 4-9(b) Digital input terminal when host device is PNP open collector output

Remark：

1. Be sure that the 24V and COM + terminals are not connected when using an external power supply.
2. PNP and NPN input cannot be used mixedly

4.4.6 Digital output wiring

Here is an example of DO1. The interface circuitry of DO1 ~ DO4 is the same.

1) When host device is relay input:

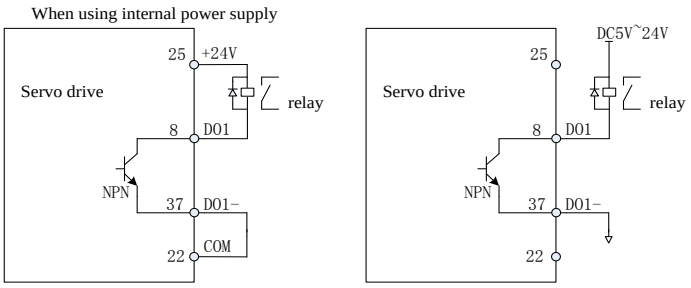


Figure 4-10(a) Correct digital input wiring when host device is relay output

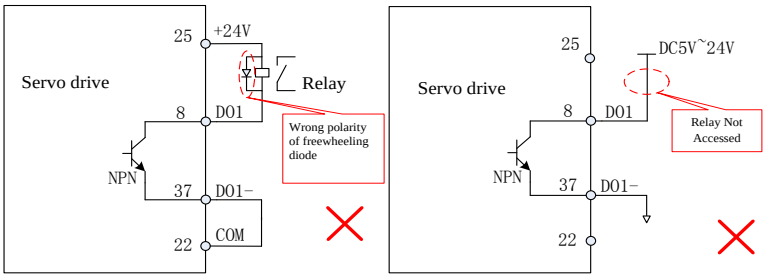


Figure 4-10(b) incorrect digital input wiring when host device is relay output

Remark:

When the host device is relay input, make sure to access the freewheeling diode, or it may damage the DO port.

2) When the host device is optocoupler input

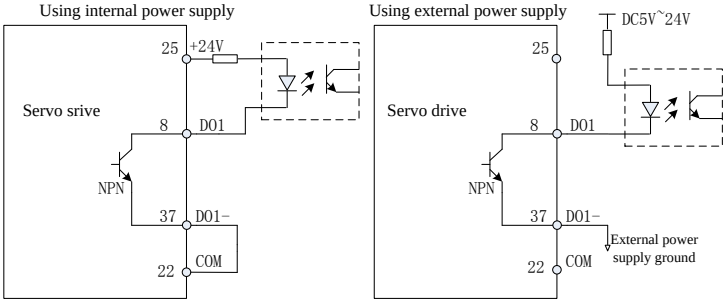


Figure 4-11(a) correct digital input wiring when the host device is optocoupler input

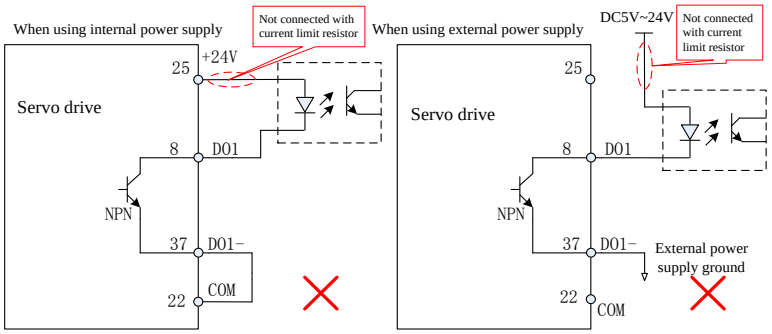


Figure 4-11(b) incorrect digital input wiring when the host device is optocoupler input

Remark:

The maximum allowable voltage, current capacity of servo drive internal optocoupler output circuit is as followed:

- Voltage：DC30V(maximum)
  - Current: DC 50mA (maximum)
- If driving the inductive loads (relay, contactor), a surge voltage absorption circuit should be added; such as RC absorption circuit (the leakage current should be less than the holding current of contactor or relay) varistor, or freewheeling diode (for DC circuit, check the polarity during installation). The element of snubber circuit should be closed to the relay or contactor.

4.4.7 CN4 analog input terminal wiring

Table 4-4 analog input terminal description

Signal name	Function	Pin	Function describe
Analog	AI1	15	Voltage analog input
	AI2	30	

	GND	29	Analog input ground

AI1, AI2 generally used for speed and torque analog signal input。

Input voltage range：-10V～+10V, resolution 12 bit；

Maximum allowable voltage：±12V；

Input impedance：10K；

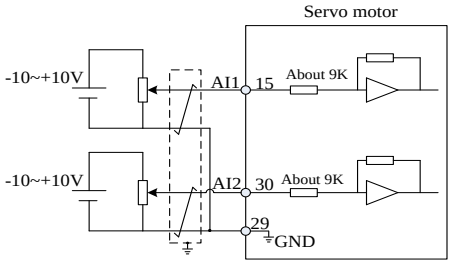


Figure 4-12 AI1, AI2 terminal wiring diagram

4.4.8 CN4 position command input signal

Describe for position command pulse input signal, the instruction symbol input signal terminal of CN4 are as followed.

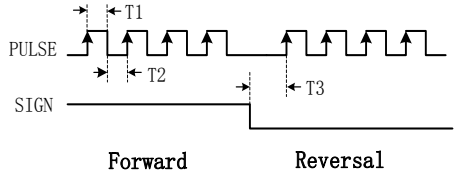
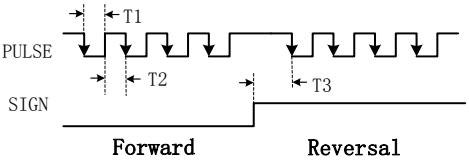
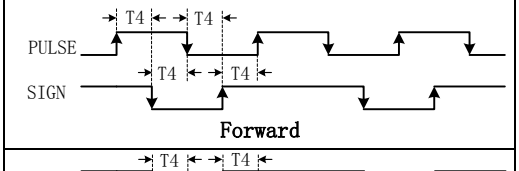
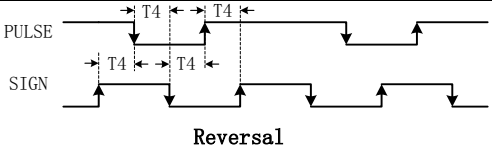
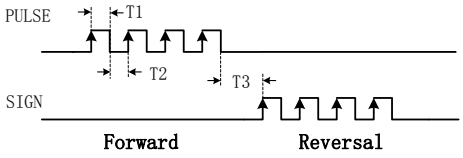
Table 4-4 position pulse input signal specifications

Signal name		Pin	Function	
Position instruction	PULSE+	33	Pulse command input： Differential Input Open collector input	Input pulse shape： Direction + pulse A, B phase orthogonal pulse CW/CCW pulse
	PULSE-	34		
	SIGN+	31		
	SIGN-	32		
	PULHIP	1	External power input interface of command pulse	
	PULHIS	16		
	GND	41	5V power supply ground	
	COM	36	24V power supply ground	

Pulse command can be input by open collector input or differential input. The maximum differentia input pulse wave is 500Kpps, maximum open collector input pulse wave is 200Kpps.

Different forms of command input pulse has different timing parameters，see section table 3-5 table 3-6 for details：

Table 4-5 different command pulse timing table

Pulse instruction form	Logic state	Pulse waveform
Direction+ pulse	P1-02=0 Positive logic	
	P1-02=1 Negative logic	
Two-phase orthogonal pulses (4times)	P1-02=2 Positive logic	
		
CCW/CW pulse	P1-02=4 Positive logic	

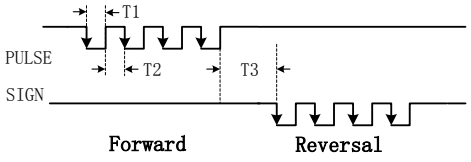
Pulse instruction form	Logic state	Pulse waveform
	P1-02=5 Negative logic	

Table 4-6 Pulse input time parameter

Pulse mode	Maximum input frequency	The minimum allowable width				Voltage
		T1	T2	T3	T4	
Differential	500Kpps	1 s	1 s	2 s	0.5 s	5V
Open collector	200Kpps	2.5 s	2.5 s	5 s	1.25 s	24V(MAX)

4.4.8.1 Position instruction pulse differential input mode

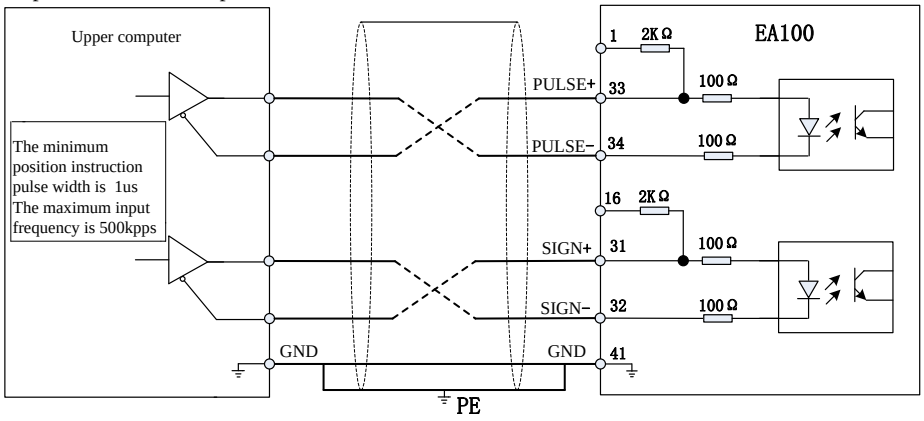


Figure 4-13 Position instruction pulse differential input mode wiring

Please ensure "2.8V≤ (H level -L level) ≤3.7V", otherwise the servo drive input pulse will be unstable. It will result in the following situations:

- Missing pulse when enter instruction pulse.
- The instruction is opposite when enter instruction direction

4.4.8.2 Position instruction pulse differential input mode Instruction direction

When using the servo internal 24V power supply

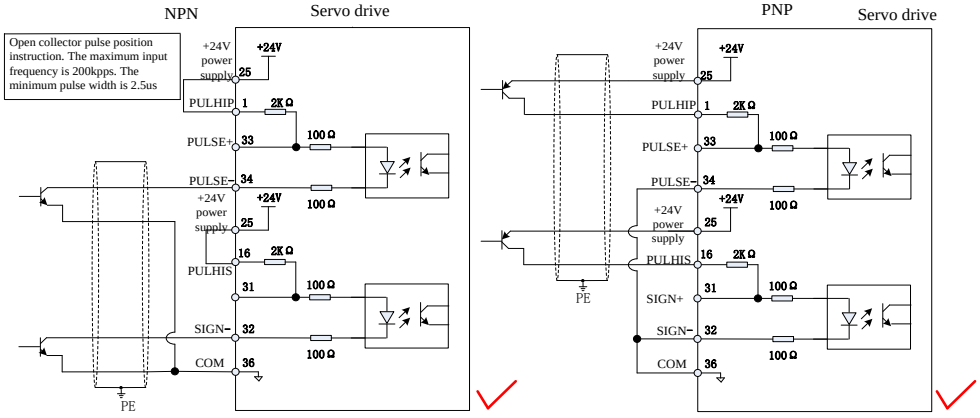


Figure 4-14 open collector pulse input command wiring diagram (using the servo internal 24V)

When using the servo external 24V power supply

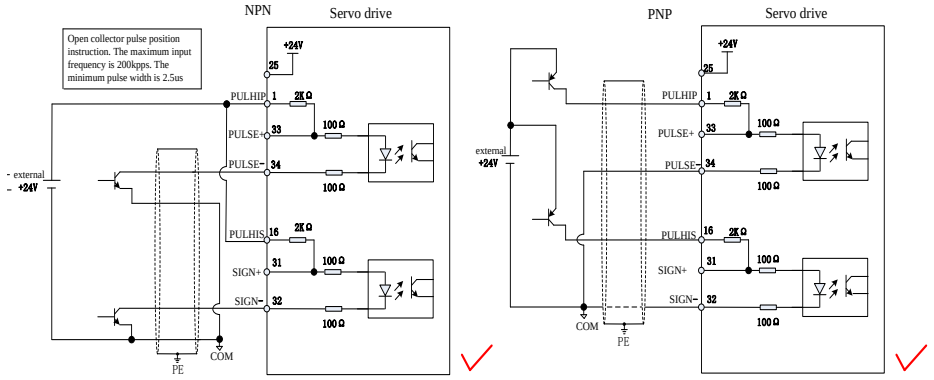


Figure 4-15 (a) open collector pulse input command wiring diagram (using external power supply and internal limiting resistor)

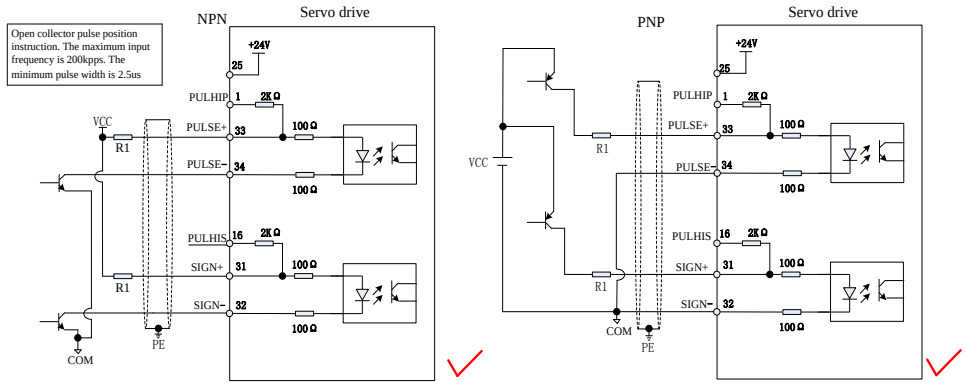


Figure 4-15 (b) open collector pulse input command wiring diagram (using external power supply and external limiting resistor)

Selection of limit resistor R1is as followed：

The selection of resistor R1 is satisfied ： $\frac{V_{CC}-1.5}{R1+200}=10mA$

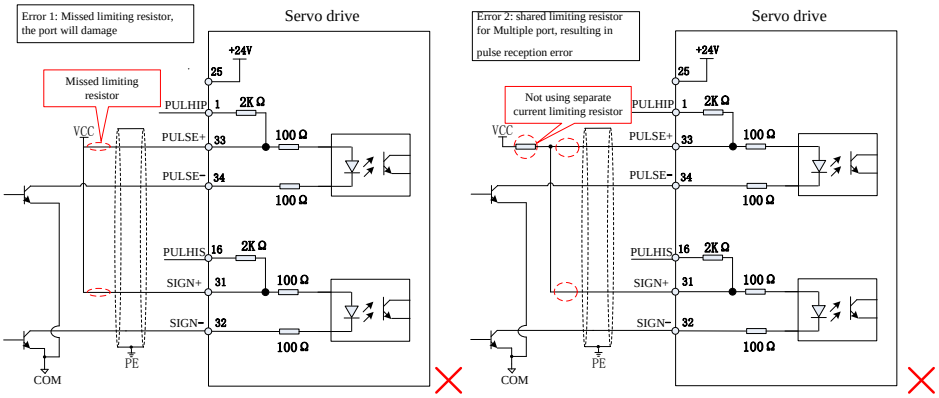
Recommended resistance for R1：

VCC voltage	R1 resistance	R1 power
24V	2.0K	0.5W
12V	0.8K	0.5W

Remark：

1) Make sure a pair of differential signals is connected with a twisted two cables
2) Encoder cable routing must be separated from the power cable routing by at least 30cm or more.
3) The pulse input interface is not shielded input interface. In order to reduce noise, we recommend the ground output signal of the upper computer the ground output signal of the servo drive should be connected together.

Examples of typical wrong wiring



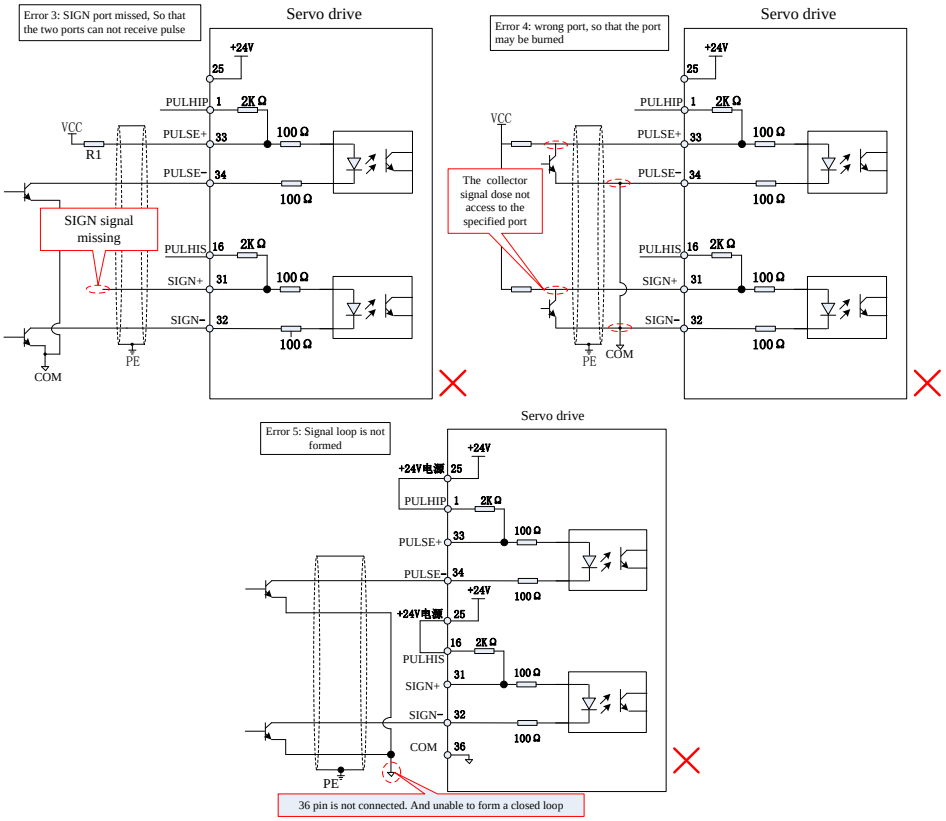


Figure 4-16 5 typical wiring errors

4.4.9 CN4 encoder output frequency division circuit

Table 3-8 Encoder frequency division output signal description

Signal name	Pin	Function	
PA+	28	A Phase frequency division output signal	A,B orthogonal frequency pulse output signal
PA-	13		
PB+	12	B Phase frequency division output signal	
PB-	27		
PZ+	11	Z Phase frequency division output signal	Origin pulse output signal
PZ-	26		
OCZ	35	Z Phase frequency division output signal	Origin pulse open collector output signal
GND	14/42/43/44	Origin pulse open collector output signal ground	

Encoder frequency division circuit output differential signals by a differential drive. Generally, it will provide a feedback signal when the drive and the host device constituting the position control system. In the upper computer device, please use a differential or optocoupler receive as circuit receive. The maximum output current is 20mA.

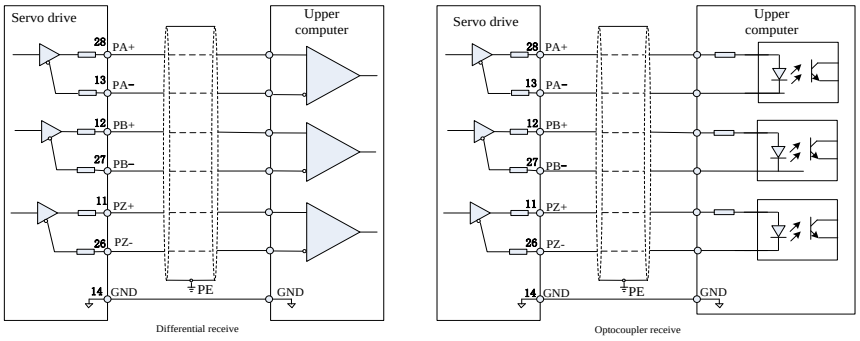


Figure 4-17 frequency division output wiring diagram

Encoder Z-phase frequency division circuit can provide a feedback signal by open collector output signal when the drive and the host device constituting the position control system. In the upper computer device, please use a relay or optocoupler receive as circuit receive. The maximum output current is 40mA.

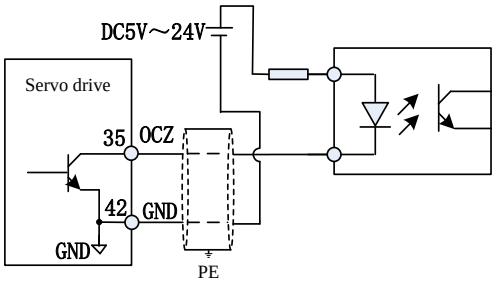


Figure 4-18 OCZ terminal wiring diagram

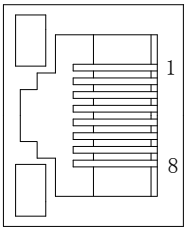
Remark：
Be sure that the signal ground of the upper computer should be connected with the ground of power supply, and shielded twisted-pair cables should be used to reduce noise. The maximum withstand voltage of drive internal transistor is DC 30V, and the maximum allowable input current is 40mA.

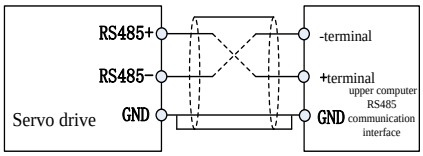
4.5 CN2, CN3 communication terminal wiring

Drive is connected with the upper computer by CN2, CN3. Users can operate the drive by MODBUS communication, and the communication distance is about 15m. RS485 can support multiple drives simultaneously online.

Communication signal connectors CN2, CN3 are two same internal, parallel communication signal connectors

Table 4-9 Communication Connector Pin Description

Signal	Pin	function	Terminal pinout
RS485+	1	RS485 Communication port	
RS485-	2		
GND	3	Reference ground	
RS232-RXD	4	The sender of RS232 is connected with the receiver upper computer	
RS232-TXD	5	The receiver of RS232 is connected with the sender upper computer	
GND	6	Reference ground	
CANH	7	CAN Communication port	
CANL	8		



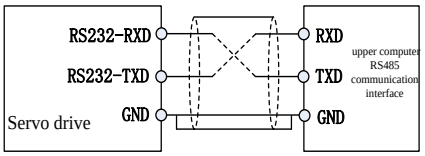
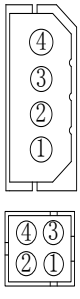
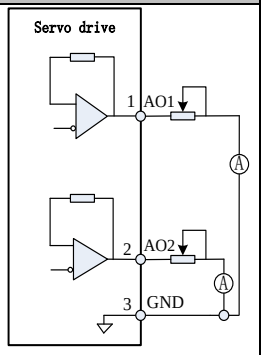


Figure 4-19 Communication terminal wiring diagram

4.6 CN1 analog output terminal

CN1: there are two different terminals shape, its connection end signal as follows:

Table 4-10 analog output signal description

Signal name	Pin	Function		Terminal pinout	wiring
AO1	1	1 analog output, the output voltage 0V ~ 10V, maximum output current 1mA	Can be set by P6 group		
AO2	2	2 analog output, the output voltage 0V ~ 10V, maximum output current 1mA			
GND	3	The analog output signal common ground			
Retention	4	Cannot be connected with any signal line			

Remark：

1) After turn off control power, analog monitor output terminal may output voltage of about 5V during 10ms, please note it when using.
2) The maximum output of analog terminal current is 1mA. The drive can be damaged is it is more than 1mA.

4.7 Holding brake

When the motor is used to vertical axis or similar situation, in order to protect the moving parts when loss power, you should use motors with holding brake.

1. The holding brake is used only to keep the motor stopped, not for stopping the running motor

2. When motors with holding brake running, there may be a clicking sound; it does not affect the function.

Holding brake need an external 24V power supply, brake signal and brake power supply wiring as follows.

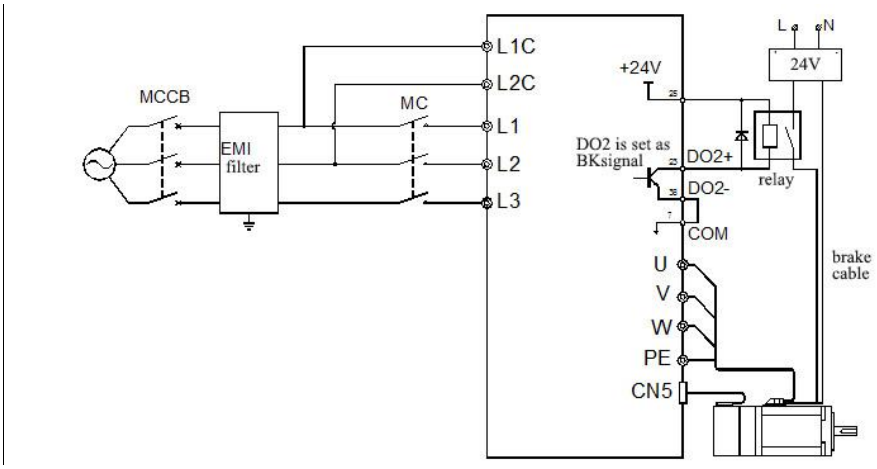


Figure 4-20 brake signal and brake power supply wiring

4.7.1 Holding brake Wiring Precautions：

1) The 2nd function (BK) signal terminals (DO2 +, DO2-) should be used to control the intermediate relay. The power supply of brake is controlled by turning on or off the intermediate relay.

2) There is no polarity of the brake coil, when the brake powered on it is in release state.

3) Be sure to use an external power supply for brake. For Intermediate relay, it can be powered by servo drive internal DC24V，and it is suggested that don't use the one DC24V power supply for both brake and relay

4) When using external power for relay coil, please note DO2 + terminal should be connected to the positive terminal, DO2- terminal connected to the negative terminal.

5) The input voltage of brake should be at least 21.5V. And it is recommended to use cable more than 0.5mm^2 considering the voltage drop on the cable. Brake specific parameters in Table 3-11.

6) Brake should not to share power supply with other electrical appliances to avoid voltage drop which can lead to braking malfunction.

Table 4-11 Brake datasheets

Model	Holding torque (Nm)	Voltage （V)	Power （W）	Release time （ms)	Closing time （ms)
SER06-0R4-30-2□AY1	2.0	24±10%	6.3±7%	150	150
SER08-0R7-30-2□AY1	3.0		10.4±7%	150	150
SER13-1R0-□□-2□BY1	20.0		19.5±7%	200	200
SER13-1R5-□□-□□BY1					
SER13-2R0-□□-3□BY1					
SER13-3R0-□□-3□BY1					

4.7.2 Holding brake operation timing

4.7.2.1 There is a holding brake operation delay. Brake release and closing time please refer to the following diagram

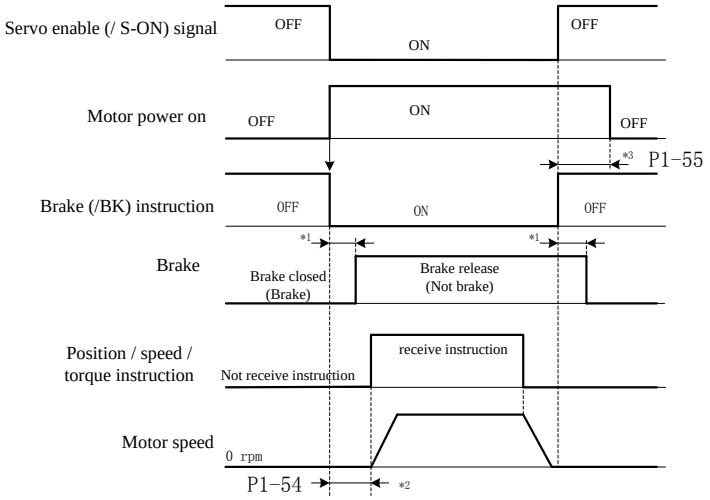


Figure 4-21 holding brake release delay time and closing

*1：For different motors, the brake delay time is different. Please refer to table 3-11 and the actual circumstances

*2：It has been set by P1-54 that the time from the servo drive receiving enable (/ S-ON) instruction to it can receive position, speed and torque instruction should be bigger than the time for brake to release. When the upper computer output instruction to servo motor, please wait until S-ON signal is ON.

*3：Please set the brake running and the servo OFF time by P1-55, P1-56, P1-57.

4.7.2.2 Servo motor brake signal (/ BK) output time when is stopped

When used in the vertical axis, the weight of moving parts may cause slight movement. By setting P1-55, we can make motor in power off state after the brake is closed to eliminate the slight movement.

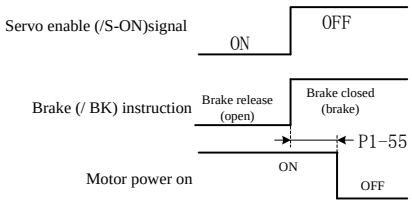


Figure 4-22 Servo cancel enable the brake operation timing

Remark：
When an alarm occurs, P1-55will be invalid, the servo motor will be in powered off state immediately. In this case, the movement unit may move before the brake action.

4.7.2.3 Servo motor brake signal (/ BK) output time in rotation

When an alarm occurs in the servo motor rotation, or the servo motor rotation forcibly cancel the enable signal, the servo motor will be in powered off state immediately. In this case, by setting P1-56 (output speed value brake instruction) and P1-57(servo OFF-brake instruction waiting time), you can adjust the brake signal (/ BK) output time.

Brake operating condition when the servo motor rotation

When any one of the following condition is satisfied, the brake will be enable:

- When the motor is in powered off state, and the speed motor is below the value as P1-56 set.
- When the motor is in powered off state, and after a period as P1-57 set.

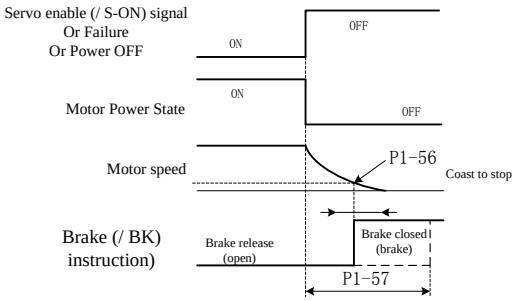


Figure 4-23 servo motor brake action during rotation

Remark：

- Even the set value in P1-56 is faster than the maximum motor speed, it will also be limit by the motor speed.
- Do not place the motor rotation signal (TGON) and brake signal (BK) to one terminal. If they are assigned to one terminal, the brake may not work.

4.8 Standard wiring diagram for control circuit

4.8.1 Position control mode standard wiring diagram

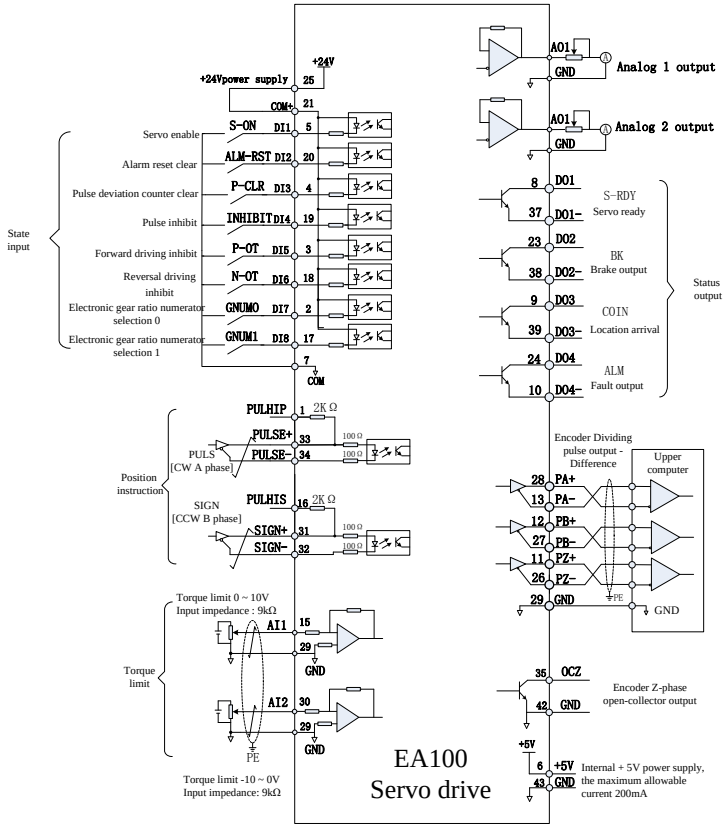


Figure 4-24 standard position mode control circuit wiring diagram

4.8.2 Speed Control Mode Standard Wiring Diagram

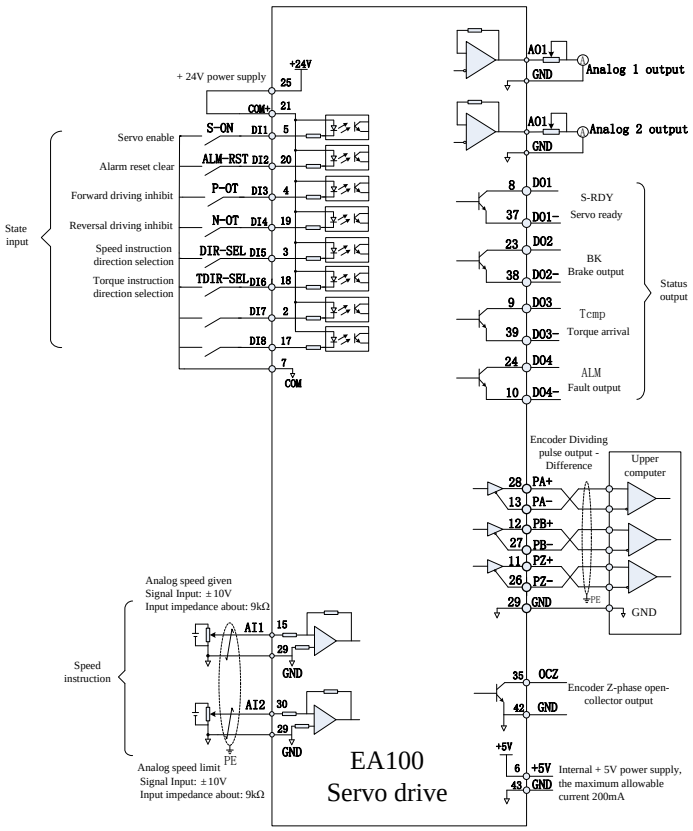


Figure 4-25 standard speed mode control circuit wiring diagram

4.8.3 Torque Control Mode Standard Wiring Diagram

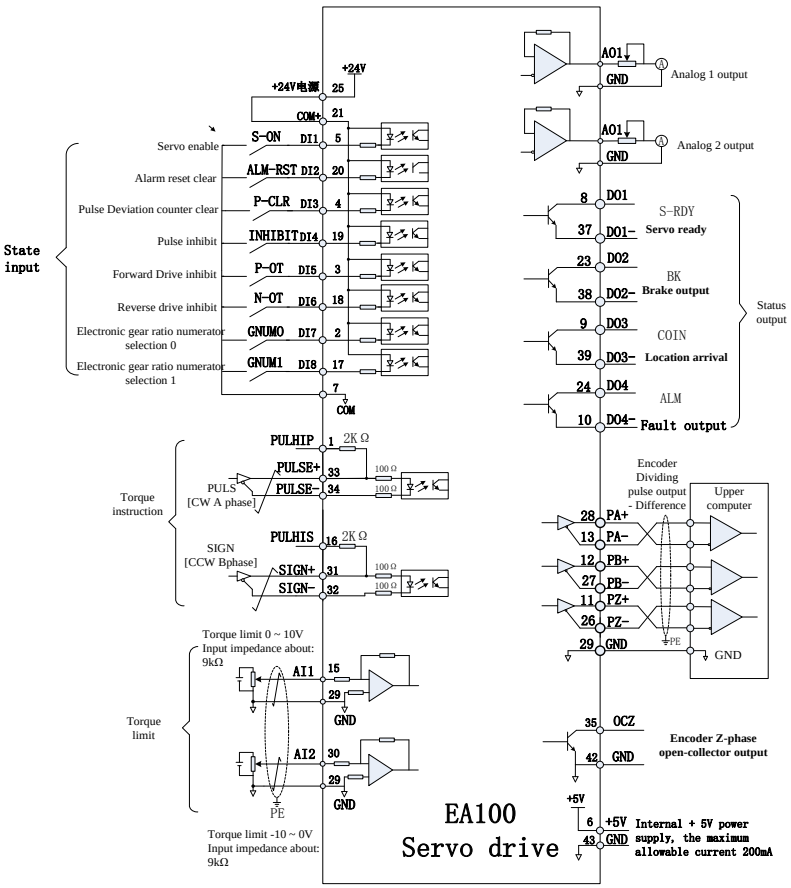


Figure 4-26 standard torque mode control circuit wiring diagram

4.9 Control circuit wiring precaution

- Encoder cable routing must be separated from the power cable routing by at least 30cm or more.
- If the control circuits need to extend, make sure the shield is reliable connected.
- In the servo drive, + 24V COM and + 5V reference to GND. Do not exceed the maximum allowable load current, otherwise the drive may be broken.
- Try to use the shortest command input and encoder cable.
- Please use the cable more than 1.5mm^2 for grounding cable.
- Must be a single-point ground.

4.10 Servo drive main circuit block diagram

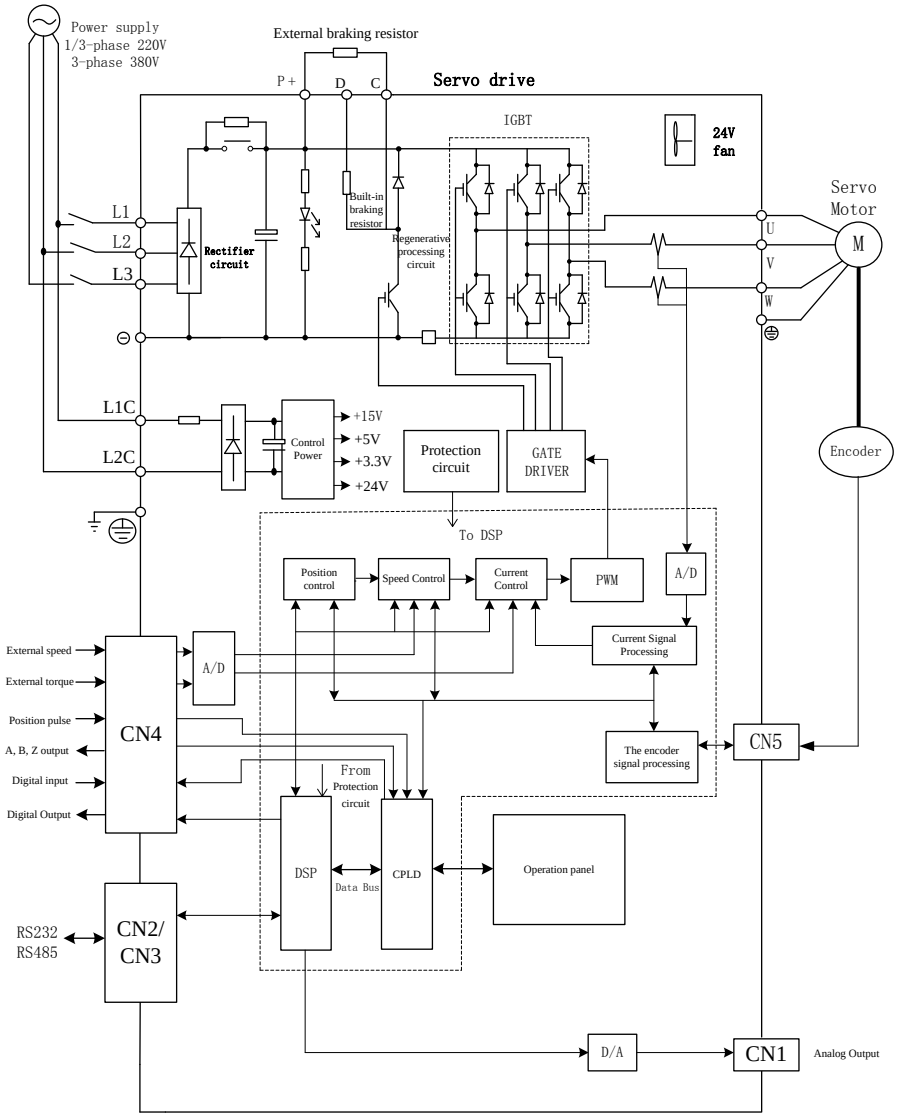


Figure 4-27 servo drive main circuit diagram

5 Running and debugging

Before connecting the load, according to the commands in this manual, make sure that the motor running normally, then you can connect the motor with load.

Usually a servo drive can be put into using after the following tests.

1) Wiring, checking.
2) Drive power on, adjust the parameters.
3) No-load running.
4) Control function debugging.

Strongly recommended: please make sure that the motor running normally without load at first, then connect the motor with load to avoid unnecessary danger!

5.1 Drive power on

5.1.1 before power on

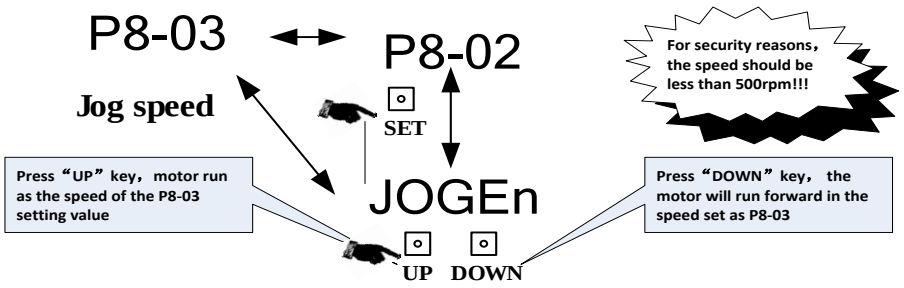
1) Check whether drive and motor are matched (check their specifications).
2) L1, L3, L2 and U, V, W, cannot connect conversely, and check whether these terminals are loose.
3) U, V, W of the motor must be correctly connected to the U, V, W of the drive.
4) Check whether the input voltage is corresponding with the nameplate or panel of drive.
5) Encoder terminal should be connected correctly.
6) The servo motor and driver should be well grounded.

5.2 Trial running

5.2.1 Parameters setting

Parameter	Name
P8-02	JOG function open
P8-03	JOG speed setting

Cancel the servo enable, and then enter the JOG mode to operate in the following diagram.



JOG Operation

If the motor runs normally then you can do next step. If they did not run normally, please check the system wiring, including phase sequence of motor control wiring, the encoder wiring. Repeat the above steps. If it still cannot run normally, please contact the manufacturer to solve it.

5.3 Servo enable method

There are three ways to make the servo drive enable:

1) After the servo drive is powered up, set P8-05 parameter to 1. The servo drive can be enable immediately, but parameter P8-05will automatically restore to 0 when power off;
2) The input terminal DI1 is the default servo enable terminal. Setting P6-01=00001, so that the DI1 terminal is closed, servo drive can be enable, and valid after restart;
3) The input terminal DI1 is the default servo enable terminal. When using internal 24V power supply, the 24V and COM should be shorted, servo drive can enable.

5.3.1 Position control mode

According to the command mode and operation characteristics of the servo drive, there are three kinds of operation modes, namely, position control mode, speed control mode and torque control mode.

In position control mode, the displacement is generally controlled by the number of external input pulse, and the rotational speed is controled by the external input pulse frequency. Because the position mode can be used for speed and position control, it is generally applied to positioning device. It is the most widely used mode. It is mainly used for the robot hand, chip machine, engraving and milling engraving, CNC machine tools, etc…

5.3.2 Position control mode steps

1) Wiring according with chapter 3.10 ;
2) Set P1-00 to 1 (position control mode, the default value is 1), set P1-01 to 0 (external pulse is given, the default value is 0);
3) Set P1-02 to 0 (pulse + direction control mode, the default value is 0) or other mode for the user;
4) Set the electronic gear ratio. P1-27 is set for molecular (default is 1). P1-28 is set for denominator (default is 1), the default pulse for one

motor rotating circle is 10000.

a) If P1-27 = 10, P1-28=1, the motor rotates one circle with 1000 external pulse input

b) If the P1-27=1, P1-28=10, the motor rotates one circle with 100000 external pulse input

5) Enable drive. Keep DI1 and COM which are in the CN4 terminal short connected, the drive will enable (DI1is the default servo enable terminal, the user can modify it by function code).

5.3.3 Position control mode when the main function code

Table 5-1 Main function code for position control mode

Function code	Setting value	Description
P1-00	1：Position control mode	Control mode selection
P1-01	0：External command (Default) 1：Internal instruction	Position command source
P1-02	0：Pulse + direction，positive logic（default value） 1：Pulse + direction，negative logic 2：Two phase orthogonal pulse (4 times of frequency), positive 3：Two phase orthogonal pulse (4 times of frequency), negative 4：CCW/CW pulse, positive logic 5：CCW/CW pulse, negative logic	External pulse input form
P1-27	User Setting，Default value 1	Electronic gear molecular
P1-28	User Setting，Default value 1	Electronic gear denominator
P1-33	User Setting，Default value 10	Positioning complete width
P1-36	User Setting，Default value 25000	Alarm threshold of position following deviation
P1-37	User Setting，Default value 25000	Fault threshold of position following deviation
P1-53	0：Free stopping（Default value） 1：Stopping at zero speed	Stop mode
P1-15	User Setting，Default value 0	External pulse instruction smoothing filter time constant
P1-46	User Setting，Default value 300	Forward maximum torque limit
P1-47	User Setting，Default value 300	Reverse maximum torque limit
P5-00	User Setting，Default value 30	Position regulator proportional gain KPP
P5-02	User Setting，Default value 0	Front position regulator feedforward gain
P5-03	User Setting，Default value 5	Position feedforward smoothing time
P5-04	User Setting，Default value 350	Speed regulator proportional gain KVP
P5-05	User Setting，Default value 10	Speed regulator integration time constant

5.4 Speed control mode

In speed control mode, the rotational speed is controlled by analog input, digital input, and communication. It is mainly used in some constant speed situation. Such as the application of the analog engraving and milling machine, the position control is achieved by the upper computer, the servo drive works in speed control mode.

5.4.1 Speed control mode:

1) According to the wiring of section 3.10.

2) Servo JOG test run through the key to confirm the normal operation of the motor.

3) Refer to the section 3.10.2 wiring for the necessary DI/DO and analog terminals for connecting CN4.

4) To carry out the relevant setting of speed mode.

5) To enable the servo drive, and then first make the motor rotate at low speed, determine whether the rotation direction of the motor is normal, and then adjust the gain.

5.4.2 Speed control mode main function code:

Speed control mode when the main function code

Function code	Reference value	Description
P1-00	0: Speed control mode	Control mode is speed control
P1-05	0: Internal digital given 1: Analog value 1 given 2: Analog value 2 given 3: Not used	Select the speed command source

	4: Internal multi section speed command 5: Point running	
P1-16	100ms	Speed instruction acceleration time T_{SACC}
P1-17	100ms	Speed instruction deceleration time T_{SDEC}
P1-18	10ms	Speed instruction S curve smoothing time T_{SL}
P3-00～P3-31	When using the internal speed	Internal Multi-speed parameters
P1-53	0：Free stopping 1：Stopping at zero speed	Stop mode
P1-46	300%	Forward maximum torque limit
P1-47	300%	Reverse maximum torque limit
P5-04	350	Speed regulator proportional gain KVP
P5-05	10	Speed regulator integration time constant

5.5 Torque control mode debugging steps

The torque control mode is the size of the output torque of the motor. Mainly used in the material of the force has strict requirements of the winding and winding device, such as winding device or pull fiber device, some tension control occasions, torque setting according to the change of the radius of the winding change, to ensure that the material force will not change with the radius of the wound.

5.5.1 Torque control mode debug step:

1) According to the wiring of section 3.10
2) Servo JOG test run through the key to confirm the normal operation of the motor.
3) Refer to the section 3.10.3 wiring commands for the DI/DO and the source of the torque command, speed limit, etc..
4) To carry out the relevant setting of the torque mode.
5) Enable the servo, and then set a lower speed limit value, give a forward or reverse torque command to the servo application, make confirm whether the motor rotation direction and speed are correct, if it's normal , then you can start to use.

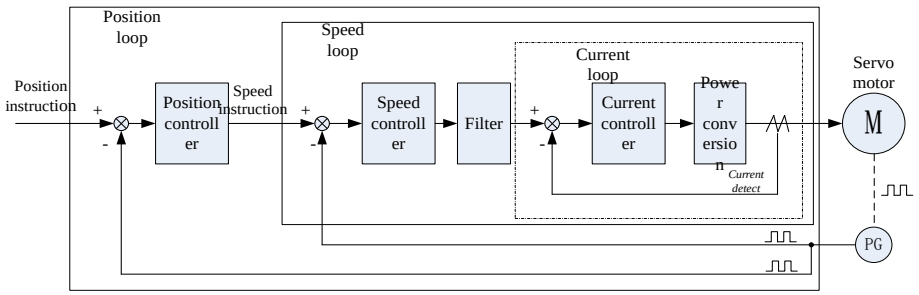
5.5.2 Mainly related to the function codes of torque control mode:

Mainly related to the function codes of torque control mode

Function code	Reference value	Description
P1-00	2: Torque control mode	Control mode selection
P1-48	0: Internal limit [P1-46, P1-47] 1: Analog 1 limit, while limited by P1-46, P1-47 2: Analog 2 limit, while limited by P1-46, P1-47 3: Not used	Torque limit source selection
P4-00	100%	Internal digital torque given
P4-01	100rpm	Speed limit of torque control
P1-22	100us	Speed limit of torque control
P1-46	300%	Forward maximum torque limit
P1-47	300%	Reverse maximum torque limit
P5-04	350	Speed regulator proportional gain KVP
P5-05	10	Speed regulator integration time constant

5.6 Gain parameter adjustment strategy

The drive includes three control loops: current loop, speed loop and position loop. The control block diagram is as follows:



Three block diagram of servo system

In theory, the inner control loop bandwidth must be higher than the outer, otherwise the whole control system will be unstable and cause vibration or is a response to the poor, so three control loop bandwidth relationship should be as follows:

Bandwidth of position loop < Bandwidth of speed loop < Bandwidth of current loop

Since the drive has been adjusted to the current control loop in the best state, the user only needs to adjust the control parameters of speed loop and position loop.

5.6.1 Gain adjustment procedure

The choice of position and speed bandwidth must be decided by the mechanical rigidity and applications, connected by a belt conveying mechanical rigidity and lower and can be set to a low bandwidth; driven by the speed reducer of the ball screw rod of the mechanical stiffness of the medium can be set to medium bandwidth; to drive directly to the ball screw rod or linear motor stiffness is higher, can be set to high bandwidth. If the properties of machine is unknown, can gradually increase the gain to improve the bandwidth and gain can be lowered until resonance.

In each gain of servo drive, if one parameter is changed, other parameters are also should be adjusted. Please don't make a big change to one parameter. Regarding the change steps of servo parameters, please follow the following principles:

Improve response	Reduce response, suppress vibration and overshoot
1.Increase the proportion of speed regulator P5-04	1.lower position regulator proportional gain P5-00
2.Reduce the speed regulator integral time constant P5-05	2.Increasing speed regulator integral time constant P5-05
3.Improve the position regulator proportional gain P5-00	3.Reduce the speed regulator P5-04

5.6.2 Speed gain adjustment procedure

1) Setting load inertia ratio of P5-08.
2) Setting speed regulator integral time constant P5-05 for larger values.
3) In the range of no vibration and strange noise to adjust P5-04(Speed controller proportional gain) higher, if there is a slight, you should adjust the P5-04 smaller.
4) In the range of no vibration to adjust P5-05(Speed controller integral time constant) smaller, if there is a slight, you should adjust the P5-05 higher.
5) If the mechanical system is unable to adjust the gain due to resonance and other reasons, it cannot get the desired response, the torque low pass filter or notch filter to adjust the suppression of resonance, and then in order to improve the response, need to do the above steps again. First, try to use low pass filter, if the effect is not good, then try to use notch filter.

5.6.3 Position control gain adjustment procedure

1) Setting load inertia ratio of P5-08.
2) Setting speed regulator integral time constant P5-05 for larger values.
3) In the range of no vibration and strange noise to adjust P5-04(Speed controller proportional gain) higher, if there is a slight, you should adjust the P5-04 smaller..
4) In the range of no vibration to adjust P5-05(Speed controller integral time constant) smaller, if there is a slight, you should adjust the P5-05 higher.
5) Increase the position regulator proportional gain P5-00, if there is a slight, you should adjust it smaller.
6) If the mechanical system is unable to adjust the gain due to resonance and other reasons, it cannot get the desired response, the torque low pass filter or notch filter to adjust the suppression of resonance, and then in order to improve the response, need to do the above steps again. First, try to use low pass filter, if the effect is not good, then try to use notch filter.
7) The position feed forward gain P5-02 can be adjusted properly if the positioning time is shorter and the position error is smaller.

6 Function Parameters

6.1 Function parameters define

Function parameters are divided into the following 11 groups. The first code after starting code P is the group number. The next two parameters is the group internal number. The address is consisted of the group parameters and group internal parameters. The functional groups are defined as follows:

P0-xx group: Monitoring parameters
P1-xx group: Basic parameters
P2-xx group: Internal multi segment position control parameters
P3-xx group: Internal multi segment speed control parameters
P4-xx group: Torque control parameters
P5-xx group: Gain tuning parameters
P6-xx group: Input / output setting parameters
P7-xx group: Communication parameters
P8-xx group: Auxiliary function parameters
Pb-xx group: Origin return function parameters
PE-xx group: Motor parameters

Function parameter set attribute description:

(○): Set at any time, take effect immediately
(●): Set at any time, take effect when repower
(☆): Set at any time, take effect when repower
(□): Set when stop, take effect immediately
(■): Set when stop, take effect when repower
(▲): Read only, cannot set

Control mode description:

P—Position control mode
S—Speed control mode
T—Torque control mode

6.2 Function parameter list

6.2.1 P0 group - Monitoring parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P0-00	Motor speed	0	rpm	√	√	√	▲	0000H
P0-01	Motor load rate	0	%	√	√	√	▲	0001H
P0-02	Current electric angle	0	°	√	√	√	▲	0002H
P0-03	DI Input level (binary display)	Low bit: 11111 High bit: 11111	-	√	√	√	▲	0003H
P0-04	DO Output level (binary display)	Low bit: 11111 High bit: 1	-	√	√	√	▲	0004H
P0-05	Encoder multi circle position value (only for 17 bit absolute encoder)	0	rev	√	√	√	▲	0005H
P0-06	Total running time	0	min	√	√	√	▲	0006H
P0-08	AI1 voltage value	0	mV	√	√	√	▲	0008H
P0-09	AI2 voltage value	0	mV	√	√	√	▲	0009H
P0-10	Encoder sector number (only for 2500ppr incremental encoder)	0	-	√	√	√	▲	000AH
P0-11	Bus voltage	0	V	√	√	√	▲	000BH
P0-12	Effective current value	0	A	√	√	√	▲	000CH
P0-13	Servo drive current state	-	-	√	√	√	▲	000DH
P0-14	Brake load ratio	0	%	√	√	√	▲	000EH
P0-15	IGBT module temperature	0	℃	√	√	√	▲	000FH
P0-16	Total collected external pulse	0	ppr	√			▲	0010H
P0-18	Display P1-60 selected fault codes	-	-	√	√	√	▲	0012H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P0-19	Speed when P1-60 failure occurs	0	rpm	√	√	√	▲	0013H
P0-20	Bus voltage when P1-60 fault occurs	0	V	√	√	√	▲	0014H
P0-21	Effective current when P1-60 fault occurs	0	A	√	√	√	▲	0015H
P0-22	Running time when P1-60 fault occurs	0	min	√	√	√	▲	0016H
P0-24	Low 4 bit of encoder single-turn position value (only for 17 bit encoder)	0	ppr	√	√	√	▲	0018H
P0-25	High 5 bit encoder single-turn position value (only for the 17 encoder)	0	ppr	√	√	√	▲	0019H
P0-26	The current total inertia load - continuous detection	0	kg*cm2	√	√		▲	001AH
P0-27	Current load inertia ratio - continuous detection	0	%	√	√		▲	001BH
P0-28	Total number of feedback pulses	0	ppr	√			▲	001CH
P0-30	Received external pulse frequency	0	Khz	√			▲	001EH

6.2.2 P1 group - Basic control parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication address
				P	S	T		
P1-00	Control mode selection: 0: Speed control mode 1: Position control mode 2: Torque control mode 3: Speed position switching mode 4: Torque speed switching mode 5: Position torque switching mode	1	-	√	√	√	○	0100H* 2100H*
P1-01	Position command source selection: 0: external pulse command (pt) 1: internal multiple command (pr)	0	-	√			○	2101H
P1-02	External pulse command input form: 0: Pulse + direction, positive logic 1: Pulse + direction, negative logic 2: Two phase orthogonal pulse (4 times of frequency), positive logic 3: Two phase orthogonal pulse (4 times of frequency), negative logic 4: CCW/CW pulse, positive logic 5: CCW/CW pulse, negative logic	0	-	√			●	2102H
P1-03	Internal position command multiple execution options: 0: From pr1 to pr16, cycle 1: From pr1 to pr16, not cycle 2: External Di switch	0	-	√			○	2103H
P1-05	Speed command source: 0: Internal digital given (P3-00 given) 1: Analog quantity 1 given (AI1) 2: Analog quantity 2 given (AI2) 3: Not used 4: Internal multi section speed command 5: Point running (should make external JOG DI enable)	0	-		√		○	2105H
P1-06	Multi section speed selection: 0: Multi section speed automatic switching, cycle	0	-		√		○	2106H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication address
				P	S	T		
	1: Multi section speed automatic switch, not cycle 2: Multi section speed external Di switch							
P1-07	Frequency dividing output	2500	ppr	√	√	√	●	2107H
P1-08	Torque command selection: 0: Internal digital given (given by P4-00) 1: Analog value 1 given (AI1) 2: Analog value 2 given (AI2) 3: Not used	0	-		√		○	2108H
P1-09	Speed feedback filter time constant	500	us	√	√	√	○	2109H
P1-10	First group of resonance frequency setting value	1000	Hz	√	√		○	210AH
P1-11	First group of resonance points in the notch depth	0	dB	√	√		○	210BH
P1-12	Internal position command acceleration time T_{PACC}	100	ms	√			☆	210CH
P1-13	Internal position command deceleration time T_{PDEC}	100	ms	√			☆	210DH
P1-14	Internal position command S curve smoothing time T_{PL}	10	ms	√			☆	210EH
P1-15	External pulse command smoothing filter time constant	0	ms	√			○	210FH
P1-16	Speed command acceleration time T_{SACC}	200	ms		√		☆	2110H
P1-17	Speed command deceleration time T_{SDEC}	200	ms		√		☆	2111H
P1-18	Speed command S curve smoothing time T_{SL}	50	ms		√		☆	2112H
P1-19	Speed command low-pass filter smoothing filter time constant	10. 0	ms		√		○	2113H
P1-20	Analog speed command gain	3000	rpm		√		○	2114H
P1-21	Current feedback low-pass smoothing constant	100	us	√	√	√	○	2115H
P1-22	Torque command low-pass smoothing constant	100	us	√	√	√	○	2116H
P1-23	The torque command when analog maximum input (10V)	100	%			√	○	2117H
P1-24	Second group of resonance frequency setting value	1000	Hz	√	√		○	2118H
P1-25	Second group of resonance points in the notch depth	0	dB	√	√		○	2119H
P1-26	Electronic gear ratio factor	0	-	√			○	211AH
P1-27	Electronic gear molecular 1	1	-	√			○	011BH* 211BH*
P1-28	Electronic gear denominator	1	-	√			○	011CH* 211CH*
P1-29	Electronic gear molecular 2	1	-	√			○	011DH* 211DH*
P1-30	Electronic gear molecular 3	1	-	√			○	011EF* 211EH*
P1-31	Electronic gear molecular 4	1	-	√			○	011FH* 211FH*
P1-32	Position approaching width When the fault counter is less than the setting value, it will export position approaching signal	20	ppr	√			○	2120H
P1-33	Position complete width	10	ppr	√			○	2121H
P1-34	Action selection to remove position deviation by external DI signal 0: By rising edge of P-CLR 1: By low level of P-CLR 2: By high level of P-CLR	0	-	√			○	2122H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication address
				P	S	T		
	3: By falling edge of P-CLR							
P1-35	Automatic selection of position deviation: 0: Automatically remove deviation only when fault occurs 1: Automatically remove deviation when fault occurs or servo cancel enable 2: No automatically remove deviation, and remove deviation as P1-34 set	1		√			○	2123H
P1-36	Alarm threshold of position following deviation	25000	256 ppr	√			○	2124H
P1-37	Fault threshold of position following deviation	25000	256 ppr	√			○	2125H
P1-38	Threshold of torque reaches	0	%			√	○	2126H
P1-39	Maximum speed setting (over-speed setting value)	5000	rpm	√	√	√	○	2127H
P1-40	Zero speed signal output value	10	rpm	√	√	√	○	2128H
P1-41	Rotation signal output value	10	rpm	√	√	√	○	2129H
P1-42	Speed approaching threshold	100	rpm		√		○	212AH
P1-43	Speed reach threshold	20	rpm		√		○	212BH
P1-44	Zero fixed value of analog speed command	10	rpm		√		○	212CH
P1-45	Z Pulse output width	0	0.5ms	√	√	√	●	212DH
P1-46	Forward maximum torque limit	300	%	√	√	√	○	212EH
P1-47	Reverse maximum torque limit	300	%	√	√	√	○	212FH
P1-48	Torque limit source selection; 0: Internal limit [P1-46, P1-47] 1: Analog 1 limit, while limited by P1-46, P1-47 2: Analog 2 limit, while limited by P1-46, P1-47 3: Not used	0	-	√	√	√	○	2130H
P1-49	Third group of resonance frequency setting value	1000	Hz	√	√		○	2131H
P1-50	Third group of resonance points in the notch depth	0	dB	√	√		○	2132H
P1-53	Stop mode selection 0: When servo OFF, free stopping; 1: When servo OFF, stopping at zero speed	0	-	√	√	√	○	2135H
P1-54	Delay time of Servo ON-receive command	200	ms	√	√	√	○	2136H
P1-55	Delay Time of Servo OFF-braking command	200	ms	√	√	√	○	2137H
P1-56	Speed brake command output speed	50	rpm	√	√	√	○	2138H
P1-57	Waiting time of Servo OFF-Brake command	500	ms					
P1-58	Direction selection of frequency dividing output pulse	0	-	√	√	√	●	213AH
P1-60	Fault display options: 0: The last fault 1: Before the latest fault 2: 2 times before the latest fault 3: 3 times before the latest fault	0	-	√	√	√	○	213CH
P1-61	System parameter initialization	0	-	√	√	√	○	213DH
P1-62	Manufacturer parameter 1	0	-	√	√	√	□	213EH
P1-63	Manufacturer parameter 2	0	-	√	√	√	□	213FH

6.2.3 P2 group - Multi-position control parameters

Parameters	Function	Initial value	unit	Applicable control mode			Property	Communication address
				P	S	T		

Parameters	Function	Initial value	unit	Applicable control mode			Property	Communication address
				P	S	T		
P2-00	High 5 pulse number of internal position command 1	1	ppr	√			☆	2200H
P2-01	Low 4 pulse number of internal position command 1	0	ppr	√			☆	2201H
P2-02	Moving speed of internal position command 1	100	rpm	√			☆	2202H
P2-03	Waiting time after the completion of the Pr1 into the Pr2	1. 0	s	√			☆	2203H
P2-04	High 5 pulse number of internal position command 2	-1	ppr	√			☆	2204H
P2-05	Low 4 pulse number of internal position command 2	0	ppr	√			☆	2205H
P2-06	Moving speed of internal position command 2	100	rpm	√			☆	2206H
P2-07	Waiting time after the completion of the Pr2 into the Pr3	1. 0	s	√			☆	2207H
P2-08	High 5 pulse number of internal position command 3	0	ppr	√			☆	2208H
P2-09	Low 4 pulse number of internal position command 3	0	ppr	√			☆	2209H
P2-10	Moving speed of internal position command3	1000	rpm	√			☆	220AH
P2-11	Waiting time after the completion of the Pr3 into the Pr4	0. 0	s	√			☆	220BH
P2-12	High 5 pulse number of internal position command 4	0	ppr	√			☆	220CH
P2-13	Low 4 pulse number of internal position command 4	0	ppr	√			☆	220DH
P2-14	Moving speed of internal position command 4	1000	rpm	√			☆	220EH
P2-15	Waiting time after the completion of the Pr4 into the Pr5	0. 0	s	√			☆	220FH
P2-16	High 5 pulse number of internal position command 5	0	ppr	√			☆	2210H
P2-17	Low 4 pulse number of internal position command 5	0	ppr	√			☆	2211H
P2-18	Moving speed of internal position command 5	1000	rpm	√			☆	2212H
P2-19	Waiting time after the completion of the Pr5 into the Pr6	0. 0	s	√			☆	2213H
P2-20	High 5 pulse number of internal position command 6	0	ppr	√			☆	2214H
P2-21	Low 4 pulse number of internal position command 6	0	ppr	√			☆	2215H
P2-22	Moving speed of internal position command 6	1000	rpm	√			☆	2216H
P2-23	Waiting time after the completion of the Pr6 into the Pr7	0. 0	s	√			☆	2217H
P2-24	High 5 pulse number of internal position command 7	0	ppr	√			☆	2218H
P2-25	Low 4 pulse number of internal position command 7	0	ppr	√			☆	2219H
P2-26	Moving speed of internal position command 7	1000	rpm	√			☆	221AH
P2-27	Waiting time after the completion of the Pr7 into the Pr8	0. 0	s	√			☆	221BH
P2-28	High 5 pulse number of internal position command 8	0	ppr	√			☆	221CH
P2-29	Low 4 pulse number of internal position command 8	0	ppr	√			☆	221DH
P2-30	Moving speed of internal position command 8	1000	rpm	√			☆	221EH
P2-31	Waiting time after the completion of the Pr8 into the Pr9	0. 0	s	√			☆	221FH
P2-32	High 5 pulse number of internal	0	ppr	√			☆	2220H

Parameters	Function	Initial value	unit	Applicable control mode			Property	Communication address
				P	S	T		
	position command 9							
P2-33	Low 4 pulse number of internal position command 9	0	ppr	√			☆	2221H
P2-34	Moving speed of internal position command 9	1000	rpm	√			☆	2222H
P2-35	Waiting time after the completion of the Pr9 into the Pr10	0. 0	s	√			☆	2223H
P2-36	High 5 pulse number of internal position command 10	0	ppr	√			☆	2224H
P2-37	Low 4 pulse number of internal position command 10	0	ppr	√			☆	2225H
P2-38	Moving speed of internal position command 10	1000	rpm	√			☆	2226H
P2-39	Waiting time after the completion of the Pr10 into the Pr11	0. 0	s	√			☆	2227H
P2-40	High 5 pulse number of internal position command 11	0	ppr	√			☆	2228H
P2-41	Low 4 pulse number of internal position command 11	0	ppr	√			☆	2229H
P2-42	Moving speed of internal position command 11	1000	rpm	√			☆	222AH
P2-43	Waiting time after the completion of the Pr11 into the Pr12	0. 0	s	√			☆	222BH
P2-44	High 5 pulse number of internal position command 12	0	ppr	√			☆	222CH
P2-45	Low 4 pulse number of internal position command 12	0	ppr	√			☆	222DH
P2-46	Moving speed of internal position command 12	1000	rpm	√			☆	222EH
P2-47	Waiting time after the completion of the Pr12 into the Pr13	0. 0	s	√			☆	222FH
P2-48	High 5 pulse number of internal position command 13	0	ppr	√			☆	2230H
P2-49	Low 4 pulse number of internal position command 13	0	ppr	√			☆	2231H
P2-50	Moving speed of internal position command 13	1000	rpm	√			☆	2232H
P2-51	Waiting time after the completion of the Pr13 into the Pr14	0. 0	s	√			☆	2233H
P2-52	High 5 pulse number of internal position command 14	0	ppr	√			☆	2234H
P2-53	Low 4 pulse number of internal position command 14	0	ppr	√			☆	2235H
P2-54	Moving speed of internal position command 14	1000	rpm	√			☆	2236H
P2-55	Waiting time after the completion of the Pr14 into the Pr15	0. 0	s	√			☆	2237H
P2-56	High 5 pulse number of internal position command 15	0	ppr	√			☆	2238H
P2-57	Low 4 pulse number of internal position command 15	0	ppr	√			☆	2239H
P2-58	Moving speed of internal position command 15	1000	rpm	√			☆	223AH
P2-59	Waiting time after the completion of the Pr15 into the Pr16	0. 0	s	√			☆	223BH
P2-60	High 5 pulse number of internal position command 16	0	ppr	√			☆	223CH
P2-61	Low 4 pulse number of internal position command 16	0	ppr	√			☆	223DH
P2-62	Moving speed of internal position command 16	1000	rpm	√			☆	223EH
P2-63	Waiting time after the completion of the Pr16 into the Pr1	0. 0	s	√			☆	223FH

6.2.4 P3 group- Multi section speed control parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication address
				P	S	T		
P3-00	Internal speed command register 1	0	rpm		√		○	0300H* 2300H
P3-01	Internal command 1 running time setting	1. 0	s		√		○	0301H* 2301H
P3-02	Internal speed command register 2	0	rpm		√		○	0302H* 2302H
P3-03	Internal command 2 run time setting	1. 0	s		√		○	0303H* 2303H
P3-04	Internal speed command register 3	-400	rpm		√		○	0304H* 2304H
P3-05	Internal command 3 run time setting	1. 0	s		√		○	0305H* 2305H
P3-06	Internal speed command register 4	0	rpm		√		○	0306H* 2306H
P3-07	Internal command 4 run time setting	1. 0	s		√		○	0307H* 2307H
P3-08	Internal speed command register 5	800	rpm		√		○	0308H* 2308H
P3-09	Internal command 5 run time setting	1. 0	s		√		○	0309H* 2309H
P3-10	Internal speed command register 6	0	rpm		√		○	030AH* 230AH
P3-11	Internal command 6 run time setting	1. 0	s		√		○	030BH* 230BH
P3-12	Internal speed command register 7	-800	rpm		√		○	030CH* 230CH
P3-13	Internal command 7 run time setting	1. 0	s		√		○	030DH* 230DH
P3-14	Internal speed command register 8	0	rpm		√		○	030EH* 230EH
P3-15	Internal command 8 run time setting	1. 0	s		√		○	030FH* 230FH
P3-16	Internal speed command register 9	1200	rpm		√		○	0310H* 2310H
P3-17	Internal command 9 run time setting	1. 0	s		√		○	0311H* 2311H
P3-18	Internal speed command register 10	0	rpm		√		○	0312H* 2312H
P3-19	Internal command 10 run time setting	1. 0	s		√		○	0313H* 2313H
P3-20	Internal speed command register 11	-1200	rpm		√		○	0314H* 2314H
P3-21	Internal command 11 run time setting	1. 0	s		√		○	0315H* 2315H
P3-22	Internal speed command register 12	0	rpm		√		○	0316H* 2316H
P3-23	Internal command 12 run time setting	1. 0	s		√		○	0317H* 2317H
P3-24	Internal speed command register 13	1500	rpm		√		○	0318H* 2318H
P3-25	Internal command 13 run time setting	1. 0	s		√		○	0319H* 2319H
P3-26	Internal speed command register 14	0	rpm		√		○	031AH* 231AH
P3-27	Internal command 14 run time setting	1. 0	s		√		○	031BH* 231BH
P3-28	Internal speed command register 15	-1500	rpm		√		○	031CH* 231CH
P3-29	Internal command 15 run time setting	1. 0	s		√		○	031DH* 231DH
P3-30	Internal speed command register 16	0	rpm		√		○	031EH* 231EH
P3-31	Internal command 16 run time	1. 0	s		√		○	031FH*

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication address
				P	S	T		
	setting							231FH

6.2.5 P4 group- Multi-torque control parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P4-00	Internal digital torque given	100. 0	%			√	○	0400H* 2400H
P4-01	Speed limit of torque control	100	rpm			√	○	2401H
P4-02	Torque speed limit command source: 0: P4-01 given 1: Analog 1 given 2: Analog 2 given 3: Not used	0	-			√	○	2402H
P4-03	Torque speed limit command gain	1000				√	○	2403H
P4-05	Torque command compensation	0	%			√	○	2405H

6.2.6 P5 group- Gain tuning parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P5-00	Position regulator proportional gain KPP	30. 0	rad/s	√			○	2500H
P5-01	Position gain fluctuation ratio	50	%	√			○	2501H
P5-02	Front position regulator feedforward gain	0. 0	%	√			○	2502H
P5-03	Position feedforward smoothing time	5	ms	√			☆	2503H
P5-04	Speed regulator proportional gain KVP	350. 0	rad/s	√	√		○	2504H
P5-05	Speed regulator integration time constant	10. 0	ms	√	√		○	2505H
P5-06	Speed gain fluctuation rate	50	%	√	√		○	2506H
P5-07	Gain adjustment mode selection 0: Manual mode 1: Semi-automatic mode (non-continuous adjustment) 2: Automatic mode (continuous adjustment)	0	-	√	√		○	2507H
P5-08	Load inertia ratio total inertia / motor inertia	0. 01	-	√	√		○	2508H
P5-09	Offline load inertia torque autotuning	50	%	√	√		○	2509H
P5-11	Speed bandwidth	60	Hz	√	√		○	250BH
P5-12	PDFF Control coefficient	100	%	√	√		○	250CH
P5-13	Gain switching condition	0	-	√	√		○	250DH
P5-14	Gain switching time	5	ms	√	√		○	250EH
P5-15	Gain delay time	5	ms	√	√		○	250FH
P5-16	Gain switching threshold	100	rpm, ppr	√	√		○	2510H
P5-17	Control loop coefficient	4	-	√	√		○	2511H
P5-19	Low frequency rigidity coefficient	1. 0	-	√	√		○	2512H
P5-20	External disturbance resistance gain	0	%	√	√		○	2513H

6.2.7 P6 group- Digital input (DI) / output (DO) parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P6-00	DI filter time	2	ms	√	√	√	○	2600H
P6-01	DI level logic	00000000	-	√	√	√	○	2601H
P6-02	DI1 function code	1	-	√	√	√	○	2602H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P6-03	DI2 function code	2	-	√	√	√	○	2603H
P6-04	DI3 function code	3	-	√	√	√	○	2604H
P6-05	DI4 function code	4	-	√	√	√	○	2605H
P6-06	DI5 function code	5	-	√	√	√	○	2606H
P6-07	DI6 function code	6	-	√	√	√	○	2607H
P6-08	DI7 function code	7	-	√	√	√	○	2608H
P6-09	DI8 function code	8	-	√	√	√	○	2609H
P6-12	DO level logic	0000	-	√	√	√	○	260CH
P6-13	DO1 function code	1	-	√	√	√	○	260DH
P6-14	DO2 function code	2	-	√	√	√	○	260EH
P6-15	DO3 function code	8	-	√	√	√	○	260FH
P6-16	DO4 function code	12	-	√	√	√	○	2610H
P6-19	AI1 bias adjustment	0	mV	√	√	√	○	2613H
P6-20	AI2 bias adjustment	0	mV	√	√	√	○	2614H
P6-22	AI1 filter time	2	ms	√	√	√	○	2616H
P6-23	AI2 filter time	2	ms	√	√	√	○	2617H
P6-25	AO1 bias adjustment	0	mV	√	√	√	○	2619H
P6-26	AO2 bias adjustment	0	mV	√	√	√	○	261AH
P6-27	AO1 function plan	0	-	√	√	√	○	261BH
P6-28	AO2 function plan	1	-	√	√	√	○	261CH

6.2.8 P7 group - Communication parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P7-00	Station code setting	1	-	√	√	√	○	2700H
P7-01	Communication transmission rate 0: 4800 1: 9600 2: 19200 3: 38400 4: 57600	1	bps	√	√	√	○	2701H
P7-02	Communication data format 0: No parity 1 + 8 + N + 1 1: Odd parity 1 + 8 + O + 1 2: Even parity 1 + 8 + E + 1 3: No parity 1 + 8 + N + 2 4: Odd parity 1 + 8 + O + 2 5: Even parity 1 + 8 + E + 2	0	-	√	√	√	○	2702H

6.2.9 P8 group – Auxiliary function parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
P8-00	Software reset: 0: No operation 1: System software reset	0	-	√	√	√	□	2800H
P8-01	Fault reset 0: No operation 1: Fault reset	0	-	√	√	√	□	2801H
P8-02	Jog function (trial run) When enter this function code, press UP key, the motor will run forward in the speed set as P8-03, and it will stop if loose UP key. When press Down key, the motor run reversal in the speed set as P8-03, and it will stop if loose Down key. Press MODE key to cancel this function code. Jog will be invalid.	0	-	√	√	√	□	2802H
P8-03	Jog speed	100	rpm	√	√	√	○	2803H
P8-04	Offline inertia identification switch	0	-	√	√		□	2804H
P8-05	Internal servo enable command 0: No function	0	-	√	√	√	○	2805H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
	1: servo enable (auto-zero after power)							
P8-07	Default monitoring project selection	0	-	√	√	√	■	2807H
P8-11	0: Servo enable when the fan is running 1: The fan is running after power	0	-	√	√	√	○	280BH
P8-12	Drive overload warning threshold setting	80	%	√	√	√	○	280CH
P8-13	Motor overload warning threshold set	80	%	√	√	√	○	280DH
P8-14	Enabling conditions for each stopping mode selection 0: Free stopping, start enable as condition of P8-15 1: Free stopping and zero speed stopping are both selected	0	-	√	√	√	○	280EH
P8-15	Enabling conditions: 0: Start enable as time set in P8-16 1: Start enable as speed set in P8-17 2: Start enable according to time and speed conditions 3: Immediately enable	3	-	√	√	√	○	280FH
P8-16	After the S-OFF , S-ON effective required interval time	5. 00	-	√	√	√	○	2810H
P8-17	Effective enable speed	20	rpm	√	√	√	○	2811H
P8-18	Braking resistor value	50	Ω	√	√	√	■	2812H
P8-19	Braking resistor capacity	100	W	√	√	√	■	2813H
P8-20	Brake discharge duty ratio	22500	-	√	√	√	○	2814H

6.2.10 PB group– origin return function parameters

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
PB-00	Back to zero failure alarm time	0	ms	√	√	√	○	2B00H
PB-01	Origin triggered start mode: 0: Disable origin return function 1: Power on, after servo enable origin return automatically 2: The SHOM function terminal (function 23) trigger origin return	0	-	√	√	√	○	2B01H
PB-02	Short distance moving mode of reaching origin 0: After finding reference origin, motor run back in second section speed to searching nearest Z-phase pulse as the mechanical origin. 1: After finding reference origin, motor run in the same direction in second section speed to searching nearest Z-phase pulse as the mechanical 2: According to PB-03.	0	-	√	√	√	○	2B02H
PB-03	Origin detector type and direction setting: 0: Forward direction to search the origin, and regard P-OT input as coarse reference origin. 1: Reverse direction to search the origin, and regard N-OT input as coarse reference origin. 2: Forward direction to search the	0	-	√	√	√	○	2B03H

Parameters	Function	Initial value	Unit	Applicable control mode			Property	Communication Address
				P	S	T		
	origin and regard ORGP terminal signal (Function No. 22) as coarse reference origin. 3: Reverse direction to search the origin and regard ORGP terminal signal (Function No. 22) as coarse reference origin. 4: Forward to search Z-phase pulse origin directly 5: Reverse to search Z-phase pulse origin directly							
PB-04	Back to zero first section high speed	0	rpm	√	√	√	○	2B04H
PB-05	Back to zero second section low speed	100	rpm	√	√	√	○	2B05H
PB-06	High 5 of origin return offset pulse	0	rev	√	√	√	○	2B06H
PB-07	Low 4 of origin return offset pulse	0	ppr	√	√	√	○	2B07H
PB-08	Whether clear the position deviation after origin return 0: Do not clear 1: Clear	0	-	√	√	√	○	2B08H

6.2.11 PE group - motor parameters

Parameters	Function	Default value	Settings ranges	Unit	Property	Run mode
PE-00	Motor parameter password	0	0-65535	-	■	P S T
PE-01	Motor Codes	Related motor code	120-8000		■	P S T
PE-02	Motor rated power	0. 0	0. 0～6553. 5	KW	■	P S T
PE-03	Motor rated current	3. 00	0. 01～100. 00	A	■	P S T
PE-04	Motor rated torque	2. 40	0. 1～100. 00	N. m	■	P S T
PE-05	Motor rated voltage	220V	220～380	V	■	P S T
PE-06	Rated motor speed	3000	10～9000	rpm	■	P S T
PE-07	Motor maximum speed	5000	10～9000	rpm	■	P S T
PE-08	Motor number of pole-pairs	4	1～360		■	P S T
PE-09	Q axis inductance	3. 0	0. 01～655. 35	mH	■	P S T
PE-10	D axis inductance	3. 0	0. 01～655. 35	mH	■	P S T
PE-11	Resistance between lines	3. 920	0. 001～65. 535	Ω	■	P S T
PE-12	Torque coefficient	1. 59	0. 01～655. 35	-	■	P S T
PE-13	Not used					
PE-14	Encoder rotor inertia	0. 12	0. 01～655. 35	Kg*cm^2	■	P S T
PE-15	Encoder type	0	0～4	-	■	P S T
PE-16	Encoder pulses per revolution	2500	512～30000	ppr	■	P S T
PE-18	Encoder electrical angle	15.0	0. 0～359. 9	°	■	P S T
PE-19	Encoder rising electrical angle of U phase	80. 5	0. 0～359. 9	°	■	P S T
PE-20	Motor autotuning method setting	0	0～2	-	□	P S T
PE-21	Absolute encoders using method selection	0	0: Incremental encoder 1: Absolute encoder	-	■	P S T
PE-22	Incremental encoder AB phase sequence relationship	0	0: A leads B CCW 1: A leads B CW	-	■	P S T
PE-23	Q axis current regulator proportional gain	8000	-	-	○	P S T
PE-24	D axis current regulator proportional gain	8000	-	-	○	P S T
PE-25	Q axis current regulator integral gain	13000	-	-	○	P S T

Parameters	Function	Default value	Settings ranges	Unit	Property	Run mode
PE-26	D axis current regulator integral gain	13000	-	-	○	P S T

Notice

*: Some function parameters have two communication addresses, such as P1-00 have two communication addresses: 0100H and 2100H. Beginning with address 0, it indicates that this parameter written to the RAM register of the drive, and can be executed immediately, but will not be saved; Beginning with address 2, it indicates that this parameter written to the EEPROM of drive, can be executed immediately and saved;

*: If you require to frequently rewrite parameters frequently to EEPROM, due to the limit of writing cycles of EEPROM, EEPROM may be damaged. Therefore, for parameters which need to be frequently rewritten via communication, please use RAM address, whose starting address is 0. For example, in speed mode, when need to transfer speed command in real time via the communication, the written address of speed command must use 0300H, not 2300H.

*: For the parameters whose RAM register addresses are not listed, when using the address starting with 0, the data will be received but will not be executed and saved. When these parameters using EEPROM address, the data will be saved, but whether executed immediately depend on parameter attributes.

7 Function parameter details

7.1 P0 group - Monitoring parameters

Monitoring group parameters are used to view the status of the servo drive, they cann't be modified.

P0-00	Motor speed	Initial value	Unit	Communication Address
		0	rpm	0000H

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Display current motor speed

P0-01	Motor load rate	Initial value	Unit	Communication Address
		0	%	0001H

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Show the actual output torque of the motor and the motor rated torque ratio

P0-02	Current electric angle	Initial value	Unit	Communication Address
		0	°	0002H

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Display current electric angle of motor rotor

Electric angle= Motor mechanical angle * Pole pairs of motor

P0-03	DI Input level (binary display)	Initial value	Unit	Communication Address
		0	-	0003H

Control mode：P S T
Data size：32bit
Display mode：Binary system
Parameter function：Show the status of the input terminal, a total of 10bit data, representing the DI1~DI10.

For example, panel display:	0010100101 DI8 DI7 DI6 DI5 DI4 DI3 DI2 DI1	DI2,DI4,DI5,DI6 are closed. DI9, DI10 are not used.

P0-04	DO Output level (binary display)	Initial value	Unit	Communication Address
		0	-	0004H

Control mode：P S T
Data size：32bit
Display mode：Binary system
Parameter function：Show the status of the output terminal, a total of 6bit data, representing the DO1~DO6.

For example, panel display:

0000000101
DO4 DO3 DO2 DO1

DO2,DO4 output are valid. DO5,DO6 are not used.

P0-05	Encoder multi circle position value (only for 17 bit absolute encoder)	Initial value	Unit	Communication Address
		0	rev	0005H

Control mode：P S T
Data size：16bit

Display mode：Decimal system
Parameter function：Show multi circle value of encoder feedback, range: -32768~+32767

P0-06	Total running time	Initial value	Unit	Communication Address
		0	min	0006H

Control mode：P S T
Data size：32bit
Display mode：Decimal system
Parameter function：Display the total time elapsed after the servo drive is out of the factory.

P0-08	AI1 voltage value	Initial value	Unit	Communication Address
		0	mV	0008H

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function： Display analog channel 1 acquisition of the actual value of the voltage.

P0-09	AI2 voltage value	Initial value	Unit	Communication Address
		0	mV	0009H

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Display analog channel 2 acquisition of the actual value of the voltage.

P0-10	Encoder sector number (only for 2500ppr incremental encoder)	Initial value	Unit	Communication Address
		0	-	000AH

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Display the current incremental encoder sector number.
If the motor uses the 2500ppr incremental encoder, the sector number means the UVW combination of the encoder feedback, generally in the counter clockwise rotation, jump in accordance with : 2- > 6- > 4- > 5- > 1- > 3-.

P0-11	Bus voltage	Initial value	Unit	Communication Address
		0	V	000BH

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function： Show the actual value of the DC bus voltage in the drive.

P0-12	Effective current value	Initial value	Unit	Communication Address
		0	A	000CH

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：Show the effective value of current motor current.

Effective current value $I = \sqrt{\frac{2}{3}(I_U^2 + I_V^2 + I_W^2)}$

P0-13	Servo drive current state	Initial value	Unit	Communication Address
		-	-	000DH

Control mode：P S T
Data size：16bit
Display mode： -
Parameter function：Show the current state of the servo drive.
When selecting the display P0-13, the following figure shows the display of the LED display on the servo drive panel.

LED2, LED1,LED0 Show the current state of the servo drive，three states below：

Servo is in the normal operation condition，LED2~LED0 display:	
Servo is ready but not enabled，LED2~LED0 display:	
Servo is in a fault state，LED2~LED0 display:	

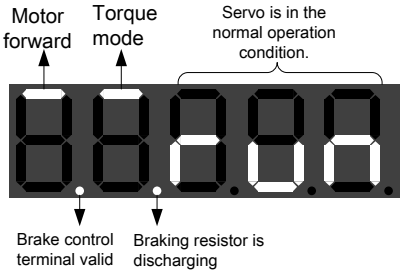
LED3 shows current control mode for servo drives，the decimal point indicates whether the brake resistance is in the discharge state.

Servo is in position control mode, the brake resistance is not working		Servo is in the position control mode, the brake resistance is discharged.	
Servo is in the speed control mode, the brake resistance is not working		Servo is in the speed control mode, the brake resistor is discharged	
The servo is in the torque control mode and the brake resistance is not working		Servo is in the torque control mode, the braking resistor is discharged.	

LED4 shows the direction of the current motor speed, the number of points to maintain the brake terminal (BK-) status.

Motor reversal, keeping the brake control terminal BK is invalid		Motor reversal, keeping the brake control terminal BK valid	
Zero speed of motor, the brake control terminal BK is invalid		Zero speed of motor, the brake control terminal BK is valid	
The motor is rotating , and the brake control terminal BK is invalid		The motor is rotating , and the brake control terminal BK is valid	

For example:



In particular, when the servo is at the origin of the regression process, P0-13is showing: 

P0-14	Brake load ratio	**Initial value**	**Unit**	**Communication Address**
		0	**%**	**000EH**

Control mode：P S T
Data size：16bit
Display mode：Decimal system
Parameter function：When the motor is in the braking state, the load rate of the current braking resistor is displayed.

P0-15	IGBT module temperature	**Initial value**	**Unit**	**Communication Address**
		0	**℃**	**000FH**

Control mode：P S T
Data size：16bit

Display mode：Decimal system

Parameter function： IGBT module inside temperature

EA100 servo driver has perfect over temperature protection mechanism. Because the temperature detection device is located inside the IGBT module, the temperature can reach 100 or higher, which is a normal phenomenon.

P0-16	Total collected external pulse	Initial value	Unit	Communication Address
		0	ppr	0010H

Control mode：P S T

Data size：32bit

Display mode：Decimal system

Parameter function： In the position mode, the total number of pulses sent to the servo is useful only in the position control mode.

Note: This value may be more than five, please check the high data through the left shift key.

P0-18	Display P1-60 selected fault codes	Initial value	Unit	Communication Address
		0	-	0012H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show the last fault (P1-60) of the fault code

P0-19	Show speed when P1-60 failure occurs	Initial value	Unit	Communication Address
		0	rpm	0013H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show the motor speed when the last fault occurred.

P0-20	Show bus voltage when the P1-60 fault occurs	Initial value	Unit	Communication Address
		0	V	0014H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show bus voltage when the last fault occurs

P0-21	Show effective current when P1-60 fault occurs	Initial value	Unit	Communication Address
		0	A	0015H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show the effective value of the motor current at the time of the last fault.

P0-22	Show running time when P1-60 fault occurs	Initial value	Unit	Communication Address
		0	min	0016H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show the running time when the last fault occurs.

P0-24	Low 4 bit of encoder single-turn position value (only for 17 bit encoder)	Initial value	Unit	Communication Address
		0	ppr	0018H

Control mode：P S T

Data size：16bit

Display mode：Decimal system

Parameter function： Show current single loop position value low 4 bits of 17 bit encoder feedback.

P0-25	High 5 bit encoder single-turn position value (only for the 17 encoder)	Initial value	Unit	Communication Address
		0	ppr	0019H

Control mode：P S T

Data size：16bit
Display mode：Decimal system
Parameter function：Show current single loop position value high 5bits of 17 bit encoder feedback.

Single loop position value =10000*P0-25+P0-24

For example：

P0-24 00131
P0-25 00015

Single loop position value = 10000*15+131=150131

P0-26	The current total inertia load - continuous detection	Initial value	Unit	Communication Address
		0	kg*cm^2	001AH

Control mode：P S
Data size：16bit
Display mode：Decimal system
Parameter function：Show identification of the total value of the load of the total inertia, when servo drive is online inertia identification.

Total load inertia = Motor inertia + Load inertia

P0-27	Current load inertia ratio - continuous detection	Initial value	Unit	Communication Address
		0	%	001BH

Control mode：P S
Data size：16bit
Display mode：Decimal system
Parameter function：Show the ratio of the real time value of the load inertia and the inertia of the motor, when servo drive is online inertia identification

P0-28	Total number of feedback pulses	Initial value	Unit	Communication Address
		0	ppr	001CH

Control mode：P
Data size：32bit
Display mode：Decimal system
Parameter function：Show the total number of the rotation of the servo motor ,it's useful only in the position control mode.
Note: This value may be more than five, please check the high data through the left shift key.

P0-30	Received external pulse frequency	Initial value	Unit	Communication Address
		0	KHz	001EH

Control mode：P
Data size：32bit
Display mode：Decimal system
Parameter function：Show the number of external pulses that are collected in the position adjustment cycle, it's only useful in the position control mode.

7.2 P1-xx Basic control parameters

P1-00	Control mode selection	Initial value	Unit	Communication Address
		1	-	0100H 2100H

Control mode：P S T
Range：0～5
Data size：16bit
Display mode：Decimal system
Parameter function： Select control mode of servo system

P1-00=0：Speed control mode
Servo drive works in speed control mode, which can determine the speed of the motor running through communication, analog and multi section speed.

P1-00=1：Position control mode
Servo drive works in position control mode, which can determine the position of the motor running through the external position pulse and the multi section position.

P1-00=2：Torque control mode
Servo drive works in the torque control mode, which can determine the output torque of the motor through communication and analog.

P1-00=3：Speed- position switching mode
Servo drive works in speed -position switching mode , please set P1-00=3 and external DI pin function code select MSEL functions.At this point , servo drive can switch between speed control mode and position control mode.

At the moment , make sure the servo drive running correctly. During the pay attention to switching can be switching control
mode when servo motor stop.From retentionpulse will be cleared.

If switch signals under the condition even then velocity fall below zero

Note: Although mode switching signal then zero signal is valid ,it can't switch

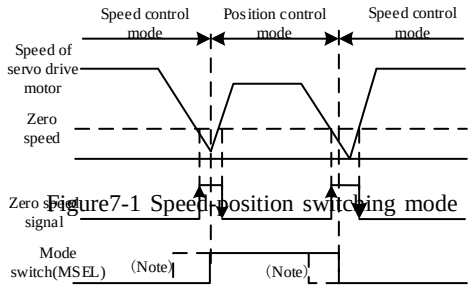


Figure7-1 Speed-position switching mode

instruction of speed and position to ensure switching between two kinds of control mode, running at zero speed state, but for safety,

position control mode to speed control mode,

of higher than zero velocity rotational state, speed ,also can't switch control mode.

switch ON/OFF when zero signal is invalid, control mode .

P1-00=4 ： Torque-speed switching mode

Servo drive works in torque -speed switching mode , please set P1-00=4 and external DI pin function code select MSEL functions.At this point , servo drive can switch between torque control mode and speed control mode. Torque-speed switching mode switch through external DI junction,whenever can switch control mode,

Note: If instruction value of speed instruction is 0 when switch speed in setting deceleration time to stop. function, the drive can only run in

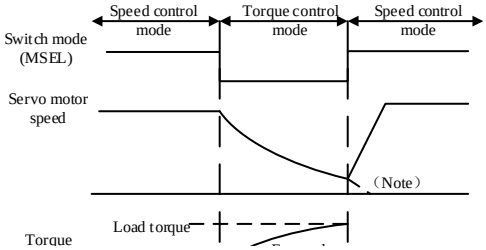


Figure7-2 Torque-speed switching mode

control mode, the servo motor slowdown
If external DI signal unused MSELn torque control mode.

P1-00=5：Position-torque switching mode

Servo drive works in position-torque switching mode , please set P1-00=5 and external DI pin function code select MSEL functions.At this point , servo drive can switch between position control mode and torque control mode. It can switch at zero speed state, but for safety, switching control mode when servo motor stop. From position control mode to speed control mode, retentionpulse will be cleared.

If switch signals under the condition state, even then velocity fall below speed ,also can't switch control mode.

NOTE: If external DI signal unused to position control mode.

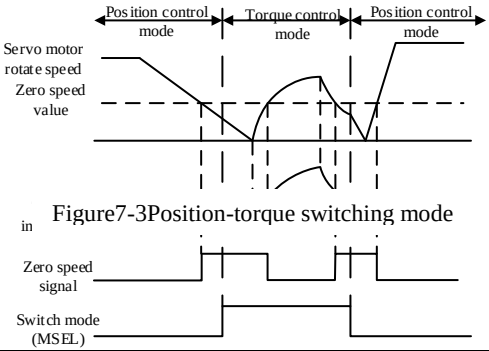


Figure7-3Position-torque switching mode

of higher than zero velocity rotational zero

MSELn function, the drive can only run in

P1-01	Position command source selection	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2101H**

Control mode：P

Range：0～1

Data size：16bit

Display mode：Decimal system

Parameter function：Select the source of the position command

P1-01=0：External pulse command (pt)

Position command is derived from the external input pulse number, the frequency of the external pulse determines the speed of the motor running.

Please see the description of P1-02.

P1-01=1：Internal multiple command (pr)

Position command is derived from the internal multiple command set by the P2 group.

Please see the description of P1-03 and Section 7.3 .

P1-02	External pulse command input mode:	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2102H**

Control mode：P

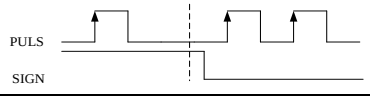
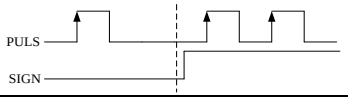
Range：0～5

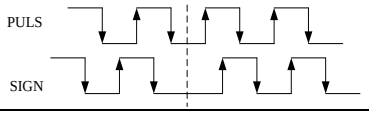
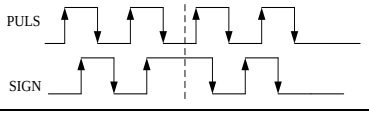
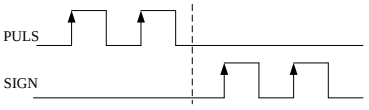
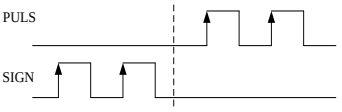
Data size：16bit

Display mode：Decimal system

Parameter function：The way of selecting an external pulse.

Table 7-1 pulse command logic

Parameters	Pulse form	Logic state	Direction of rotation	
			Forward	Reverse
P1-02=0	Pulse + direction	Positive logic		
P1-02=1	Pulse + direction	Negative logic		

Parameters	Pulse form	Logic state	Direction of rotation	
			Forward	Reverse
P1-02=2	Two phase orthogonal pulse (4 times frequency)	Positive logic		
P1-02=3	Two phase orthogonal pulse (4 times frequency)	Negative logic		
P1-02=4	CCW/CW pulse	Positive logic		
P1-02=5	CCW/CW pulse	Negative logic		

P1-03	Internal position command multiple execution options	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2103H**
		0	**-**	**2102H**

Control mode：P

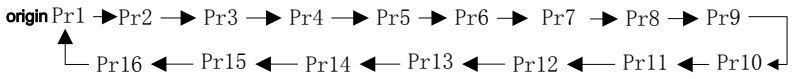
Range：0～2

Data size：16bit

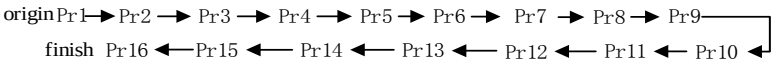
Display mode：Decimal system

Parameter function：When the P2 group is given a position command, the multi section position switch mode is chosen.

P1-03=0：Press the 16 section position from the start of the PR1 cycle.

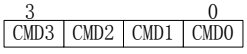


P1-03=1：According to the 16 section position from the PR1 to the Pr16, running only one cycle .

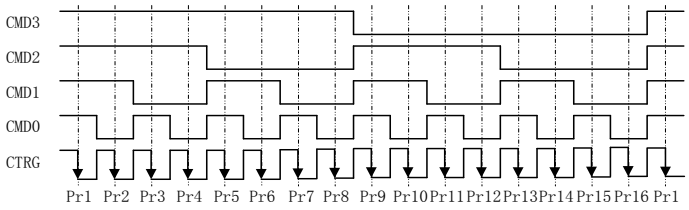


P1-03=2：By external DI input switching operation as stipulated in the table 7-2. DI terminals must be set to 5(CMD0), 6(CMD1), 7(CMD2), 8(CMD3) and 9(CTRG)function.

DI default is low level effectively, if 4 road（5/6/7/8）DI input information in the following way to form a number D of bit 4:



，and D for 0000-1111 respectively corresponding to pr1-pr16，according to the value of D run under different position pr instructions.



NOTE：

1：It will not take effect that if changes the current period of paraments in the operation when P1-03=0 or 1，these paraments will only be effective in the next run.

2：The segment has implemented will be cleared that if can make OFF or power down in the operation when P1-03=0 or 1.At the moment , if directly to run again, the current position as a starting point ,since Pr1starts execution.

3：The multistage position command execution triggered by falling edge CTRG when P1-03=2，please set corresponding DI input terminal low level effectively.

4：Only the execution of a position command has finished, the response to another command whenP1-03=2.

- In the process of a position command execution, servo drive will not terminate the current position command execution by DI terminal state change.
- When the current position commad execution has finished, the servo drive in a wait state, according to the current DI terminal state executes the corresponding segment of position instruction after receives the CTRG falling edge.

Table7-2internal position instruction multistage (DI)function

Pr instruction	CMD3	CMD2	CMD1	CMD0	CTRG	Corresponding paramter	explaination	Speed setting
Pr1	0	0	0	0	↓	P2-00	Pr1pulses total	P2-02

Pr instruction	CMD3	CMD2	CMD1	CMD0	CTRG	Corresponding paramter	explaination	Speed setting
						P2-01		
Pr2	0	0	0	1	↓	P2-04 P2-05	Pr2pulses total	P2-06
Pr3	0	0	1	0	↓	P2-08 P2-09	Pr3 pulses total	P2-10
Pr4	0	0	1	1	↓	P2-12 P2-13	Pr4 pulses total	P2-14
Pr5	0	1	0	0	↓	P2-16 P2-16	Pr5 pulses total	P2-18
Pr6	0	1	0	1	↓	P2-20 P2-21	Pr6 pulses total	P2-22
Pr7	0	1	1	0	↓	P2-24 P2-25	Pr7 pulses total	P2-26
Pr8	0	1	1	1	↓	P2-28 P2-29	Pr8 pulses total	P2-30
Pr9	1	0	0	0	↓	P2-32 P2-33	Pr9 pulses total	P2-34
Pr10	1	0	0	1	↓	P2-36 P2-37	Pr10 pulses total	P2-38
Pr11	1	0	1	0	↓	P2-40 P2-41	Pr11 pulses total	P2-42
Pr12	1	0	1	1	↓	P2-44 P2-45	Pr12 pulses total	P2-46
Pr13	1	1	0	0	↓	P2-48 P2-49	Pr13 pulses total	P2-50
Pr14	1	1	0	1	↓	P2-52 P2-53	Pr14 pulses total	P2-54
Pr15	1	1	1	0	↓	P2-56 P2-57	Pr15 pulses total	P2-58
Pr16	1	1	1	1	↓	P2-60 P2-61	Pr16 pulses total	P2-62

NOTE: In the table, 0/1 is just respectively invalid/effective, doesn't represent the actual level. More are available at logic level settings.

P1-05	Speed command source selection	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2105H**

Control mode：S

Range：0～5

Data size：16bit

Display mode：Decimal system

Parameter function：Speed command source selection：

P1-05=0：Internal digital given (P3-00 given);

P1-05=1：Analog quantity 1 given (AI1);

P1-05=2：Analog quantity 2 given (AI2);

P1-05=3：Not used;

P1-05=4：Internal multi section speed command（P1-06）;

P1-05=5：Point running (should make external JOG DI enable);

P1-06	Internal multi section speed command execution mode	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2106H**

Control mode：S

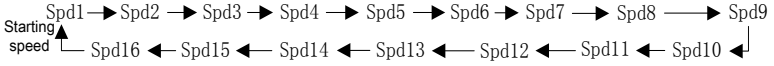
Range：0～2

Data size：16bit

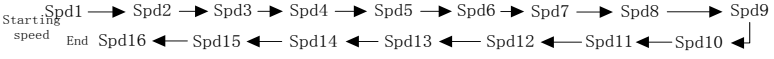
Display mode：Decimal system

Parameter function： When P1-05=4, select the switching mode of operation of multi section speed.

P1-06=0：According to the 16 section speed command from spd1 begin circularly run.



P1-06=1：According to the 16 section speed command from the spd1 run to spd16, only run a cycle.

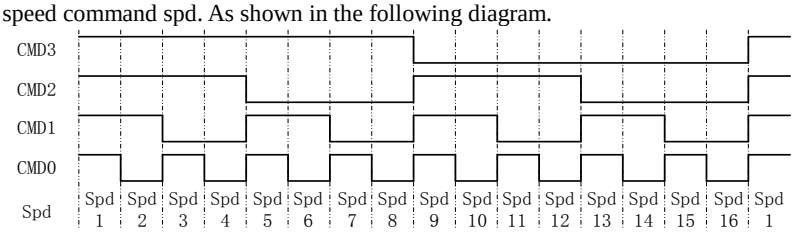


P1-06=2：External DI input switch operation by table 7-3. The DI terminal needs to set to 5 (CMD0), 6 (CMD1), 7 (CMD2) and 8 (CMD3) function.

DI default is low level valid, if 4 input (5/6/7/8) DI form a 4bit number in the following ways:

3			0
CMD3	CMD2	CMD1	CMD0

D: , thenD is 0000-1111 corresponding to pr1-pr16, system according to the value of D running at different speed command spd. As shown in the following diagram.



NOTE:

1：It will not take effect that if modifies the current segment paraments in the operation when P1-06=0 or1.

2：The segment has implemented will be cleared that if can make OFF or power down in the operation when P1-06=0 or 1.At the moment , if directly to run again, since Spd1 starts execution.

3：If DI terminal state unchanged,servo drive run continuously according to the current DI terminal state corresponding speed whenP1-06=2.Once the DI terminal state changes, then immediately run to the speed of new DI terminal state according to acceleration and deceleration time.

Table7-3 Internal multistage speed instruction（DI）function

Internal speed instruction	CMD3	CMD2	CMD1	CMD0	Corresponding paramter	Explaination
Spd1	0	0	0	0	P3-00	Setting speed (0-±motor rated speed)
Spd2	0	0	0	1	P3-02	Setting speed (0-±motor rated speed)
Spd3	0	0	1	0	P3-04	Setting speed (0-±motor rated speed)
Spd4	0	0	1	1	P3-06	Setting speed (0-±motor rated speed)
Spd5	0	1	0	0	P3-08	Setting speed (0-±motor rated speed)
Spd6	0	1	0	1	P3-10	Setting speed (0-±motor rated speed)
Spd7	0	1	1	0	P3-12	Setting speed (0-±motor rated speed)
Spd8	0	1	1	1	P3-14	Setting speed (0-±motor rated speed)
Spd9	1	0	0	0	P3-16	Setting speed (0-±motor rated speed)
Spd10	1	0	0	1	P3-18	Setting speed (0-±motor rated speed)
Spd11	1	0	1	0	P3-20	Setting speed (0-±motor rated speed)
Spd12	1	0	1	1	P3-22	Setting speed (0-±motor rated speed)
Spd13	1	1	0	0	P3-24	Setting speed (0-±motor rated speed)
Spd14	1	1	0	1	P3-26	Setting speed (0-±motor rated speed)
Spd15	1	1	1	0	P3-28	Setting speed (0-±motor rated speed)
Spd16	1	1	1	1	P3-30	Setting speed (0-±motor rated speed)

NOTE: In the table, 0/1 is just respectively invalid/effective, doesn't represent the actual level. More are available at logic level settings.

P1-07	Frequency dividing output	**Initial value**	**Unit**	**Communication Address**
		2500	**ppr**	**2107H**

Control mode：P S T

Range：When using 2500ppr encoder：358~2500；When using 17bit encoder：1171～4095

Data size：16bit

Display mode：Decimal system

Parameter function：Servo motor rotation one circle, drive feedback A, B pulse number to the host computer.

For example, P1-07=550, then servo motor rotation one circle, PA+-、PB+- terminals output 550 pulse, the orthogonal relationship between PA+- pulse and PB+- pulse.

Do not set the value beyond the above range, otherwise the output pulse will be incorrect.

P1-08	Torque command selection	**Initial value**	**Unit**	**Communication Address**
		0	**-**	**2108H**

Control mode：T

Range：0～2

Data size：16bit

Display mode：Decimal system

Parameter function： Select the source of the torque command on torque control mode

P1-08=0：Internal digital given (P4-00 given);

P1-08=1：Analog value 1 given (AI1);
P1-08=2：Analog value 2 given (AI2);

P1-09	Speed feedback filter time constant	Initial value	Unit	Communication Address
		500	s	2109H

Control mode：P S T
Range：0～2000
Data size：16bit
Display mode：Decimal system
Parameter function：Setting speed feedback filter time constant.
The greater the parameter value, detection more smooth, but the speed of bandwidth becomes smaller; the parameter value is smaller, faster response speed detection, greater bandwidth. But the parameters are too small to cause noise, too big to be a shock.

P1-10	First group of resonance frequency setting value	Initial value	Unit	Communication Address
		1000	Hz	210AH

Control mode：P S
Range：50～1000
Data size：16bit
Display mode：Decimal system
Parameter function：Please see the function of P1-50 parameters.

P1-11	First group of resonance points in the notch depth	Initail value	Unit	Communication Address
		0	dB	210BH

Control mode：P S
Range：0～32
Data size：16bit
Display mode：Decimal system
Parameter function：Please see the function of P1-50 parameters.

P1-12	Internal position command acceleration time T_{PACC}	Initail value	Unit	Communication Address
		100	ms	210CH
P1-13	Internal position command deceleration time T_{PDEC}	Initail value	Unit	Communication Address
		100	ms	210DH
P1-14	Internal position command S curve smoothing time T_{PL}	Initail value	Unit	Communication Address
		10	ms	210EH

Control mode：P
Range：P1-12, P1-13: 0～10000.　P1-14: 0~1000
Data size：16bit
Display mode：Decimal system
Parameter function：When executes internal multistage position instruction（P1-01=1），the three parameters are used to set acceleration an deceleration time of motor. The three parameters are invalid when executes position instruction of external pulse.
P1-12： Set the motor speed acceleration time from 0 to motor rated speed.
P1-13： Set the motor speed deceleration time from motor rated speed to 0.
P1-14：Set the smoothing time of S curve in the process of acceleration and deceleration.

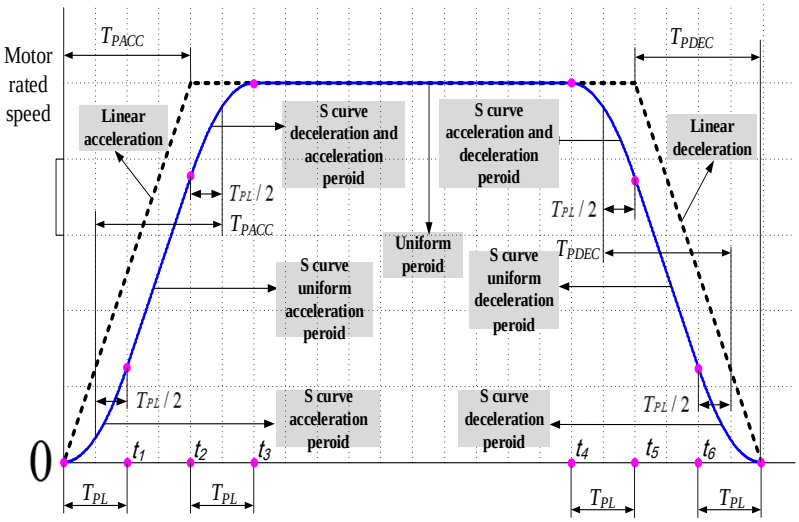


Figure7-4 Internal position instruction acceleration and deceleration time、S curve smoth

In the figure, linear acceleration is acceleration and deceleration curve of motor when P1-14=0.

When P1-14 isn't 0，motor accelerates and decelerates according to S curve amongT_{PL}（P1-14）.From 0 speed to motor rated speed required total acceleration time is T_{PACC}+T_{PL}， from motor rated speed to 0 speed required total deceleration time is T_{PDEC}+T_{PL}。

The purpose of S curve is making movement instruction to carry on the smoothing processing, avoiding system produces too much quick jump(differential of acceleration) because of drastic change of input instruction, thus stimulates vibration and noise of the mechanical structure.

NOTE：

P1-12、P1-13 refers to the variation of motor speed is motor rated speed requiring acceleration and deceleration time. If the variation of target speed isn't motor rated speed, the required time changes according to the proportion of variation of target speed and motor rated speed.

For example, motor target speed is 1500rpm，motor rated speed is 3000rpm，P1-12=200ms，P1-13=300ms，motor speed acceleration time is 100ms from 0 to 1500rpm，motor speed deceleration time is 150ms from 1500rpm to 0.

P1-15	External pulse command smoothing filter time constant	**Initail value**	**Unit**	**Communication Address**
		0	**ms**	**210FH**

Control mode：P

Range：0～30000

Data size：16bit

Display mode：Decimal system

Parameter function：The time constant for external pulse signal to smooth filtering .when set 0 ,it's invalid.

The function of parameter is making input pulse instruction smoothing, but will be delay phenomenon. Commonly used in :

- PC haven't the function of accelerate and deceleration；
- Electronic gear is large；
- Instruction frequency is low；
- It occurs to advanced step jump、unstable phenomenon and so on when motor runs.

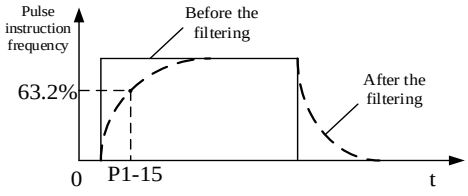


Figure7-5 External pulse command smoothing filter time constant

P1-16	Speed command acceleration timeT_{SACC}	**Initail value**	**Unit**	**Communication Address**
		200	**ms**	**2110H**
P1-17	Speed command deceleration time T_{SDEC}	**Initail value**	**Unit**	**Communication Address**
		200	**ms**	**2111H**
P1-18	Speed command S curve smoothing time T_{SL}	**Initail value**	**Unit**	**Communication Address**
		50	**ms**	**2112H**

Control mode：S

Range：P1-16、P1-17 为 0～30000，P1-18 为 0~2000

Data size：16bit

Display mode：Decimal system

Parameter function：When the drive is a given model of internal speed（P1-05=0、4、5），the three parameters are used in setting the acceleration and deceleration time of motor.

P1-16： Set the motor speed acceleration time from 0 to motor rated speed.

P1-17： Set the motor speed deceleration time from motor rated speed to 0.

P1-18：Set the smoothing time of S curve in the process of acceleration and deceleration.

In the process of accelerate or decelerate, if use S curve（P1-18≠0），the drive adopts three stage acceleration curve planning to dispose movement instruction smoothly. At the moment, the acceleration is continuous, avoiding system produces too much quick jump(differential of acceleration) because of drastic change of input instruction, thus stimulates vibration and noise of the mechanical structure. Users can use P1-16 adjusting the slope of speed's change in the accelerated process; Use the P1-17 adjusting the slope of speed's change in the decelerated process; Use P1 to 18 to improve the steady state of motor start a

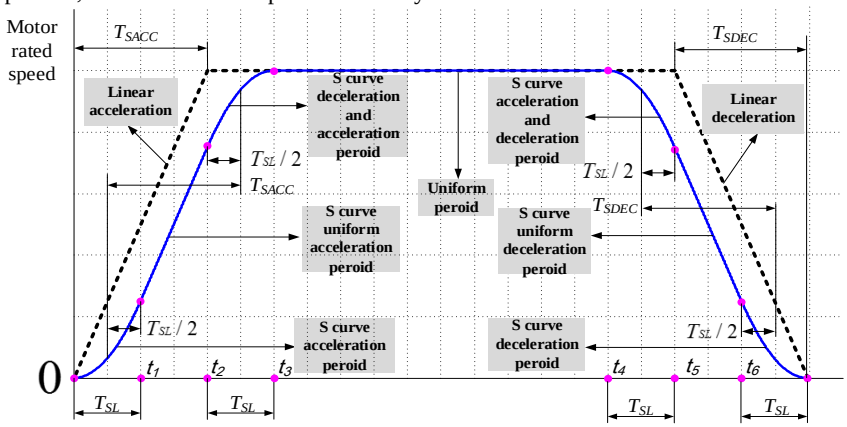


Figure7-6 Speed instruction acceleration and deceleration time ,S curve

NOTE：

P1-16, P1-17 refers to the variation of motor speed is motor rated speed requiring acceleration and deceleration time. If the variation of target speed isn't motor rated speed, the required time changes according to the proportion of variation of target speed and motor rated speed.

For example, motor target speed is 1500rpm, motor rated speed is 3000rpm，P1-16=200ms, P1-17=300ms, motor speed acceleration time is 100ms from 0 to 1500rpm，motor speed deceleration time is 150ms from 1500rpm to 0.

P1-19	Speed command low-pass filter smoothing filter time constant	Initail value	Unit	Communication Address
		10.0	ms	2113H

Control mode：S

Range：0.0～1000.0

Data size：16bit

Display mode：Decimal system

Parameter function：About speed instruction after S curve for low pass filter, make the speed instruction more smoothly. Usually just use one of the S curve or low pass filter. Two kinds of use can make the system response slow.

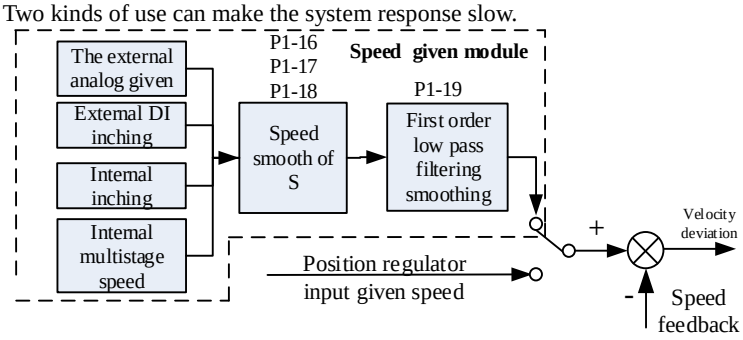


Figure7-7Speed command transmionroute

P1-20	Analog speed command gain	Initail value	Unit	Communication Address
		Rated speed of the motor	rpm	2114H

Control mode：S

Range：0～Rated speed of the motor

Data size：16bit

Display mode：Decimal system

Parameter function：Analog speed command gain setting is used to set corresponding motor speed when external analog value is 10 V through

external voltage give speed(P1-05=1、2 or 3).

For example：

When P1-20=1000，external analog value=10V，the motor running speed=1000rpm；

When P1-20=500，external analog value=10V，the motor running speed =500rpm.

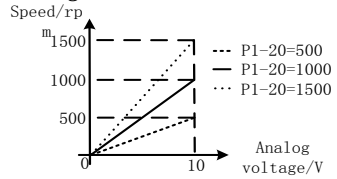


Figure7-8 Analog speed command gain

P1-21	Current feedback low-pass smoothing constant	Initail value	Unit	Communication Address
		100	s	2115H

Control mode：P S T

Range：0～10000

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P1-50Parameter function

P1-22	Torque command low-pass smoothing constant	Initail value	Unit	Communication Address
		100	s	2116H

Control Mode：P S T

Range：0～10000

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P1-50Parameter function

P1-23	The torque command when analog maximum input (10V)	Initail value	Unit	Communication Address
		100		2117H

Control Mode：T

Range：0～300

Data size：16bit

Display mode：Decimal system

Parameter function：Analog torque command gain setting is used when external voltage give torque（Set P1-08 to 1, 2 or 3）.Setting the corresponding torque when external value is 10V, the size of value indicates the percentage of the relative motor rated torque.

For example: When P1-23=100，external given=10V，motor runs with rated torque; when external give to 5V，motor runs with50% rated torque.

P1-24	Second group of resonance frequency setting value	Initail value	Unit	Communication Address
		1000	z	2118H

Control Mode：P S

Range：50～1000

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P1-50 Parameter function

P1-25	Second group of resonance points in the notch depth	Initail value	Unit	Communication Address
		0	dB	2119H

Control Mode：P S

Range：0～32

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P1-50Parameter function

P1-26	Electronic gear ratio factor	Initail value	Unit	Communication Address
		0	-	211AH

Control Mode：P

Range：0～17

Data size：16bit

Display mode：Decimal system

Parameter function：The default is 0 when using 2500ppr encoder，the default is 17 when using 17 bit encoder .The meaning refers to the

interpretation of the electronic gear.

P1-27	**Electronic gear numerator 1**	**Initail value**	**Unit**	**Communication Address**
		1	**-**	**211BH**
P1-28	**Electronic gear denominator**	**Initail value**	**Unit**	**Communication Address**
		1	**-**	**211CH**
P1-29	**Electronic gear numerator 2**	**Initail value**	**Unit**	**Communication Address**
		1	**-**	**211DH**
P1-30	**Electronic gear numerator 3**	**Initail value**	**Unit**	**Communication Address**
		1	**-**	**211EH**
P1-31	**Electronic gear numerator 4**	**Initail value**	**Unit**	**Communication Address**
		1	**-**	**211FH**

Control Mode：P
Range：1~65535
Data size：16bit
Display mode：Decimal system
Parameter function： P1-26~P1-31used to set electronic gear ratio.
Electronic gear ratio

It can be easily match with all kinds of pulse source through setting electronic gear ratio under position control mode, in order to achieve the ideal control resolution (the Angle/pulse).

Electronic gear ratio set way：

① **Set electronic gear ratio factor** P1-26。

- Set electronic gear ratio factor mainly depend on the type of the encoder motor used.
- The parameter must be 0 when motor used 2500ppr incremental encoder.
- The parameter must be 17 when motor used17bit encoder, it shows that 131072 pulse encoder feedback in per circle. Also set another nonzero value, it depends on the calculation results of electronic gear ratio.

② **Calculate the desirable electronic gear ratio**

G：Electronic gear ratio；
P：The number of input instructions' pulse；
N：Motor rotation laps；
C：The encoder line number, if encoder is 2500ppr incremental, then C＝10000（After four times the frequency ）
If encoder is 17bit encoder, then C=131072.

③ **It needn't get a specific number about calculation of electronic gear ratio G, just make numerator and denominator divided by common divisor, the value of numerator and denominator can meet parameter Range as far as possible.**

For example：

- Case1：motor uses 2500ppr encoder，when input instruction is 6000 pulses，servo motor rotate one circle：

Because of 2500ppr encoder，P1-26 must be 0. Electronic gear numerator and denominator can be set：

- ✧ Setting way I：P1-27=100，P1-28=60
- ✧ Setting way II：P1-27=10，P1-28=6
- ✧ Setting way III：P1-27=5，P1-28=3

- Case2：motor uses 17bit encoder, when input instruction is 5600 pulses, servo motor rotate one circle：

$$G=\frac{N\times C}{P}=\frac{1\times 131072}{5600}=\frac{1}{5600}\times 2^{17}=\frac{2}{5600}\times 2^{16}=\frac{1}{1400}\times 2^{15}$$

The parameters can be set：

- ✧ Setting way I：P1-26=17，P1-27=1，P1-28=5600
- ✧ Setting way II：P1-26=16，P1-27=2，P1-28=5600
- ✧ Setting way III：P1-26=15，P1-27=1，P1-28=1400

④ **Electronic gear ratio for the recommended range（when uses 2500ppr encoder）**

$$\frac{1}{1000}\le G\le 1000$$

⑤ **When it need switching frequently among the different electronic gear ratio, it can modify P1-27、P1-28 by communication mode online; also can by setting two DI terminals for 20 (GNUM0) and 21 (GNUM1) function, then to switch through external DI input. at this time, the corresponding electronic gear numerator as shown below：**

GNUM0	GNUM1	**Effective electronic gear numerator**
0	0	P1-27
0	1	P1-29
1	0	P1-30
1	1	P1-31

⑥ **Due to the electronic gear denominator P1-28 is a fixed value, so if you need to use the external terminal switching electronic gear ratio, please select the appropriate denominator values of electronic gear carefully.**

P1-32	Positioning closed width	Initail value	Unit	Communication Address
		20	ppr	2120H

Control Mode：P
Range：1～65535
Data size：16bit
Display mode：Decimal system
Parameter function： More are available at P1-33Parameter function

P1-33	Positioning completed width	Initail value	Unit	Communication Address
		10	ppr	2121H

Control Mode：P
Range：0～65535
Data size：16bit
Display mode：Decimal system
Parameter function： The setting of positioning closed and completed standard, when counting deviation is less than the set value, the corresponding event has occurred. If there is DO terminal at this point has been set for 5 function (positioning close /PNEAR+-) and 6 (positioning complete/COIN+-), the corresponding DO output terminal would be effective. Please see below.

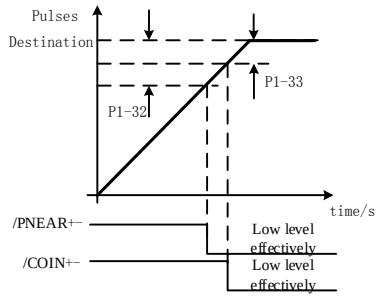


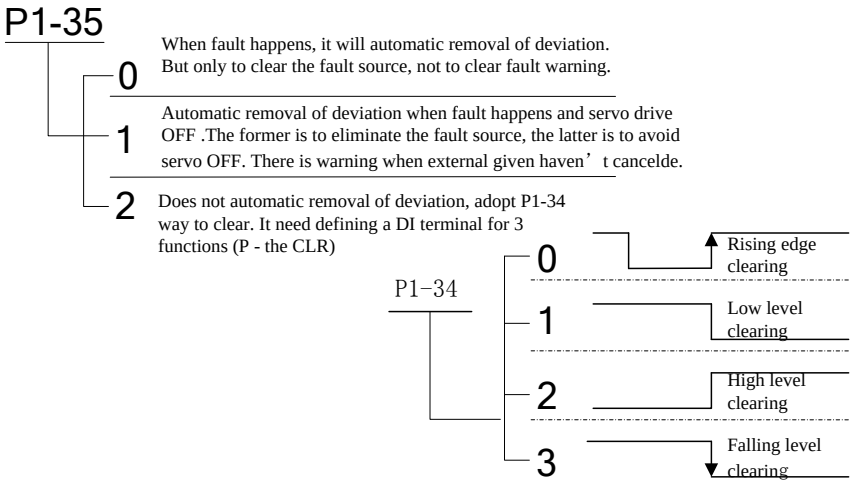
Figure7-8 Positioning closed and completed width

P1-34	Position deviation clear external DI signal action choice	Initail value	Unit	Communication Address
		0	-	2122H

Control Mode：P
Range：0～3
Data size：16bit
Display mode：Decimal system
Parameter function：Clearing deviation by choose any external DI signal.
P1-34=0：Clearing by P-CLR rising edge
P1-34=1：Clearing by P-CLR low level
P1-34=2：Clearing by P-CLR high level
P1-34=3：Clearing by P-CLR falling edge

P1-35	Position deviation automatic clear choice	Initail value	Unit	Communication Address
		0	-	2123H

Control Mode：P
Range：0～2
Data size：16bit
Display mode：Decimal system
Parameter function： choose the way of position deviation clearing
P1-35=0：Only automatic removal of deviation when fault happens；
P1-35=1：Automatic removal of deviation when fault happens and servo drive OFF；
P1-35=2：Does not automatic removal of deviation, adopt P1-34 way to clear；



NOTE：P1-34 definition has been effective, when P1-35=0 or 1, it is still cleared through setting no.3 function（P-CLR）DI terminal.

P1-36	Position follow deviation alarm threshold	Initail value	Unit	Communication Address
		25000	*256ppr	2124H

Control Mode：P
Range：0~65535
Data size：16bit
Display mode：Decimal system
Parameter function：Setting position follow deviation alarm threshold, more are available at P1-37Parameter function.

P1-37	Position follow deviation fault threshold	Initail value	Unit	Communication Address
		25000	*256ppr	2125H

Control Mode：P
Range：0~65535
Data size：16bit
Display mode：Decimal system
Parameter function：Setting position follow deviation fault threshold.

When position deviation corresponds the set, output respectively alarm and fault signal to response events.

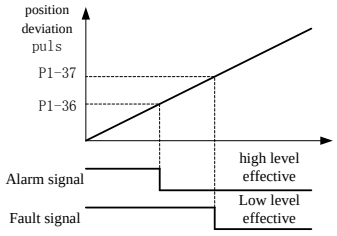
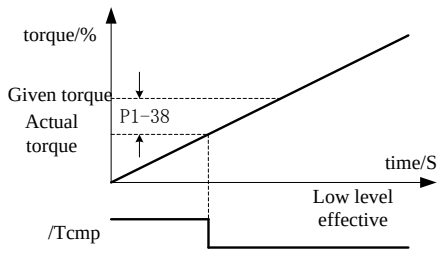


Figure7-9 Position followdeviation alarm and fault threshold

NOTE：When P1-36=0 and P1-37=0, position follow deviation alarm and fault will be blocked.

P1-38	Torque reaches threshold value	Initail value	Unit	Communication Address
		0	%	2126H

Control Mode：T
Range：0～10.0
Data size：16bit
Display mode：Decimal system
Parameter function：
When |setting torque—actual torque|≤ defined as no.13 function (/ Tcmp) at this effectively.



P1-38, torque to events. If a DO terminal is time, then the terminal output signal

Figure7-10 Torque reaches threshold

P1-39	The highest speed setting	Initail value	Unit	Communication Address
		5000	rpm	2127H

Control Mode：P S T

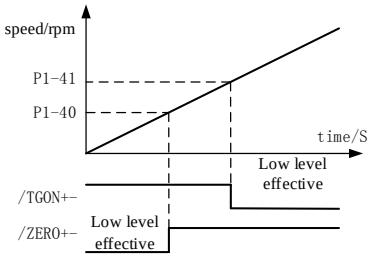
Range：0～the motor highest speed
Data size：16bit
Display mode：Decimal system
Parameter function：Setting the highest speed allowed. The given value of system shall not be higher than the set, if the motor running speed is higher than this value, speeding fault happens.

P1-40	Zero speed signal output	Initail value	Unit	Communication Address
		10	rpm	2128H

Control Mode：P S T
Range：10～100
Data size：16bit
Display mode：Decimal system
Parameter function：More are available at P1-41Parameter function.

P1-41	Rotation signal output value	Initail value	Unit	Communication Address
		10	rpm	2129H

Control Mode：P S T
Range：10～1000
Data size：16bit
Display mode：Decimal system
Parameter function：When motor stops and the the motor has stopped turning. If the motor speed in rotating condition. If set any DO terminal no.4 function（Motor rotation signal/TGON+-），will



motor speed is less than P1-40, it argues that is higher than P1-41, it argues that the motor function（Zero speed signal/ZER0+-）；no.5 output a corresponding signal.
Figure7-11 Zero speed and rotation signal output value

P1-42	Speed approaches threshold	Initail value	Unit	Communication Address
		100	rpm	212AH

Control Mode：P S T
Range：10～3000
Data size：16bit
Display mode：Decimal system
Parameter function：When |given speed-current speed|≤P1-42，it's closed to the set speed .If any DO terminal is set no.5 function（speed approaches/V-CLS+-）, the terminal output effective, as shown in figure7-12.

P1-43	Speed reaches threshold	Initail value	Unit	Communication Address
		20	rpm	212BH

Control Mode：S
Range：1～3000
Data size：16bit
Display mode：Decimal system
Parameter function：
When | given speed-current speed |≤P1-43, it reaches the set speed. If any DO terminal is set no.6 function（speed reaches/ V-CMP+-）, the terminal output effective.

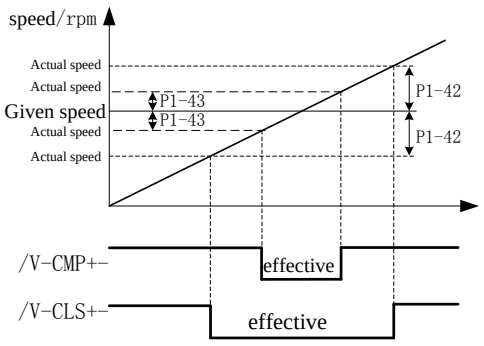


Figure7-12 speed approaches and reaches threshold

P1-44	Simulation speed instruction zero fixed value	Initail value	Unit	Communication Address

		10	**rpm**	**212CH**

Control Mode：S

Range：0～300

Data size：16bit

Display mode：Decimal system

Parameter function：Simulation speed instruction zero fixed value setting is namely zero clamp.

When servo drive chooses speed mode and speed instruction given by external analog value, the analog voltage is 0, because of external electromagnetic interference or zero drift and so on, can lead to motor can't rest. If need external analog input voltage near 0 V, the motor must be stationary, then you can use this function.

When this function is adopted to meet the following two conditions：

- The absolute value of the speed instruction that input analog voltage corresponding is less than P1-44；
- The drive is defined as DI terminal of zero fixed signal ZCLAMP is effective.

When the above conditions are satisfied, servo drive switch from the speed mode to position mode automatically, make the motor in the position to lock within ±1 pulse. Even under the action of external force, also returns zero clamp position.

NOTE：When use 2500ppr encoder, it's ±1pulse，When use 17bit encoder, it's ±3pulse.

P1-45	**Z pulse input width**	**Initail value**	**Unit**	**Communication Address**
		0	**0.5ms**	**212DH**

Control Mode：P S T

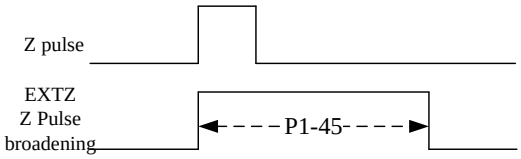
Range：0～3

Data size：16bit

Display mode：Decimal system

Parameter function：Broadening of Z pulse. when PC can't capture a narrow Z pulse, then can broaden it.

Because the width of Z pulse will decrease with motor speed increase, for the convenience of matching with all kinds of PC, Z pulse width can be adjusted according to actual situation. It set to 0 represents the output of Z pulse is original width of encoder Z signal.



P1-46	**Forward the maximum torque limit**	**Initail value**	**Unit**	**Communication Address**
		300.0	**%**	**212EH**

Control Mode：P S T

Range：0.0～350.0

Data size：16bit

Display mode：Decimal system

Parameter function：When P1-48=0, set forward direction, the limiting value of the motor output torque. The rated torque of the motor is benchmark.

P1-47	**Inversion the maximum torque limit**	**Initail value**	**Unit**	**Communication Address**
		300.0	**%**	**212FH**

Control Mode：P S T

Range：0.0～350.0

Data size：16bit

Display mode：Decimal system

Parameter function：When P1-48=0, set inversion direction, the limiting value of the motor output torque. The rated torque of the motor is benchmark.

P1-48	**Torque limit source selection**	**Initail value**	**Unit**	**Communication Address**
		0	**-**	**2130H**

Control Mode：P S T

Range：0～3

Data size：16bit

Display mode：Decimal system

Parameter function：Choosing the source of the motor output torque is limited.

P1-48=0：internal limit P1-46、P1-47 ；

P1-48=1： analog value1 limit，would be limited by P1-46、P1-47 at the same time；

P1-48=2： analog value2 limit，would be limited by P1-46、P1-47 at the same time；

P1-48=3：hold；

The meaning of the torque limit shown as follow

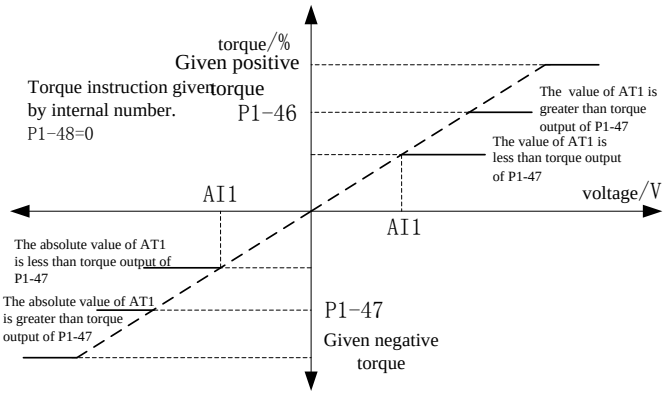


Figure7-13 torque limit

It can limit torque and speed by external instruction, please refers to specification of P4-01.

P1-49	The third group of resonance frequency value	Initail value	Unit	Communication Address
		1000	Hz	2131H

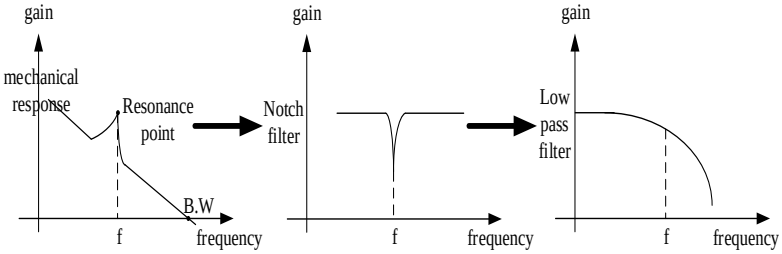
Control Mode：P S
Range：50～1000
Data size：16bit
Display mode：Decimal system
Control Mode：P S
Range：50～1000
Data size：16bit
Display mode：Decimal system
Parameter function：More are available at P1-50Parameter function

P1-50	The third group of notch depth of resonance point	Initail value	Unit	Communication Address
		0	dB	2132H

Control Mode：P S
Range：0～32
Data size：16bit
Display mode：Decimal system
Parameter function：

If the mechanical system resonance occurs, it may because of large rigidity, rapid response servo system, reduce the gain may improve, but will reduce the system response rate. In order to suppress the mechanical resonance without changing the gain, the EA100 servo driver provides two solutions: low pass filter and notch filter.

The principle of resonance suppression is to use a filter to suppress the resonant peak of the mechanical response, and the schematic diagram is as follows：



The function principle of the low pass filter and the notch filter is different, and the difference between the application situation and the result is as follows：

Filter type	Suitable occasion	Advantages	disadvantages
Low pass filter	High frequency resonance	Don't need to know the exact resonance frequency	Bring the phase delay and the bandwidth is reduced, not suitable for low frequency resonance occasions
Notch filter	Middle and low frequency resonance	Does not affect the overall system bandwidth	Must be accurate to know the resonance frequency, the frequency is set to have the mistake instead to affect the performance. Resonant frequency

Filter type	Suitable occasion	Advantages	disadvantages
			is not suitable for frequent drift occasions

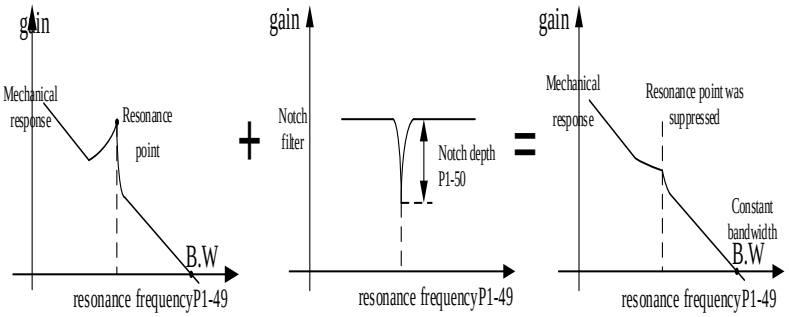


Figure7-14 The principle of vibration suppression using notch filter

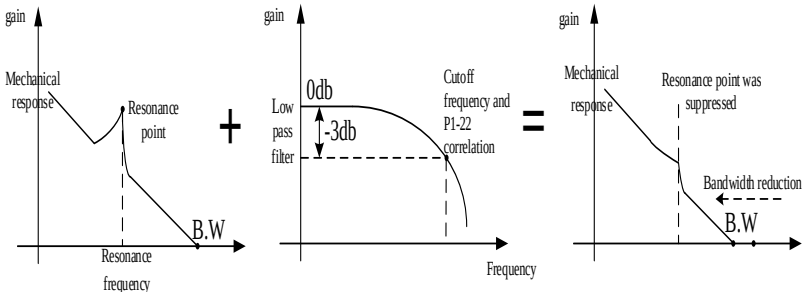


Figure 7-15 The Principle of vibration suppression using low pass filter

P1-53	Stop mode selection	Initail value	Unit	Communication Address
		0	-	2135H

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：set stop mode
P1-53=0：when servo OFF, free parking
P1-53=1：when servo OFF, slow down stop

P1-54	Servo ON- receive instruction delay time	Initail value	Unit	Communication Address
		200	ms	2136H
P1-55	Brake command - servo OFF delay time	Initail value	Unit	Communication Address
		200	ms	2137H

Control Mode：P S T
Range：0～500
Data size：16bit
Display mode：Decimal system
Parameter function：Please refer to section 3.7.2.

P1-56	Braking command action speed	Initail value	Unit	Communication Address
		50	rpm	2138H

Control Mode：P S T
Range：1～1000
Data size：16bit
Display mode：Decimal system
Parameter function：Please refer to section 3.7.2.

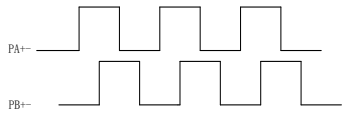
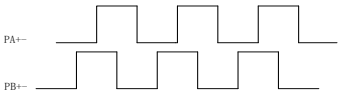
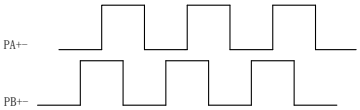
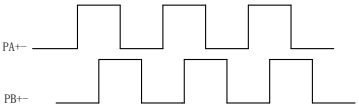
P1-57	Servo OFF- brake command waiting time	Initail value	Unit	Communication Address
		500	ms	2138H

Control Mode：P S T
Range：1～1000
Data size：16bit
Display mode：Decimal system
Parameter function：Please refer to section3.7.2.

P1-58	Frequency division output pulse direction selection	Initail value	Unit	Communication Address
		0	-	213AH

Control Mode：P S T
Range：0～1
Data size：1bit
Display mode：Decimal system
Parameter function：

Table7-4 Output pulse feedback direction

	Forward	Inversion
P1-58=0	 A phase lead B phase 90 °	 B phase lead A phase 90 °
P1-58=1	 B phase lead A phase 90 °	 A phase lead B phase 90 °

P1-60	Fault display selection	Initail value	Unit	Communication Address
		0	-	213CH

Control Mode：P S T
Range：0～3
Data size：16bit
Display mode：Decimal system
Parameter function：Select display which fault in the drive digital tube

P1-60=0：Last fault；
P1-60=1：The first 1 failures；
P1-60=2：The first 2 failures；
P1-60=3：The first 3 failures

Servo drive a total of 4 times the recent the information failure of failure, through this function, it can choose monitoring parameters of P0-18 ~ P0-22 to show which failure.

P1-61	System parameter initialization	Initail value	Unit	Communication Address
		0	-	213DH

Control Mode：P S T
Range：0～65535
Data size：16bit
Display mode：Decimal system
Parameter function：System parameter initialization related setting. Stop setting, power up again.
P1-61=1：When power up again, removal of fault record；
P1-61=65535：When power up again, all function code parameters are returned to the factory default value (except PE group）；
P1-61= Other values：No operation.

7.3 P2-xx Internal multi segment position (Pr) control parameter

This set of features can be enabled if the servo driver is currently in a position mode (P1-00=1) and the command source is an internal multi segment instruction (P1-01=1).
P2 - xx group a total of 64 functional code, is divided into 16 groups, corresponding to the multi segment location directive PR1 to pr16. Since the beginning of P2-00, each of the 4 functional code to set a target location, to achieve the target position allows the uniform speed, after the positioning completion of the waiting time.
The following is a detailed description of the four parameters P2-00~P2-03 involved in the first paragraph of PR1, the other 15 sections of the same, no longer detail. Please refer to figure 7-17.

P2-00	The number of internal position instruction 1 pulses high five	Initail value	Unit	Communication Address

P2-01		1	ppr	2200H
	The number of internal position instruction 1 pulses low four	Initail value	Unit	Communication Address
		0	ppr	2201H

Control Mode：P

Range：P2-00：-30000～+30000；P2-01：-9999~+9999

Data size：16bit

Display mode：Decimal system

Parameter function：Set the target pulse number of first position moves.

The calculation formula is： Pr1 segment total pulse number =10000* P2-00 + P2-01

Please pay special attention to when computing, P2-00 and P2-01 are a symbol number.

For example：

If the P2-00 input13, P2-01 input1050, set the target pulse number to 131050.

If the P2-00 input is 13, P2-01 input -1050, target pulse number is 128950.

If the P2-00 input -13, P2-01 input-1050, set the target pulse number 131050 reverse.

If the P2-00 input -13, P2-01 input 1050, set the target pulse number 128950 reverse.

P2-02	The movement speed of internal position command 1	Initail value	Unit	Communication Address
		100	rpm	2202H

Control Mode：P

Range：-9000～9000

Data size：16bit

Display mode：Decimal system

Parameter function：Set the speed of the first section of the position to run at a constant speed.

NOTE：

1: set speed is positive, the motor in accordance with the number of pulses set forward, whereas the motor according to the number of pulses set in reverse.

2: If the position pulse less, may not reach this speed when the motor running actually. Therefore, please understand the meaning of the parameters：the upper limit of the operation speed of the motor during the execution Pr1 segment position.

P2-03	After the completion of the Pr1 into the Pr2 waiting time	Initail value	Unit	Communication Address
		1.0	S	2203H

Control Mode：P

Range：0.0～3000.0

Data size：16bit

Display mode：Decimal system

Parameter function： When P1-03=0 or 1，after the completion of the first stage position command, wait for this time then start the implementation of the second stage position command. If P1-03 = 2, this parameter is invalid.

Figure 7-17 shows a schematic when run in command sequence. External terminal control mode switching schematic is similar but has the difference. Please refer to P1-03 for explanation.

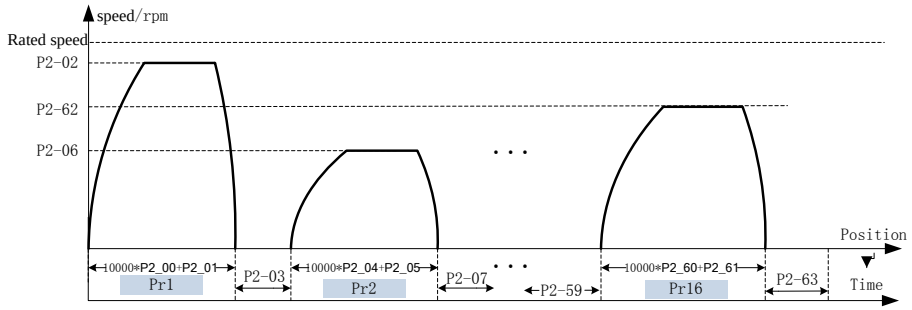


Figure7-17 Multi-position operation schematic

NOTE：

1: When using the internal multistage position, whether it is run by the command sequence or external terminal switching mode, if you modify the current segment operating parameters, the modified parameters will not be executed, will take effect when the next execution of the segment.

2: When using an external terminal switching mode during the execution period of the position command, the servo drive will not terminate execution of the current segment position command due to DI sub-state changes.

3: When using the external terminal switching mode, after the current position instruction execution is completed, the servo drive waits to receive the falling of CTRG, according to the state of the terminal DI at that time, executes position instruction of the corresponding segment.

7.4 P3-xx Internal multi-speed control parameters

If servo speed mode (P1-00 = 0) is adopted on the current , and the instruction source is internal multistage instruction (P1-05 = 4), you can enable the function.

P3 group has about 32 parameters, which is divided into 16 groups, corresponding to a multi-speed command spd1 to spd16. Since P3-00, every two parameters set period of time and speed multi-speed operation.

The following examples only spd1 group stated: P3-00 set running speed of spd1 command; P3-01 set running time of spd1 instruction. For example, when P3-00 = 400, P3-01 = 1.0, corresponding to the instruction spd1 interpreted as motor operates 1s with 400rpm speed.

P3-00	Internal speed instruction register 1	Initail value	Unit	Communication Address
		0	rpm	0300H 2300H

Control Mode：S

Range：-rated speed～+ rated speed

Data size：16bit

Display mode：Decimal system

Parameter function：The first segment speed of internal multispeed

If when servo is speed mode (P1-00 = 0) on the current, and the instruction source is the internal value given (P1-05 = 0), this code specifies speed. For example, if P3-00 = 400, after S-ON the motor has been to 400rpm.

P3-01	Internal speed instruction 1 running time setting	Initail value	Unit	Communication Address
		1.0	S	2301H

Control Mode： S

Range：0.1～6553.5

Data size：16bit

Display mode：Decimal system

Parameter function：The first segment running time of internal multispeed

According to the instruction sequence running is illustrated below

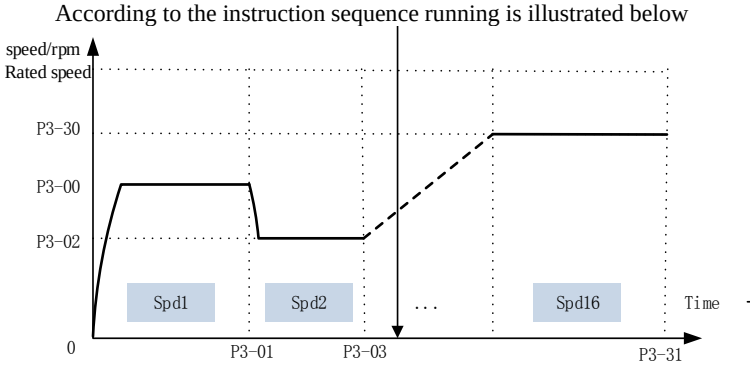


Figure7-18 Multi-speed operation

NOTE：

1: If modify the parameters currently running segment, the modified parameters will not be executed until the next time , it takes effect when you execute this segment, when adopt internal multi-speed, and run with instruction sequence (P1-05 = 4, P1-06 = 0 or 1).

2: Use an external terminal switching multispeed that P1-06 = 2, each of the internal speed command running time parameter is invalid, servo motor speed depending on the state of the corresponding segment external terminals. At the same time, the current speed value as long as modifications,it will be executed immediately.

7.5 P4-xxTorque control parameter

P4-00	Internal digital torque	Initail value	Unit	Communication Address
		100.0	%	2400H

Control Mode： T

Range：-300.0～300.0

Data size：16bit

Display mode：Decimal system

Parameter function：When P1-18=0 时， set the percentage of the motor output torque reference of the motor rated torque.

P4-01	Speed limit value during torque control	Initail value	Unit	Communication Address
		100	rpm	2401H

Control Mode： T

Range：0～motor rated speed

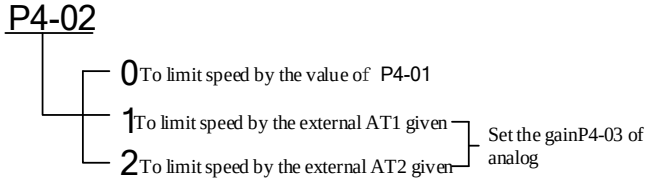
Data size：16bit
Display mode：Decimal system
Parameter function：When P4-02=0 时，set the maximum motor speed allowed by torque control

P4-02	Torque speed limit command source	Initail value	Unit	Communication Address
		0	-	2402H

Control Mode：T
Range：0～3
Data size：16bit
Display mode：Decimal system
Parameter function：Select the source, which limit the size of torque mode of operation (P1-00 = 2) speed .
P4-02=0：P4-01given
P4-02=1：Analog1given
P4-02=2：Analog2given
P4-02=3：Retention

P4-03	Torque speed limited instruction gain	Initail value	Unit	Communication Address
		Motor rated speed	rpm	2403H

Control Mode：T
Range：0～**motor rated speed**
Data size：16bit
Display mode：Decimal system
Parameter function：When P4-02 is set to limit the motor running speed under torque running mode by analog, setting speed corresponding to 10V analog. At this point, if external analog is 10V, the maximum motor speed will be limited in set of this function parameters.



NOTE：On torque mode, when P1-48 (torque limit source selection) is set to 2/3/4, that external analog and P1-46, P1-47 are limiting the size of torque meanwhile, while P4-02 (Torque speed limit instruction source) is set to 1/2, which limited the speed of the motor by external analog and select the same analog source (such as both AI1), then the analog limit both speed and torque.

P4-05	Torque command compensation	Initail value	Unit	Communication Address
		0.0	%	2405H

Control Mode： T
Range：0.0～10.0
Data size：16bit
Display mode：Decimal system
Parameter function：Superimposing a compensation amount based on the original torque command , the reference is the motor rated torque.

7.6 P5-xx Gain tuning parameters

P5-00	Position regulator proportional gain (KP)	Initail value	Unit	Communication Address
		30.0	rad/s	2500H

Control Mode：P S T
Range：1.0～2000.0
Data size：16bit
Display mode：Decimal system
Parameter function：Setting position proportional regulator gain KPP
This parameter determines the responsiveness of the position loop, the larger KPP value is set the higher position loop frequency responses, the better to follow the instruction of position, position error amount is smaller, the positioning setting time is shorter. However, too large setting may cause the system to generate vibration or positioning will overshoot (Overshoot) Under normal circumstances:

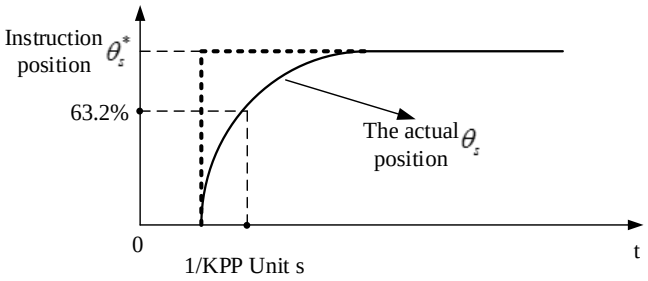
Position loop bandwidth＜Speed loop bandwidth＜Current loop bandwidth

The outer ring　　The inner ring

When the inner ring much faster than the outer ring, the inner ring can be seen straight, at this time the position loop can be modeled as the

first order low pass filter model without a static error, transfer function： $\frac{\theta_s^*}{\theta_s}=\frac{1}{\frac{1}{KPP}s+1}$

position loop response frequency： $(Hz)=\frac{KPP}{2\pi}$



7-19 Position regulator proportional gain

The time required to reach 63.2% of a target position is the reciprocal of position regulator proportional gain.

P5-01	Position regulator proportional gain fluctuation ratio	Initail value	Unit	Communication Address
		50	%	2501H

Control Mode：P S

Range：10～500

Data size：16bit

Display mode：Decimal system

Parameter function：When the gain switching condition is satisfied, it's the rate of change for target position regulator proportional gain**.**

P5-02	Front position regulator feedforward gain	Initail value	Unit	Communication Address
		0	%	2502H

Control Mode：P

Range：0.0～100.0

Data size：16bit

Display mode：Decimal system

Parameter function：Set front position regulator feed forward gain

When smooth change of position control command, increase this gain can reduce the position track deviation.

When position control instruction is not smooth change, reduce this gain can improve the resonance condition of mechanical operation.

P5-03	Position feed forward smoothing constant	Initail value	Unit	Communication Address
		5	ms	2503H

Control Mode：P

Range：2～100

Data size：16bit

Display mode：Decimal system

Parameter function：Set the first order filter time constant of feed forward gain of position regulator.

When smooth change of position control command, decrease this smoothing constant can improve the position track deviation.

When position control instruction is not smooth change, increase this smoothing constant can improve the resonance condition of mechanical operation.

P5-04	Proportional gain of speed regulator KVP	Initail value	Unit	Communication Address
		350.0	rad/s	2504H

Control Mode：P S

Range：0.1～5000.0

Data size：16bit

Display mode：Decimal system

Parameter function：When the gain value of the speed control is increased, the speed of the response can be improved. It will produce vibration and noise when it is too large.

This parameter determines the speed control loop response, the greater KVP set up the higher speed loop frequency response, the speed of the instructions to follow the better, but it's easy to trigger a mechanical resonance when to set large. The response frequency of the speed loop must 4 ~ 6 times higher than the response frequency of the position loop, when the position response frequency is higher than speed response frequency, the system may produce jitter or positioning will have overshoot phenomenon. The calculation of the response frequency of the speed loop is as follows:

When the estimated or set P5-08 is equal to the true JL/JM ：

$$fv = \left(\frac{KVP}{2\pi}\right) \times \left[\frac{(1+P5-08)}{(1+JL/JM)}\right] Hz$$

JL：Load inertia，*JM*：Motor inertia

P5-05	Speed regulator integration time constant	Initail value	Unit	Communication Address
		10.0	ms	2505H

Control Mode：P S

Range：0.1～3000.0

Data size：16bit

Display mode：Decimal system

Parameter function：When the integral time of the speed regulator is increased, it can improve the speed response ability and decrease the speed control deviation. However, it will produce vibration and noise when it is too large.

Speed loop integral can effectively eliminate the steady state error of the velocity, and the fast response is slight. The integral time constant T_i of the speed loop is reduced under the condition that the mechanical system doesn't a produce vibration or noise, so as to increase the rigidity of the system and reduce the error of the steady state. If the load inertia ratio is larger or mechanical system has resonance factor, it is necessary to confirm that the integral time constant of the velocity loop is enough large, otherwise the mechanical system is easy to produce resonance. If the load inertia ratio G is set correctly $G = J_L / J_M$, the velocity integral time constant T_i is obtained by the following formula:

$$Ti(ms) \geq \frac{5000}{2\pi \times f_v(Hz)}$$

The greater the load inertia,the greater the time constant of the velocity integral under normal circumstances.

P5-06	Speed regulator proportional gain fluctuation ratio	Initail value	Unit	Communication Address
		50	%	2506H

Control Mode：P S

Range：10～500

Data size：16bit

Display mode：Decimal system

Parameter function：When the gain switching condition is satisfied, the rate of change for target speed regulator proportional gain **target speed regulator proportional gain**

P5-07	Gain adjustment mode selection	Initail value	Unit	Communication Address
		0	-	2507H

Control Mode：P S

Range：0～2

Data size：16bit

Display mode：Decimal system

Parameter function：

P5-07=0：Manual mode

- The related parameters of position and speed regulator gain P5-00、P5-04、P5-05 and load inertia ratio P5-08 all set by the users themselves.
- The speed bandwidth is invalid under this mode.
- When switching from automatic or semi-automatic mode to manual mode, these gain parameters (P5-00, P5-04, P5-05, P5-08) will maintain the original value that semi-automatic mode automatically calculated.

P5-07=1：Semi-automatic mode (non-continuous adjustment)

- Users only need to set speed bandwidth P5-11, this system can calculate the value of P5-00, P5-04, P5-05 based on it. At the same time should be given appropriate P5-08Initail value, the actual value will automatically recognize and automatically overwritten by the system at runtime.
- After the system detects inertia becoming stable, stopping the identification of P5-08, and storing the results to P5-08.

P5-07=2：Automatic mode（continuous adjustment）

- Users only need to set speed bandwidth P5-11, this system can calculate the value of P5-00, P5-04, P5-05 based on it. The load inertia ratio will automatically recognize by the system .
- System estimate continuously the load inertia ratio, updated P5-08 in real time.

Use manual mode for the following：

- When using automatic and semi-automatic mode ineffective.
- The mechanical parts do not connect firmly, for example, there is a reverse gap.
- The mechanical rigidity is very low.
- The load inertia ratio is too large (over 20 times), or too small (less than 3 times) .
- The load inertia is large fluctuations.
- There is a continuous low speed (less than 100RPM) operation.
- The deceleration time is not more than 2000rpm/s.
- The acceleration time of speed not less than 100RPM and not less than 2000rpm/s did not last for at least 50ms.
- The acceleration and deceleration torque is smaller than the friction torque.

P5-08	Load inertia ratio	Initail value	Unit	Communication Address
		0.01	-	2508H

Control Mode：P S

Range：0.01～655.35

Data size：16bit

Display mode：Decimal system

Parameter function：Set the ratio of load inertia and motor rotor inertia

In the P5-07=0 that is, gain adjustment for manual mode should be as accurate as possible, while in the P5-07=1, 2, gain automatic and semi-automatic adjustment mode allows some deviation.

$P5-08 = J_L / J_M$ J_L Load inertia， J_M Motor rotor inertia ratio

P5-09	Offline load inertia ratio self-learning torque	Initail value	Unit	Communication Address
		50	%	2509H

Control Mode：P S

Range：10～200

Data size：16bit

Display mode：Decimal system

Parameter function：Offline learning load inertia ratio, the output torque of the motor compared to the percentage of motor rated torque.

The greater the set value, the greater the impact will be caused by the mechanical shock, but the identification time is shorter, please according to the appropriate value of the machine set.

P5-11	Speed bandwidth	Initail value	Unit	Communication Address
		60	Hz	250BH

Control Mode：P S

Range：1～1000

Data size：16bit

Display mode：Decimal system

Parameter function：Set the speed bandwidth of system

When P5-07=0，this function is invalid.

When P5-07=1、2, this parameter must be set when using the semi-automatic and automatic gain adjustment mode. The system can calculate the value of P5-00, P5-04, P5-05 related to position and speed regulator based on this parameter.

- 1～50Hz：Low rigidity, low response
- 51～250Hz：Medium rigidity, medium response
- 251～550Hz：High rigidity, high response

P5-12	PDFF control coefficient	Initail value	Unit	Communication Address
		100	%	250CH

Control Mode：P S

Range：0～100

Data size：16bit

Display mode：Decimal system

Parameter function：PDFF control coefficient=0, IP controller
PDFF control coefficient=100, PI controller
PDFF control coefficient=1~99, PDFF controller

When using the IP controller, the running motor speed will not overshoot, but the response will be slow.

When using the PI controller, the motor running speed will be overshoot, but the response is rapid.

PDFF controller integrated IP and PI controller, in order to obtain the effect of reducing overshoot and speed up the response of the system. The more parameter closes to 0, the stronger the IP function, and vice versa.

P5-13	Gain switching condition	Initail value	Unit	Communication Address
		0	-	250DH

Control Mode：P S

Range：0～18

Data size：16bit

Display mode：Decimal system

Parameter function：When P5-07=0, the gain adjustment mode is the manual mode, selecting the gain switching conditions.

When P5-07=1 and 2, the gain adjustment mode is semi-automatic and automatic mode, the function is invalid.

P5-13=0~9, for gain switching:

P5-13=0: turn off gain switching function.

P5-13=1: retention

P5-13=2: under position Mode Control, the position error is greater than the set value of the

parameter P5-16.

P5-13=3: the position command frequency is greater than the set value of the parameter P5-16.

P5-13=4: the servo motor rotation speed is greater than the value of parameter P5-16.

P5-13=5: retention

P5-13=6: under position Mode Control, the position error is less than the set value of the parameter P5-16.

P5-13=7: the position command frequency is less than the set value of the parameter P5-16.

P5-13=8: the servo motor rotating speed is less than the set value of the parameter P5-16.

P5-13=9: retention

P5-13=10~17 when switching for PI-P:

P5-13=10: retention

P5-13=11: under position Mode Control, the position error is greater than the set value of the parameter P5-16.

P5-13=12: the position command frequency is greater than the set value of the parameter P5-16.

P5-13=13: when the servo motor rotation speed is greater than the reference value of P5-16.

P5-13=14: retention

P5-13=15: position Mode Control, the position error is less than the set value of the parameter P5-16.

P5-13=16: the position command frequency is less than the set value of the parameter P5-16.

P5-13=17: when the servo motor rotating speed is less than the set value of the parameter P5-16.

P5-14	Gain switching time	Initail value	Unit	Communication Address
		5	ms	250EH

Control Mode：P S

Range：0～3000

Data size：16bit

Display mode：Decimal system

Parameter function：When the gain switching condition is satisfied, the gain is changed linearly to the target gain value during this time (0: close the function). Please refer to figure 7-20.

P5-15	Gain delay time	Initail value	Unit	Communication Address
		5	ms	250FH

Control Mode：P S

Range：0～3000

Data size：16bit

Display mode：Decimal system

Parameter function：When the gain switching condition is achieved, the switching condition must maintain the time set by the parameter then to start the switch, so as to avoid the error caused by the interference and other factors, the system isn't stable. Please refer to figure 7-20.

P5-16	Gain switching threshold	Initail value	Unit	Communication Address
		100	1puls 0.1Kpps 1rpm	2510H

Control Mode：P S

Range：0～32767

Data size：16bit

Display mode：Decimal system

Parameter function：Set gain switching threshold

- When the motor stops, switch to low gain to suppress vibration and sharp noise.
- When the motor stops, switch to high gain in order to increase the rigidity of servo.
- When the motor runs, switch to higher gain to obtain better instruction follow Performance and smaller position time.
- According to the operation of load equipment switch different gain in order to achieve optimal control.

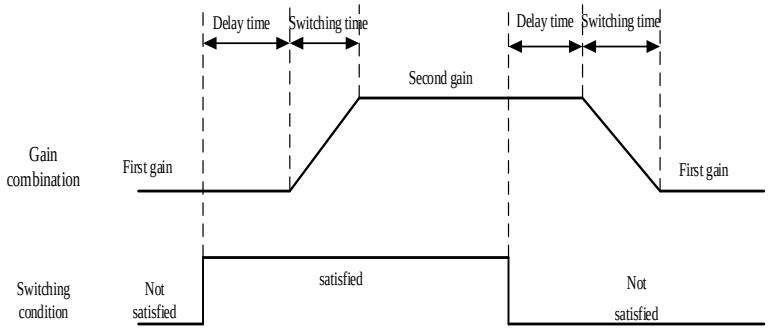


Figure7-20 Gain switching process

When the switching condition is satisfied, the gain is switched to second gain. If the switching condition is not satisfied during the second gain operation, the gain is switched to a first gain.

Switch condition change state must maintain the delay time setting by parameter P5-15 to be able to switch, so as not to switch by the interference. When switching, the current gain combination is in accordance with the setting time of the parameter P5-14, the linear smoothing gradient to the target gain combination, the various parameters of combination simultaneously changes, to avoid mechanical shock caused by sudden changes of parameters. Once the switch is started, even if the change status of the switch is changing again, the delay time can be recalculated after the switch is completed.

P5-17	Control loop coefficient	Initail value	Unit	Communication Address
		4	-	2511H

Control Mode：P S

Range：1～32

Data size：16bit

Display mode：Decimal system

Parameter function：Only in P5-07=1, 2, that is, gain adjustment mode is semi-automatic and automatic mode, this parameter is effective. So as to determine the relationship between speed bandwidth and position bandwidth .

Speed bandwidth= Position bandwidth*P5-17

There is no parameters about position bandwidth can be set. The parameters control based on the theory of automatic control that the speed loop bandwidth should be at least 4 times than the position loop bandwidth. Generally do not adjust, especially not a small adjustment.

P5-19	Low frequency rigidity coefficient	Initail value	Unit	Communication Address
		1.0	-	2513H

Control Mode：P S

Range：0.5～4.0

Data size：16bit

Display mode：Decimal system

Parameter function：Only in P5-07=1, 2, gain adjustment mode is semi-automatic and automatic mode, this parameter is effective. It used to set the rigidity of the speed loop at low frequency, that is the integral time constant of the speed regulator at low frequency. It's meaning is：

P5-20	External disturbance resistance gain	Initail value	Unit	Communication Address
		0.0	%	2514H

Control Mode：P S

Range：-100.0～100.0

Data size：16bit

Display mode：Decimal system

Parameter function ： External disturbance compensation after disturbance observation

It used to reduce the speed change of load disturbance. Its meaning is:

Compensated torque = Compensating torque + Observed disturbance quantity **P5-20*

After the disappearance of the observed disturbance, the torque will be cancelled immediately.

7.7 P6-xx Input and output(DI/DO)parameter

P6-00	DI Filter settings	Initail value	Unit	Communication Address
		2	ms	2600H

Control Mode：P S T

Range：0～20

Data size：16bit

Display mode：Decimal system

Parameter function：Set the filter time of the DI terminal, stop setting after motor stops, take effect immediately.

When there is a strong external interference, in order to prevent external interference, you can set the filter time for the DI terminal. Its meaning is that the signal of the DI terminal must maintain the time more than the P6-00 setting time and will be recognized as the valid signal by drive. For example, P6-00 is set to 2, the signal of the DI terminal must maintain the 2ms will be recognized as effective by drive.

P6-01	DI Level logic	Initail value	Unit	Communication Address
		00000000	-	2601H

Control Mode：P S T
Range：00000000～11111111
Data size：16bit
Display mode：Binary system
Parameter function：Set the level logic of each DI terminal, stop setting after motor stops and re-power effective.

0 0 0 0 0 0 0 0
DI8 DI7 DI6 DI5 DI4 DI3 DI2 DI1

8 loads way DI can be set, for a certain, bit=0, the external input low effective; if bit=1, then the external input high effective.

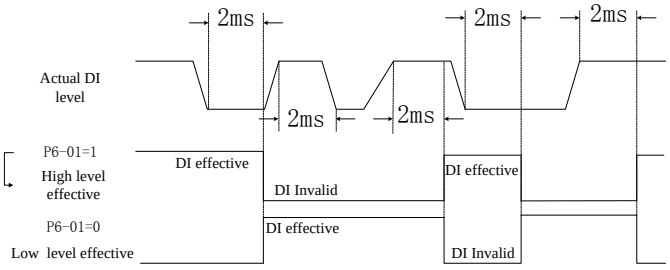
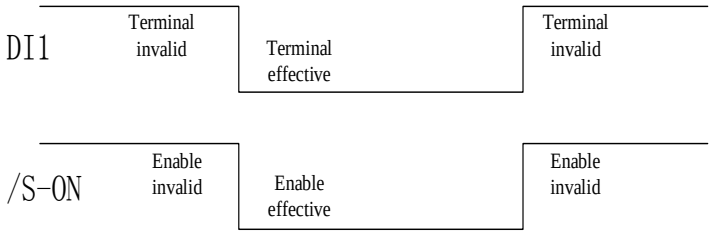


Figure7-21 DI Terminal filter and level

P6-02	DI1 function code	Initail value	Unit	Communication Address
		1	-	2602H
P6-03	DI2 function code	Initail value	Unit	Communication Address
		2	-	2603H
P6-04	DI3 function code	Initail value	Unit	Communication Address
		3	-	2604H
P6-05	DI4 function code	Initail value	Unit	Communication Address
		4	-	2605H
P6-06	DI5 function code	Initail value	Unit	Communication Address
		5	-	2606H
P6-07	DI6 function code	Initail value	Unit	Communication Address
		6	-	2607H
P6-08	DI7 function code	Initail value	Unit	Communication Address
		7	-	2608H
P6-09	DI8 function code	Initail value	Unit	Communication Address
		8	-	2609H

Control Mode：P S T
Range：0～99
Data size：16bit
Display mode：Decimal system
Parameter function：Set the function of the DI1~DI8 terminal, refer to table 7-5. Stop setting after motor stops and re-power effective.
External 8 DI corresponding function settings, can be set to a range of 0~99, but the current part of the retention items.

- As any DI to set the function code, the corresponding DI is valid, the selected event occurs. Such as P6-02=1, the DI1 is set to serve as the



enable function, when the DI1 is valid, the servo S-ON.

- The different DI can be set to the same function, the corresponding logical relations is “and”, that when the D1&amp effective, the corresponding function of the event will occur. Such as P6-03=1, P6-02=1, DI1 and DI2 at the same time effective, servo ON; when there is an invalid, servo OFF.

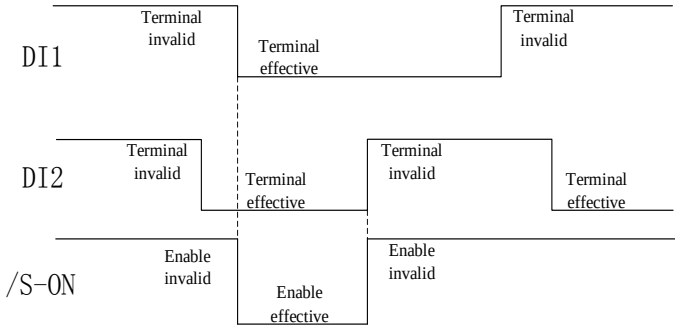


Table7-5 Digital input (DI) function definition table

Setting	Name	Function	Description	Trigger mode	Operation mode
0	Disabled	Terminal invalid			
1	S-ON	Servo enable	ON- servo motor power on enable OFF- servo motor enable disabled	Level triggered	P S T
2	ALM-RST	Alarm reset signal	ON- in the case of abnormal conditions has been lifted, reset the fault and alarm can be reset.	Edge Trigger	P S T
3	P-CLR	Position control pulse deviation counter clear	Trigger mode refer to P1-34 definition	Edge/ Level Trigger	P
4	DIR-SEL	Speed instruction direction selection	OFF- default command direction ON- directive reverse direction	Level triggered	S
5	CMD0	Internal instruction bit0	In position mode control, the signal is a position multi-segment switching function; In speed mode control, the signal is the speed multi-segment switching function	Level triggered	P S
6	CMD1	Internal instruction bit1		Level triggered	P S
7	CMD2	Internal instruction bit2		Level triggered	P S
8	CMD3	Internal instruction bit3		Level triggered	P S
9	CTRG	Internal instruction trigger	Multi position trigger condition	Edge Trigger	P
10	MSEL	Control Mode switching	Used to mixed Mode Control switching	Level triggered	P S T
11	ZCLAMP	Analog speed command Enable fixed zero	OON- zero fixed function enable OOFF- zero fixed function ban	Level triggered	S
12	INHIBIT	Pulse inhibit	ON- prohibit instruction pulse input OFF-allow instruction pulse	Level triggered	P

Setting	Name	Function	Description	Trigger mode	Operation mode
			input		
13	P-OT	Forward driving ban	OFF- prohibit forward drive ON-allow forward drive	Level triggered	P S T
14	N-OT	Prohibit reverse drive	OFF- prohibit reverse drive ON- allow reverse drive	Level triggered	P S T
15/16	Retention	Function invalid			
17	OGCMD+	Positive jog	ON- input in accordance with instructions given OFF- run command stop input	Level triggered	S
18	OGCMD-	Negative jog	ON- reverse input in accordance with a given instruction OFF- run command stop input	Level triggered	S
19	TDIR-SEL	Torque instruction direction selection	OFF- default orientation ON- instruction Reverse	Level triggered	T
20	GNUM0	Electronic Gear Ratio numerator choose 0	GNUM1 / GNUM0 / code 0 / 0 / P1-27 0 / 1 / P1-29 1 / 0 / P1-30 1 / 1 / P1-31	Level triggered	P
21	GNUM1	Electronic Gear Ratio numerator choose 1		Level triggered	P
22	ORGP	External detector input	Rising edge: the external detector is effective Falling edge: the external detector is not valid	Edge Trigger	P S T
23	SHOM	Origin regression	ON：Start origin regression function	Level triggered	P S T
24-99	Retention	Function invalid			

P6-12	DO level logic	Initail value	Unit	Communication Address
		0000	-	260CH

Control Mode：P S T
Range：0000～1111
Data size：16bit
Display mode：Binary system
Parameter function：Set the logic of the 4 DO output terminal. Stop setting after motor stops and re-power effective.

0 0 0 0
DO4 DO3 DO2 DO1

0: The bit corresponds to DO terminal active low, set low when the event is active, maintain a high level invalid.
1: The bit corresponds to DO terminal active high, set high when the event is active, maintain a low level invalid.

P6-13	DO1 function code	Initail value	Unit	Communication Address
		1	-	260DH
P6-14	DO2 function code	Initail value	Unit	Communication Address
		2	-	260EH
P6-15	DO3 function code	Initail value	Unit	Communication Address
		8	-	260FH
P6-16	DO4 function code	Initail value	Unit	Communication Address
		12	-	2610H

Control Mode：P S T
Range：0～99
Data size：16bit
Display mode：Decimal system
Parameter function：Set the event that corresponds to each DO, see table 7-6. shutdown settings, re - power up.When the event occurs, it is set to be the output of the DO terminal for the event. If the P6-13=1 is ready, the DO1 terminal outputs a low level (P6-12 bit =0).

Table7-6 Digital output (DO) function definition table

Setting value	Name	Function	Description	Operation mode
0	Disable	Terminal invalid		
1	S-RDY+-	SRDY	Valid-SRDY, can receive S-ON instructions Invalid-SRDY, cannot receive S-ON instructions	P S T
2	BK+-	Brake control	Valid-release brake Invalid-close brake	P S T
3	TGON+-	Motor rotation	Valid-motor keep rotating Invalid-motor stop rotating	P S T
4	ZER0+-	Motor zero speed	Valid-motor speed is zero Invalid-motor speed is not zero	P S T
5	V-CLS+-	Speed approach	Valid：when speed control, | motor actual speed-speed instruction |<P1-42 setting	S
6	V-CMP+-	Speed reach	Valid：when speed control, | motor actual speed-speed instruction |<P1-43 setting	S
7	PNEAR+-	Position approach	Valid：when position control mode，positional deviation pulses< positioning close to width P1-32 setting	P
8	COIN+-	Position reach	Valid：when position control mode，positional deviation pulses< positioning close to width P1-33 setting	P
9	C-LT+-	TLML	Valid-motor torque is limited Invalid-motor torque is unlimited	P S
10	V-LT+-	Speed limited signal	Valid-motor speed is limited Invalid-motor speed is unlimited	T
11	WARN+-	Warning output	Valid：warning event Invalid：no warming event	P S T
12	ALM+-	Fault output	Valid：fault event Invalid：no fault event	P S T
13	Tcmp+-	Torque reach signal	Valid：motor output torque reach fixed value Invalid：motor output torque can not reach fixed value	T
14	Home+-	ZRN signal	Valid：ZRN signal complete Invalid：ZRN signal can not complete	P S T

P6-19	**AI1 Offset adjustment**	**Initail value**	**Unit**	**Communication Address**
		0	**mV**	**2613H**
P6-20	**AI2 Offset adjustment**	**Initail value**	**Unit**	**Communication Address**
		0	**mV**	**2614H**

Control Mode：P S T

Range：-1000～1000

Data size：16bit

Display mode：Decimal system

Parameter function：Because of the circuit, the voltage will have a certain deviation, such as when the external given to 0V, the system may be collected the voltage 200mv. At this time can be corrected by this parameter, similar to the mechanical zero adjustment function.

If the AI1, AI2 given 0V to collect the XmV voltage, then set the P6-19/20 to X, you can eliminate the deviation.

P6-22	**AI1 Filtering time**	**Initail value**	**Unit**	**Communication Address**
		2	**ms**	**2616H**
P6-23	**AI2 Filtering time**	**Initail value**	**Unit**	**Communication Address**
		2	**ms**	**2617H**

Control Mode：P S T

Range：0～1000

Data size：16bit

Display mode：Decimal system

Parameter function：About analog value through the AI1, AI2 input is adopted the first order low-pass filter. It can reduce the external electromagnetic interference caused by analog fluctuations. But the system response to slowly due to setting too large,.

P6-25	AO1 Offset adjustment	Initail value	Unit	Communication Address
		0	mV	2619H
P6-26	AO2 Offset adjustment	Initail value	Unit	Communication Address
		0	mV	261AH

Control Mode：P S T
Range：0～1000
Data size：16bit
Display mode：Decimal system
Parameter function：The EA100 servo has two analog output channels, which is convenient for the user to monitor the running state of the servo system by the way of receiving the analog quantity. When the output voltage is DC offset, the DC offset can be adjusted by adjusting the parameters.
If AO1, AO2 in the output should be 0V, the actual output of the detected DC voltage is XmV, then set the P6-25/26 to X, then can eliminate bias.

P6-27	AO1 Functional Planning	Initail value	Unit	Communication Address
		0	-	261BH
P6-28	AO2 Functional Planning	Initail value	Unit	Communication Address
		1	-	261CH

Control Mode：P S T
Range：0～4
Data size：16bit
Display mode：Decimal system
Parameter function：set the meaning of AO terminal output
P6-27/28= 0：motor speed；
P6-27/28= 1：speed instruction；
P6-27/28= 2：torque instruction；
P6-27/28= 3：positional deviation (after electronic gear ratio calculation)；
P6-27/28= 4：the speed of instruction under position mode；
When the output of the AO terminal is 10V, it indicates that the value which represents reaches the maximum value.

7.8 P7-xx Communication parameters

P7-00	Local station number setting	Initail value	Unit	Communication Address
		1	-	2700H

Control Mode：P S T
Range：0～254
Data size：16bit
Display mode：Decimal system
Parameter function：This machine is as the address from the station.

P7-01	Baud rate	Initail value	Unit	Communication Address
		1	bps	2701H

Control Mode：P S T
Range：0～4
Data size：16bit
Display mode：Decimal system
Parameter function：Set the baud rate
P7-01=0：4800；
P7-01=1：9600；
P7-02=2：19200；
P7-03=3：38400；
P7-04=4：57600；

P7-02	Communication data format	Initail value	Unit	Communication Address
		0	-	2702H

Control Mode：P S T
Range：0～5
Data size：16bit
Display mode：Decimal system
Parameter function：Set the communication data format

P7-02=0：No parity 1+8+N+1；
P7-02=1：Odd parity check 1+8+O+1；
P7-02=2：even-parity check 1+8+E+1；
P7-02=3：No parity 1+8+N+2；
P7-02=4：Odd parity check 1+8+O+2；
P7-02=5：Odd parity check 1+8+E+2；

7.9 P8-xx Auxiliary check even-parity function parameters

P8-00	Software Reset	Initail value	Unit	Communication Address
		0	-	2800H

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：Software Reset，all the values of the function parameters will be returned to the set value. Effect is equivalent to power off reset.
P8-00=0：No operation
P8-00=1：System software reset, executed once

P8-01	Fault Reset	Initail value	Unit	Communication Address
		0	-	2801H

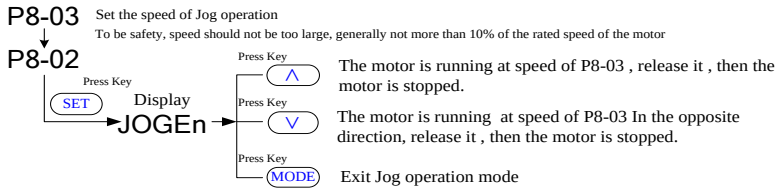
Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：Reset driver alarm and fault
P8-01=0：No operation
P8-01=1：Alarm and fault reset, automatic reset after completion. If the fault cannot reset, this function is invalid.

P8-02	Dynamic function	Initail value	Unit	Communication Address
		0	-	2802H

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：More are available at P8-03Parameter function

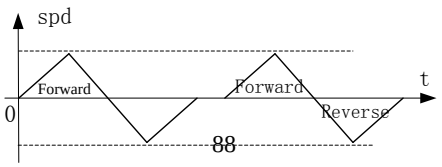
P8-03	Jog Speed	Initail value	Unit	Communication Address
		0	rpm	2803H

Control Mode：P S T
Range：0～motor rated speed
Data size：16bit
Display mode：Decimal system
Parameter function：Set the drive to receive the running speed of the motor when it is running.
In order to avoid the system run directly uncontrollable incidents caused by loss, after the initial installation of the system or replacement device, it is recommended with a dynamic function test run. Move the operation process are as follows:



P8-04	Off-line inertia identification	Initail value	Unit	Communication Address
		0	-	2804H

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：Triangle wave



injection method is used to study the load

inertia, and the results are written to P5-08. Turn on the function , the motor will be set according to the torque of the P5-09 size, rotate four times, after the success of the study, the results of the identification to write P5-08.

NOTE：Please make sure that the motor rotation range in the range of equipment available, otherwise it is possible to damage the equipment.

P8-05	Internal servo enable instruction	Initail value	Unit	Communication Address
		0	-	2805H

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：Internal servo enable
P8-05=0：no function
P8-05=1：servo enable S-ON, automatic reset after power up

P8-07	Default monitoring item selection	Initail value	Unit	Communication Address
		0	-	2807H

Control Mode：P S T
Range：0～30
Data size：16bit
Display mode：Decimal system
Parameter function：Select the item which monitors on the LED that servo driver default on. Specific items see table 7-7

Table7-7 Servo drive default monitoring project

Setting Value	Monitoring Items		Setting Value	Monitoring Items	
0	P0-00	Motor speed	15	P0-15	IGBT Module temperature
1	P0-01	Motor load rate	16	P0-16	Total external pulse
2	P0-02	Current electric degree	18	P0-18	P1-60 Selection fault code
3	P0-03	DI Input level(Binary)	19	P0-19	P160 Speed of fault
4	P0-04	DO Output level(Binary)	20		
5	P0-05	Multi-turn encoder positional value(only for absolute encoder)	21	Retention	
6	P0-06	System total running time	22		
8	P0-08	AI1 Voltage value	24	P0-24	Encoder single ring position value low 4 bit(only for absolute encode)
9	P0-09	AI2 Voltage value	25	P0-25	Encoder single ring position value high 5 bit(only for absolute encode)
10	P0-10	Encoder sector number(only for Incremental encoder)	26	P0-26	Current load total inertia-continuous detection
11	P0-11	Busbar voltage	27	P0-27	Current load inertia ratio-continuous detection
12	P0-12	Current effective value	28	P0-28	Total feedback pulse
13	P0-13	Servo drivers current state	30	P0-30	Received external pulse frequency
14	P0-14	Brake load rate			

P8-11	Fan control selection	Initail value	Unit	Communication Address
		0	-	280BH

Control Mode：P S T
Range：0～1
Data size：16bit
Display mode：Decimal system
Parameter function：Control the operation of the drive fan
P8-11=0: the drive cooling when servo enable, fan run
P8-11=1: after the power dissipation, the fan is running

P8-12	Driver overload warning threshold	Initail value	Unit	Communication Address
		80	%	280CH

Control Mode：P S T
Range：20～100

Data size：16bit

Display mode：Decimal system

Parameter function：Set the alarm threshold for the overload of the driver, the reference is the rated current of the servo motor.

The driver has overload protection function, in accordance with the driver rated current 110% to generate the overload curve, but this situation will be directly into the fault state. This parameter can be set to drive overload alarm threshold, once the driver is detected overload is greater than the set value, that is, a driver overload warning ALE04, but will not stop running.

P8-13	Motor overload warning settings	Initail value	Unit	Communication Address
		80	%	280DH

Control Mode：P S T

Range：20～100

Data size：16bit

Display mode：Decimal system

Parameter function：Setting the alarm threshold for the overload of the servo motor, the reference is the rated current of the servo motor.

Motor overload protection function, according to 120% of the servo motor rated current began to generate overload curve, but this situation will be directly into the fault state. This parameter can set the motor overload alarm threshold, once detected motor overload is greater than the set value, that is, the motor overload warning ALE03, but will not stop running.

P8-14	S-ON condition selection of each parking mode	Initail value	Unit	Communication Address
		0	-	280EH

Control Mode：P S T

Range：0～1

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P8-17 Parameter function explanation

P8-15	S-ON condition	Initail value	Unit	Communication Address
		3	-	280FH

Control Mode：P S T

Range：0～3

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P8-17 Parameter function explanation

P8-16	After the S-OFF S-ON effective required interval	Initail value	Unit	Communication Address
		5.00	S	2810H

Control Mode：P S T

Range：0.01～300.00

Data size：16bit

Display mode：Decimal system

Parameter function：More are available at P8-17 Parameter function explanation

P8-17	S-ON effective speed setting	Initail value	Unit	Communication Address
		20	rpm	2811H

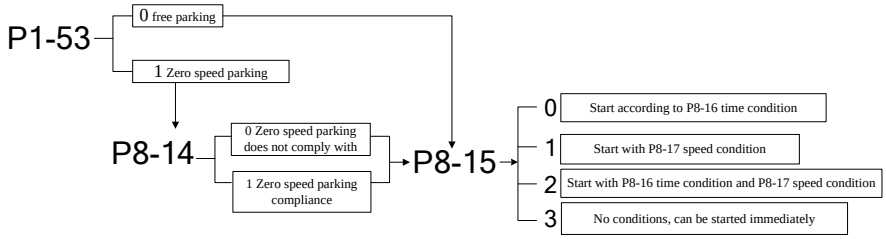
Control Mode：P S T

Range：20～motor rated speed

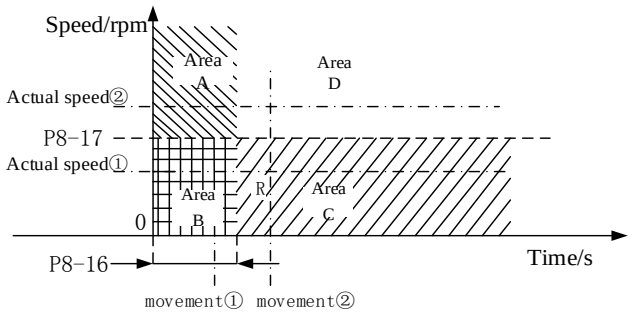
Data size：16bit

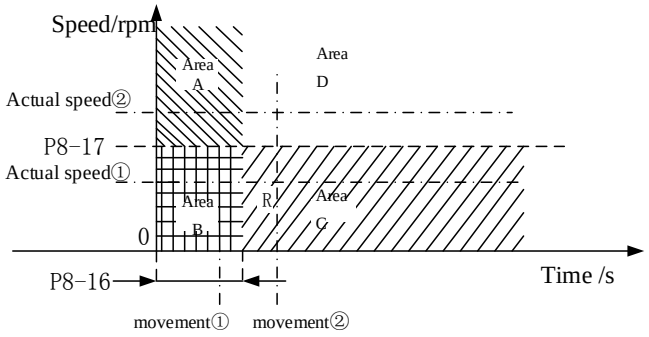
Display mode：Decimal system

Parameter function：After the S-OFF setting S-ON condition, first setting the parking mode (P1-53), and then select whether to set S-ON condition on zero speed parking (P8-14, free parking must comply with S-ON condition), last set S- ON condition. When setting these conditions we must shut down, and effect immediately.



As shown following, different settings, S-ON region is not the same, different settings in P8-15:





P8-15=0	Only in C and D regional S-ON is legal, that is,the time interval is greater than P8-16, such as time ②, the figure in time ①can not be S-ON successful.
P8-15=1	Only in B and C regional S-ON is legal, that is, the actual speed reduced to less than P8-17, such as the actual speed ①, the figure in speed②can not be S-ON successful.
P8-15=2	Only in C regional S-ON Is legal, that is ,not only time intervals is greater than P8-16,but also the actual speed should be less than P8-17, at the same time can be S-ON successful,such as R point.

P8-18	**Braking resistance setting**	**Initail value**	**Unit**	**Communication Address**
		50(different models)	**Ω**	**2812H**

Control Mode：P S T
Range：10~750
Data size：16bit
Display mode：Decimal system
Parameter function：Setting the braking resistor, when using the built-in braking resistor please do not modify.

P8-19	**Braking resistor power setting**	**Initail value**	**Unit**	**Communication Address**
		100	**W**	**2813H**

Control Mode：P S T
Range：30~3000
Data size：16bit
Display mode：Decimal system
Parameter function：Setting the braking resistor power, when using the built-in braking resistor please do not modify.

P8-20	**Brake discharge duty ratio**	**Initail value**	**Unit**	**Communication Address**
		50	**-**	**2814H**

Control Mode：P S T
Range：0~100
Data size：16bit
Display mode：Decimal system
Parameter function：when braking, duty ratio of opening brake pipe
When P8-20 is set to 100, duty ratio is 100% , that is , during braking the brake pipe fully opens;
When P8-20 is set to 0, duty ratio is 0%, that is, during braking the brake pipe is completely closed.
When P8-20 is set to 0, duty ratio is 0%, that is, during braking the brake pipe is completely closed.

7.9 Pb-xx the origin of regression function parameters

Pb-00	**alarm time of failure back to zero**	**Initail**	**Unit**	**Communicatio**

		value		n Address
		0	ms	2B00H

Control Mode：P S T

Range：0~65535

Data size：16bit

Display mode：Decimal system

Parameter function: When receive the instruction of the origin of regression , if in this parameter's setting time,it fails to locate the origin,then the drive appears AL01C and alarm, ALM terminal will act.

This parameter is set to 0, close monitoring of the origin of regression, and it is not alarm even the origin of regression fails.

Note: It is recommended to set Pb-00 to a appropriate time, and avoid false alarms when performing a long time.

	Origin triggered start mode: 0: Disable origin of regression function 1: The servo can enable automatic execution after origin of regression 2: from SHOM function terminal (function 23) triggered the original Point return.	Initail value	Unit	Communicatio n Address
Pb-01		0	-	2B01H

Control Mode：P S T

Range：0~2

Data size：16bit

Display mode：Decimal system

Parameter function：Choose Start mode of origin of regression function

Pb-01=0：Do not use of origin of regression function.

Pb-01=1：Servo drive when power is first, once the servo enable (S-ON), automatically and immediately homing.

Pb-01=2：That being defined as SHOM of origin of regression make DI terminal (function 23) can be effective when immediately Start homing. Even when the SHOM unfinished terminal is invalid, we can not suspend the execution of the of origin of regression.

Note: SHOM terminals are level triggered. If the origin of return is completed at the terminal is still valid, it will perform the origin of regression again.

	Move a short distance to reach the origin of ways: 0: after finding the origin point Reference, the motor folded in 2nd speed to find the nearest degree Z-phase pulse as the mechanical origin. 1: after find reference point, the motor continues to move in the same direction in 2nd speed to find the nearest Z-phase pulse as Mechanical origin. 2: According to Pb-03 settings.	Initail value	Unit	Communicatio n Address
Pb-02		0	-	2B02H

Control Mode：P S T

Range：0~2

Data size：16bit

Display mode：Decimal system

Parameter function：**Setting short distance moves when arriving near the origin:**

Pb-02=0：**after finding the origin point Reference, the motor folded in 2nd speed to find the nearest degree Z-phase pulse as the mechanical origin.**

Pb-02=1：**after find reference point, the motor continues to move in the same direction in 2nd speed to find the nearest Z-phase pulse as Mechanical origin.**

Pb-02=2：**According to Pb-03 settings.**

When Pb-03=0 or 1, the forward reverse limit CCWL (prohibit the positive driver of the terminal P-OT, function number 13) or CWL (prohibit reverse drive terminal N-OT, function number 14) immediate deceleration stop.

If Pb-03=2 or 3, find the rising edge of the detector ORGP as a mechanical origin.

If Pb-03=4 or 5, find the first Z pulse rising edge as the mechanical origin.

	origin detector type and Looking direction setting: 0: Forward direction to fing the origin point, and with P-OT signal Input point as a rough reference point of origin. 1: Reverse direction to find the origin point, and with N-OT signal Input point as a rough reference point of origin. 2: Forward direction to fing the origin point,, and terminal ORGP signal (function 22) as the origin point of reference. 3: Reverse direction to fing the origin point,,	Initail value	Unit	Communicatio n Address
Pb-03		0	-	2B03H

	and terminal ORGP signal (function 22) as the origin point of reference. 4: Forward direction to directly find origin of Z-phase pulse 5: Reverse direction to directly find origin of Z-phase pulse			

Control Mode：P S T

Range：0~5

Data size：16bit

Display mode：Decimal system

Parameter function：**Setting origin detector type and looking direction:**

Pb-03=0：Forward direction looking for the origin, and make the CCWL limit point of input (prohibit the forward drive terminal P-OT, function number 13) as the origin of the rough reference point. When the completion of the origin location, CCWL is converted to prohibit forward drive function, and then the re-trigger will produce limit warning. When this method is used, the limit input point as the origin of the rough reference point, it is recommended to set the return to find the Z pulse (Pb-02=0) as a precision machine origin.

Pb-03=1：Reverse direction looking for the origin, and make the CWL limit point of input (prohibit reverse drive terminal S-OT, function number 14) as the origin of the rough reference point. After the completion of the origin positioning, CWL is turned to prohibit the reverse function, and then the trigger will produce a limit warning. When using this method, the limit input point as the origin of the rough reference point, it is recommended to set the return to find the Z pulse (Pb-02=0) as a precise mechanical origin.

Pb-03=2：Forward direction looking for the origin, and make ORGP (input point of external detector, DI function number 22) as reference point of the origin. At this time, the exact mechanical origin can be set to return to search (Pb-02=0) or not to return to find (Pb-02=1) Z phase pulse. When the Z phase pulse is not used as the mechanical origin, the positive edge of ORGP can be set to the mechanical origin (Pb-02=2).

Pb-03=3：Reverse direction to find the origin, and make ORGP (external detector input point, DI function number 22) as reference point of the origin. At this time the exact mechanical origin can be set to return to search (Pb-02=0) or not to return to find (Pb-02=1) Z phase pulse. When the Z phase pulse is not used as the mechanical origin, the positive edge of ORGP can be set to the mechanical origin (Pb-02=2).

Pb-03=4：Forward direction direct search for the rising edge of the Z phase pulse as the origin, this approach is usually used for the load for the occasion of rotary motion, at this time can't externally connected any detecting switch.

Pb-03=5：Reverse direction direct search for the rising edge of the Z phase pulse as the origin, this approach is usually used for the load for the occasion of rotary motion, at this time can't externally connected any detecting switch.

Pb-04	**back to zero the first high speed setting**	**Initail value**	**Unit**	**Communication Address**
		500	**rpm**	**2B04H**

Control Mode：P S T

Range：0~3000

Data size：16bit

Display mode：Decimal system

Parameter function：when implement the origin of regression function, the motor speed before reaching the reference point .

Pb-05	**back to zero the second low speed setting**	**Initail value**	**Unit**	**Communication Address**
		50	**rpm**	**2B05H**

Control Mode：P S T

Range：0~1000

Data size：16bit

Display mode：Decimal system

Parameter function: when implement the origin of regression function, after reaching the reference point, the motor speed of final positioning to the origin point.

This rate should not be set too high, orwhen the load inertia is large ,it may occur overshoot.

Pb-06	**High 5 position of the origin of regression Offset Pulse Number**	**Initail value**	**Unit**	**Communication Address**
		0	**rev**	**2B06H**
Pb-07	**Low 4 position of the origin of regression Offset Pulse Number**	**Initail value**	**Unit**	**Communication Address**
		0	**ppr**	**2B07H**

Control Mode：P S T

Range：Pb-06：-30000～+30000；Pb-07：-9999~+9999

Data size：16bit

Display mode：Decimal system

Parameter function：when implement the origin of regression function, If you want the motor's stop position and the reference point have pulses offset, the Pb-06 and Pb-07 set the offset:

The formula is : offset **=10000* Pb-06 +Pb-07**

Be sure to pay attention to the calculation, Pb-06 and Pb-07 were signed.

example：

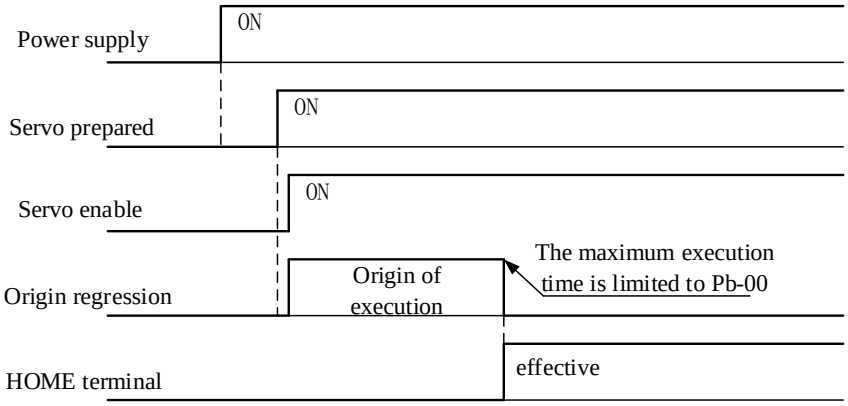
- When Pb-06 is 612，Pb-07 is 0302，then the setting offset is +6120302。
- When Pb-06 is -2，Pb-07 is 0000，then the setting offset is-20000。
- When b-06 is 13，Pb-07 is 1050，then the setting offset is+131050。

- When Pb-06 is 13，Pb-07 is -1050，then the setting offset is+128950。
- When Pb-06 is -13，Pb-07 is -1050，then the setting offset is-131050。
- When Pb-06 is -13，Pb-07 is 1050，then the setting offset is-128950。

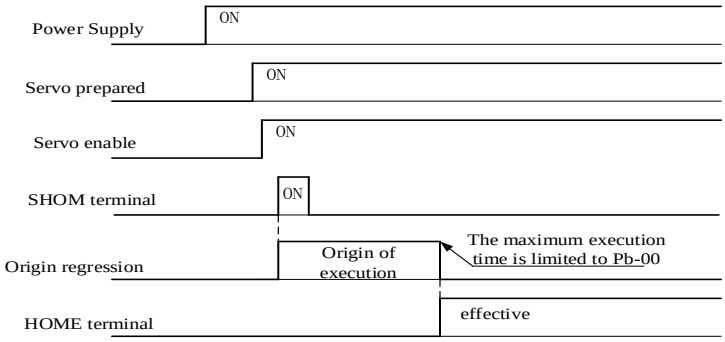
Pb-08	Whether to clear the position deviation after the origin of regression is completed	Initail value	Unit	Communication Address
		0	-	2B08H

Control Mode：P S T
Range：0~1
Data size：16bit
Display mode：Decimal system
Parameter function：Whether to clear the position deviation after the origin of regression is completed
Pb-08=0：No clear position deviation.
Pb-08=1: clear position deviation.

Origin regression time sequence diagram：
（a）： The origin regression to trigger the start mode time sequence diagram
1: On power, servo enable after the automatic implementation of the origin regression (Pb-01=1)

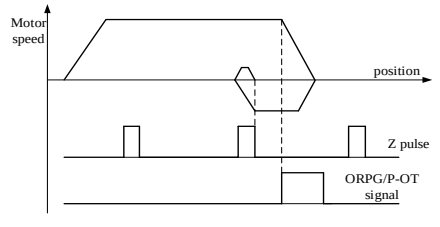
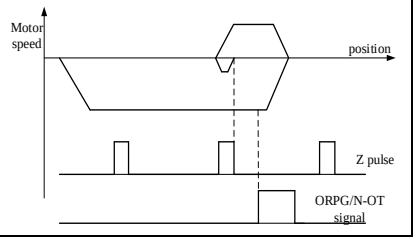


2: The origin regression (Pb-01=2) is triggered by the SHOM functional terminal (function number 23).

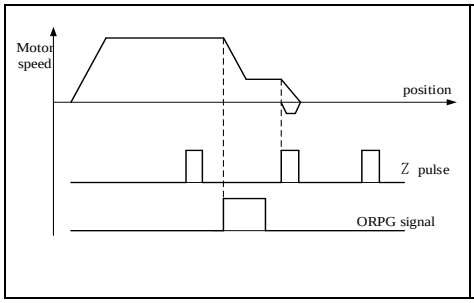


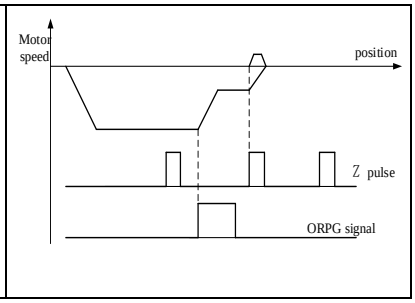
After the completion of the origin of the return, is defined as the HOME (function number 14) of the output terminal that is the output of the effective signal. If the origin of the regression process, cancel the servo enable or alarm, the regression function will be suspended and the HOME terminal does not output effective signal.

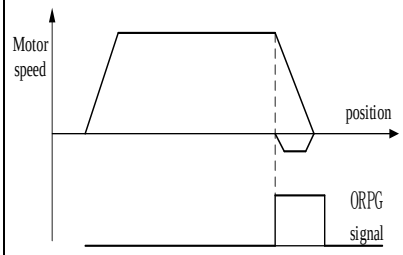
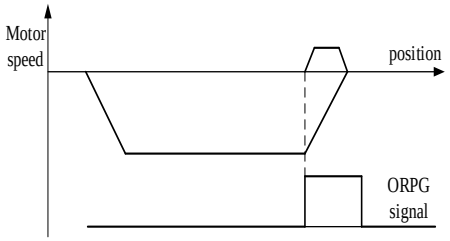
（b）：Speed displacement time sequence diagram of origin regression

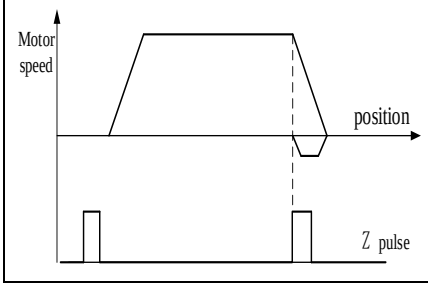
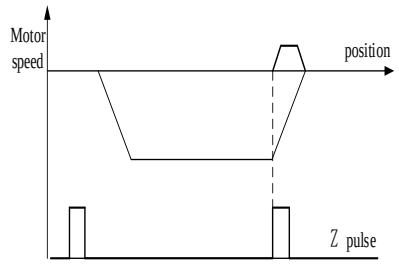
1: Pb-02=0，Pb-03=0 or 2	2: Pb-02=0，Pb-03=1 or 3
	

3: Pb-02=1，Pb-03=2	4: Pb-02=1，Pb-03=3





5: Pb-02=2，Pb-03=2	6: Pb-02=2，Pb-03=3
	

7: Pb-02=2，Pb-03=4	8: Pb-02=2，Pb-03=5
	

8 Communications protocol

8.1 Application Scope

- Applicable series: EA100
- Applicable network: Support Modbus protocol, RTU format, RS485 bus.

The typical RTU message frame format:

Start Bit	Device Address	Function Code	Data	CRC	Stop Bit
T1-T2-T3-T4	8Bit	8Bit	n*8Bit	16Bit	T1-T2-T3-T4

8.2 Physical interface

- RS485 asynchronous half duplex communication mode
- RS485 terminal default data format：1-8-N-1, baud rate：9600bps
- Data format: 1-8-N-1/2, 1-8-O-1/2, 1-8-E-1/2, baud rate 4800bps, 9600bps, 19200bps, 38400bps, 57600bps optional, can be set by the function code P7-01 and P7-02

8.3 Protocol format

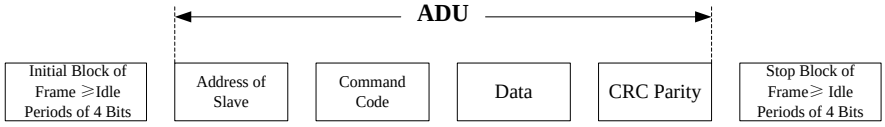


Figure 1 protocol format

The parity in ADU (Application Data Unit) is obtained via the CRC16 parity of the 1st three parts of ADU and switching the low bytes and high bytes. Low bytes of CRC parity go first, and high bytes of it follow in the protocol format.

8.4 Command interpretation

Command code 0x03: Read parameter and status of servo drive.

ADU Item	Byte No.	Range
Master requests:		
Address of slave	1	0-0FEH
Command code	1	0x03
Register start address	2	0x0000-0x0FFFF
Register number	2	0x0000-0x0008
CRC parity(Low bytes go first)	2	
Slave responds：		
Address of slave	1	Servo drive address
Command code	1	0x03
Byte length	1	2* Register number
Register data	2* Register number	
CRC parity	2	

Command code 0x06: write servo drive single function code or control parameters

ADU Item	Byte No.	Range
Master requests:		
Address of slave	1	0-0FEH
Command code	1	0x06
Byte length	2	0x0000-0x0FFFF
Register data	2	0x0000-0x0FFFF
CRC parity	2	
Slave responds：		
Address of slave	1	Local address
Command code	1	0x06
Read bytes	2	0x0000-0x0FFFF
Register data	2	0x0000-0x0FFFF
CRC parity	2	

Command code 0x10: rewrite the servo drive multiple function code or control parameters

ADU Item	Byte No.	Range
Host send request：		
Address of slave	1	0-0FEH
Command code	1	0x10
Register start address	2	0x0000-0x0FFFF
Register number	2	0x0000-0x0008
Byte length of register data	1	2* Register number
Register data	2* Register number	

CRC parity	2	
Slave responds：		
Slave address	1	Local address
command code	1	0x10
Read bytes	2	0x0000-0x0FFFF
Register data	2	0x0000-0x0008
CRC parity	2	

Command code 0x08: line diagnostics and settings

ADU Item	Byte No.	Range
Master requests:		
Address of slave	1	0-0FEH
Command code	1	0x08
Sub function code	2	0x0000-0x0FFFF
data	2	
CRC parity	2	
Slave responds：		
Address of slave	1	Local address
Command code	1	0x08
Sub function code	2	0x0000-0x0FFFF
data	2	
CRC parity	2	

Note: the 0x08 command code is only used to check whether the line is connected.

8.5 Protocol Format Description

Address code

Servo drives slave address. The Setting range: 1-247.

Function code

Function code	Function describe
03H	Read parameters and status byte of servo drive
06H	Write single function code or control parameter of servo drive
10H	Write several function codes or control parameters of servo drive
08H	Circuit diagnosis and setting

Allocation of Register Addresses

Name	Address Space	Description
Function Code	0000H-0FxxH	High byte is function code group number, and high byte address corresponding to P0-PF is 00H-0FH. And low byte is group internal function code number. For example: P3-00 corresponds to the address of 0300H.
	2000H-2FxxH	If you want to save the modified parameters, which means to modify the contents of the EEPROM, adding 2000H to functional code address is OK. For example: P3-00 corresponds to the address of 2300H

Remark

*: Some function parameters have two communication addresses, such as P1-00 have two communication addresses: 0100H and 2100H. Beginning with address 0, it indicates that this parameter written to the RAM register of the drive, and can be executed immediately, but will not be saved; Beginning with address 2, it indicates that this parameter written to the EEPROM of drive, can be executed immediately and saved;

*: If you require to frequently rewrite parameters frequently to EEPROM, due to the limit of writing cycles of EEPROM, EEPROM may be damaged. Therefore, for parameters which need to be frequently rewritten via communication, please use RAM address, whose starting address is 0. For example, in speed mode, when it need to transfer speed command in real time via the communication, the written address of speed command must use 0300H, not 2300H.

*: For the parameters whose RAM register addresses are not listed, when using the address starting with 0, the data will be received but will not be executed and saved. When these parameters using EEPROM address, the data will be saved, but whether executed immediately depend on parameter attributes.

CRC Parity

Sending equipment calculates CRC parity value first, and then attaches it to the sending message. Upon receipt of the message, receiving equipment will calculate CRC parity value again, and compare the operation result with received CRC parity value. If the two values are different, it indicates that there is error during transmission.

Calculation process of CRC parity:

1) Define a CRC parity register, and initialize it as FFFFH.
2) Conduct XOR calculation between the 1st byte of sending message and the value of CRC parity register, and then upload the result to CRC parity register. Start from address code, the start bit and stop bit will not be calculated.

3) Collect and check LSB (the least significant bit of CRC parity register).
4) Shift each bit of CRC parity register rightwards by 1 bit, the highest bit filled with 0.
5) If LSB is 1, conduct XOR calculation between the value of CRC register and A001H, and then upload the result to CRC parity register.
6) Repeat steps 3, 4 and 5 until completing 8 rounds of shifting.
7) Repeat steps 2, 3, 4, 5 and 6, and process the next byte of sending message. Repeat above process continuously until each byte of sending message is processed.
8) CRC parity date will be saved in CRC parity register after calculation.
9) First send the low byte of CRC parity when sending, and then send the high byte.

Circuit diagnostics and 0x08 setting description

Sub-function Code	Data Requested	Response Data	Indication of Sub-function
0000H	#data16	The same as the data requested	Circuit Diagnosis

Abnormal response

When the host sends the wrong data or the servo error data caused by disturbance, it will send back an exception response. Abnormal response data structure:

ADU Item	Byte count	Description
Address code	1	Address of slave
Function code	1	Equal to the function code of + 0x80
Exception code	1	See the exception code table
CRC parity (L)	2	CRC16
CRC parity (H)		CRC16

Abnormal table：

data	Meaning
01	CRC parity error
02	Function code is not correct
04	Send data length is not correct
08	Register address error
10	Register digital error
20	Register modification error
40	EEPROM busy

Note: if the function code is wrong, the exception code is 0x02

8.6 Example

Write 01 servo drive control mode for position control, that is, P1-00=1.

Sending sequence	0	1	2	3	4	5	6	7	8	9
Sending content		01H	06H	01H	00H	00H	01H	49H	F6H	

Receive sequence	0	1	2	3	4	5	6	7	8	9
Receive content		01H	06H	01H	00H	00H	01H	49H	F6H	

9 Fault alarm and Treatment

9.1Fault Diagnosis and Treatment

When a fault or alarm occurs, the servo drive will display "AL"

Last fault can be viewed by P0-18. Fault display and treatment measures are as follows:

AL001：Short circuit

AL002：Hardware over current

AL003：Software over current

Fault Causes	Check	Solution
Short circuit of drive output	1：Check the connection status between motor and drive or if there is a short circuit 2：Check if the motor damaged	1：Exclude short circuit condition and avoid metal conductor being exposed externally. 2：Replace the damaged motor
Wiring error of the motor	Check the wiring order of motor connected to the drive	Re-wiring based on the wiring order specification
Setting error of control parameter	Check if the set value is much greater than the factory setting value	Resume defaulted setting, and then gradually modify
Command changes drastically	Check if the control input command changes too drastically	Fixed the change ratio of the input command or initialize filter function
External braking resistor is too small or short circuit	Check if the external braking resistor meets the specification	Use the braking resistor matched the specification and set the parameters of P8-18 and P8-20 correctly
Drive hardware fault	When all the above problems are excluded, the fault still occurs	Send back to the dealer or the factory for check

AL003：AD Initialization Fault

Fault Causes	Check	Solution
Fault of drive hardware	Power to restart，if the fault still occurs	Send back to the dealer or the factory for check

AL004：Memory Error

Fault Causes	Check	Solution
Abnormal write of parameter data	Power off and restart，if the fault still exists	Replace the drive
Memory stored too frequently	Check the program of upper computer if the drive's EEPROM is frequently written.	Modify the program of upper computer, changed to RAM address in case it should be frequently written.

AL006：AD Sampling Fault

Fault Causes	Check	Solution
External analog sampling deviation is too large or timeout in conversion	Power off and restart，if the fault still exists	Send back to the dealer or the factory for check

AL007：Encoder Error 1

Fault Causes	Check	Solution
Encoder is loose	Check CN5 on the drive and the connector of encoder	Re-install
Encoder wiring error	Check if the encoder wiring follows the recommended specification as mentioned in the manual	Wiring correctly
Encoder connection not good	Check if CN5 on drive is well connected to servo motor encoder, and if the shielding layer is intact	Re-wiring
Encoder damaged	Exclude wiring problems, the fault still exists	Replace the motor

AL008：Encoder Error 2

Fault Causes	Check	Solution
Z signal error of incremental	Same with AL007	Same with AL007

encoder		
CRC check error of absolute encoder		

AL009：Encoder Error 3

Fault Causes	Check	Solution
AB signal error of incremental encoder	Same with AL007	Same with AL007
Communication error of absolute encoder		

AL00A：Under voltage

Fault Causes	Check	Solution
Main circuit input voltage is lower than the rated voltage value allowed	Check if input voltage and the wiring are normal	Check the mains supply
No voltage on the input side of the mains circuit	Check if the main circuit voltage is normal	Check the power supply switch
Power supply error	Check if the power is consistent with the specification	Use the correct power supply

AL00B：Overvoltage

Fault Causes	Check	Solution
Main circuit input voltage is higher than the rated voltage allowed	Check if the main circuit voltage is in the allowable range	Use the correct power supply
Power input error	Check if the power is consistent with the specification	Use the correct power supply
Motor decelerates too fast	Check if the system inertia is too large and decelerates too fast	Increase the deceleration time, or use a suitable external braking resistor
Drive hardware fault	Measuring the main circuit voltage is in the allowable range, and the fault still occurs when the motor is not running	Send back to the dealer or the factory for check

AL00D / AL00E：Motor Overload / Drive Overload

Fault Causes	Check	Solution
Continuous use above the rated load	1：Monitor P0-01 if it is continuously more than 100% 2：Monitor P0-12 if it is continuously more than the rated value	1：Increase motor capacity or reduce load 2：Increase drive capacity or reduce load
Motor, encoder wiring error	Check the U, V, W and encoder wiring	Correct wiring
Set control parameter improperly	1：if mechanical oscillates and the motor sounds abnormally 2：Acceleration and deceleration are too fast	1：Adjust the position, velocity gain value 2：Reduce acceleration and deceleration time
Drive or motor fault	Exclude above problems	Send back to the dealer or the factory for check

AL010：Drive Overheat

Fault Causes	Check	Solution
Ambient temperature is too high	Check if the ambient temperature and humidity are in the permitted range	Improve the installation environment
Cooling fan of the drive is damaged	Check if the cooling fan is running during operation	Replace the fan which is not running
The cooling of servo drive is affected	1：Check if the drive installation follows the requirements 2：Check if the drive's heat sink is blocked	1：Install the drive properly, refer to Chapter II 2：Clean up the blockage

AL012：Overspeed

Fault Causes	Check	Solution
UVW phase sequence error	Check if the phase sequence of UVW is correct	Wiring as per correct phase sequence

Over-speed judgment parameter is not properly set	Check if over speed judgment parameter is too small	Set over-speed parameter parameter correctly
Speed input command changes drastically	Check if input analog voltage signal is abnormal	Adjust the change ratio of the input signal or adjust filter

AL013：Position Deviation is too large

Fault Causes	Check	Solution
The value of position tracking error is too small	Check if the parameter of P1-37 is appropriate	Increase the setting value of P1-37
Pulse command frequency is higher than the norm	Check the frequency of pulse command	Adjust the pulse frequency so that it is not higher than specification
Gain value is too small	Check if the setting value is appropriate	Set gain value correctly
Torque limit is too low	Check the torque limit value	Adjust torque limit value correctly
Load inertia is too large	Calculate the ratio of load inertia and rotor inertia	Reduce the load inertia or re-evaluate the motor capacity

AL014：Input Phase Loss

Fault Causes	Check	Solution
Main circuit power is abnormal	Check if the L1, L2, L3 power cord is loose or just has a single phase input	Check if three-phase power is normal
Drive parameter setting is not correct	Change single-phase power supply to three-phase power supply	Set the parameters correctly

AL015：Motor phase sequence error

Fault Causes	Check	Solution
Motor UVW phase sequence error	Check the connection order between the motor and the drive.	Wiring correctly.

AL016： Drive Parameter Fault

Fault Causes	Check	Solution
Drive parameter input error	Verify if the drive parameters are correct	Input the correct drive parameters

AL017：Braking Resistor Overload

Fault Causes	Check	Solution
Braking resistor is missed or its capacity too small	1：Check the connection status of the braking resistor 2：Calculate the braking resistor value	1：Reconnect the braking resistor 2：Use appropriate braking resistor
Braking IGBT is not effective	Check if the braking IGBT is damaged	Send back to the dealer or the factory for check
Parameter setting error	check the parameters setting value of brake resistor (P8-p18) and braking resistor capacity (P8-20)	Set the parameters correctly

AL018：Encoder Overheat

Fault Causes	Check	Solution
Absolute encoder is overheat	Check if the ambient temperature of the motor is too high	Reduce the ambient temperature or conduct air forced cooling for the motor

AL019：The battery of Absolute Encoder is low

Fault Causes	Check	Solution
The battery of absolute encoder is lower than 3.1V	Measure the voltage value of the battery	Replace battery

AL01A：Low battery voltage of absolute encoder

Fault Causes	Check	Solution
The battery of absolute encoder is lower than 2.5V, much position information is missing	Measure the voltage value of the battery	Replace battery

AL01B：Drive and motor mismatch

Fault Causes	Check	Solution
Drive does not match the motor	1：Check if the motor matches the drive in the voltage class 2：Check if the motor code set in the drive is consistent with the motor nameplate	1:Choose correct drive for the and motor 2：Input the correct motor code

AL01C：Initial Point **Return Failure**

Fault Causes	Check	Solution
PB-00 parameter setting value is too small	Check if PB-00 setting value is appropriate	Increase the value of PB-00
External detector or limit switch fail	Check the external detector, limit switches and wires	Exclude fault

AL01E：The Offset Electrical Angle Autotuning Failure

Fault Causes	Check	Solution
Motor phase sequence error	Check the phase sequence of the motor	Wiring as per U, V, W phase sequence
Encoder cable wiring error	Check if the encoder cable is wired incorrectly	Wiring according to correct encoder definition wiring
Number of motor pole pairs is wrong	Check if the number of motor poles pairs is set incorrectly	Set motor pole pairs according to motor specification

9.2 Alarm Diagnose and Treatment Measures

In case the digital operator reads error ‘ALE’, but the motor does not stop running, it means that there is problem with the system. Please check the cause immediately, here below is the troubleshooting.

ALE02：Drive Overheating

Alarm Causes	Check	Solution
Ambient temperature is too high	Check if the temperature and humidity are in the permitted range	Improved servo drive cooling conditions, reduce the ambient temperature
Drive cooling fan damage	Check the cooling fan of the drive is running during operation	Replace the damaged fan
Servo drive or the the inlet and outlet of the fan is blocked	1：Check if the drive installation meets the requirements 2：Check if the heat sink of the drive is blocked	1：Drive installation refers to Chapter II 2：Clean up the blockage
The servo drive fails		Power off and restart, if the fault still exists, replace the servo drive

ALE03：Motor Overload

Alarm Causes	Check	Solution
Motor load reaches at the overload warning threshold value set in P8-13	1：Refer to AL00D and AL00E 2：The setting value of P8-13 is too small	1：Refer to AL00D and AL00E 2：Increase the setting value of P8-13 appropriately

ALE04：Drive Overload

Alarm Causes	Check	Solution
Drive load reaches at the overload warning threshold value set in P8-12	1：Refer to AL00D and AL00E 2：The setting value of P8-12 is too small	1：Refer to AL00D and AL00E 2：Increase the setting value of P8-12 appropriately

ALE05：Excessive Position Deviation

Alarm Causes	Check	Solution
Alarm threshold value of position tracking deviation is too small	check if the parameters of P1-36 are appropriate	Increase the setting value of P1-36
Pulse command frequency is higher than the specification	Detect the frequency of pulse command	Adjust the pulse frequency so that it is not higher than specification
Setting gain value is too small	check the setting value is appropriate	Set gain value correctly

Torque limit is too low	check torque limit value	Adjust torque limit value correctly
Load inertia is too large	Calculate the ratio of load inertia and rotor inertia	Reduce the load inertia or re-evaluate the motor capacity

ALE06：Brake Overload

Alarm Causes	Check	Solution
Braking resistor is missed or its capacity is too small	1：check the connection status of braking resistor 2：Calculate the value of braking resistor	1：Reconnect the braking resistor 2：Use appropriate braking resistor
Load inertia is too large	Calculate if the ratio of load inertia and rotor inertia is appropriate	Reduce load inertia or change the motor with greater inertia
Improper parameters setting	1：check the setting parameters of brake resistor (P8-p18) and braking resistor capacity (P8-20) 2：check if the deceleration time is too short	1：Set the parameters of P8-p18 and P8-20 properly 2：Increase the deceleration time

ALE07:Forward Over Travel

Alarm Causes	Check	Solution
P-OT terminal is effective, and command is forward	check the position of forward limit switch	1：Release forward limit switch 2：Give reverse command
Servo system is unstable	check the setting value of control parameter and load inertia	Re-correct control parameters or re-evaluate the motor capacity

ALE08: Reverse over travel

Alarm Causes	Check	Solution
N-OT terminal is effective, and command is reverse	check the position of reverse limit switch	1：Release reverse limit switch 2：Give the forward command
Servo system is unstable	check the setting value of control parameter and load inertia	Re-correct control parameters or re-evaluate the motor capacity

10 Specification

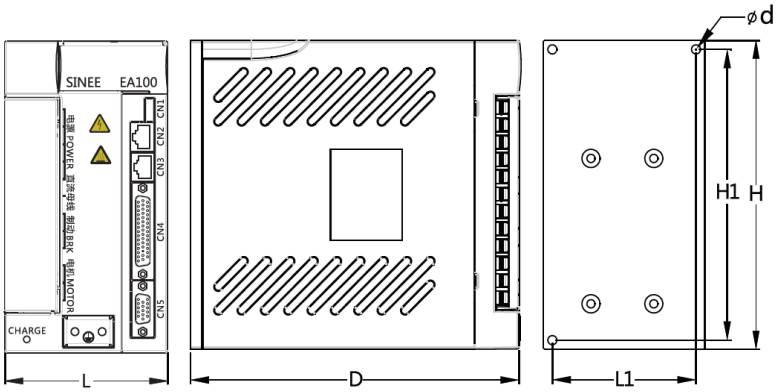
10.1 Technical specification

Model EA100-		2R8 -2A	5R5 -2A	7R6 -2A	010 -2A	5R4 -3A	8R4 -3A	012 -3A			
Applicable Encoder		2500ppr									
Model EA100-		2R8 -2B	5R5 -2B	7R6 -2B	010 2B	5R4 -3B	8R4 -3B	012 -3B	018 -3B	021 -3B	030 -3B
Applicable Encoder		17bit									
Frame		SIZE A		SIZE B					SIZE C		
Rated Output Power		0. 4	0. 75	1. 0	1. 5	1. 5	2	3	4.5	5.6	7.5
Rated Output Current		2. 8	5. 5	7. 6	10	5. 4	8. 4	12	18.0	21.0	30.0
Power	Main Power	1-phase AC220V±5% 50/60Hz 3-phase AC220V±5% 50/60Hz			3-phase AC220V ±5% 50/60Hz	3-phase AC380V±5% 50/60Hz					
	Control Power	1-phase AC220V±5%				1-phase AC380V±5%					
Working Conditions	Temperature	Working temperature: 0~40℃. Storage temperature: -20~85℃									
	Humidity	Working/storage ≤90%RH (no condensation)									
	Altitude	≤1000m									
	Vibration	≤4.9m/s², 10~60Hz (Not allowed to work at the resonance point)									
Cooling Mode		Fan cooling									
Control Mode		SVPWM, Vector control									
Six Control Modes		Speed control mode, position control mode, torque control mode, speed/position control mode, torque/speed control mode, position/torque control mode									
Front Panel		Press key: 5 LED light: 5 bit									
Regenerative Braking		Built in brake unit and resistance, connectable external braking resistor									
Feedback Mode		Support 2500ppr, 17 bit									
Digital Input and Output	Input	Servo startup, fault reset, position pulse deviation counter clear, direction selection of speed instruction, position / speed switching, internal instruction trigger, control mode switching, pulse prohibition, forward drive prohibition, reverse drive prohibition, positive jog, negative jog									
	Output	Servo ready, brake output, motor rotation output, zero speed signal, speed approach, speed arrival, location approach, location arrival, torque limit, speed limit, warning output, fault output									
Protection Function	Software	Over-voltage, under-voltage, over-speed, over-heating, over-load, encoder fault, etc.									
	Hardware	Location error is too large, EEPROM fault, etc.									
Alarm Data Tracking Function		4 sets of historical records and related data									
Communication Function		Modbus RTU, CANopen									
Encoder Signal Output	Signal Type	A, B differential output, Z signal open collector output, settable width of the Z signal									
	Encoder line number	Programmable arbitrary frequency dividing									
Position Control Mode	Maximum Input Pulse Frequency	Differential input mode: 500Kpps Open collector input mode: 200Kpps									
	PULSE Instruction Mode	Pulse + symbol, AB orthogonal pulse, CW/CCW									
	Instruction Control Mode	External pulse instruction Internal register instruction									
	Instruction Smooth Mode	Low-pass smoothing filter									
	Electronic Gear Ratio	Electronic gear ratio: N/M (1/50<N/M<200) N: 1~65535, M: 1~65535									
	Position Accuracy	±1 pulse (2500ppr) ±3 pulse (17 bit)									
Speed Control Mode	Analog Instruction Input	Voltage Range	-10V~10V								
		Input impedance	10KΩ								
	Instruction Control Mode	External analog instruction Internal register instruction									
	Instruction Smooth Mode	Low pass and S curve smoothing filter									
	Torque Limit	Parameter setting or analog input									
	Speed Ratio	1:3000 (2500ppr) 1:5000 (17bit)	Minimum speed / rated speed When continuously and smoothly running with rated load								
	Bandwidth	≥250Hz (2500ppr)									

		≥500Hz (17bit)		
	Speed Fluctuation Rate	Load Fluctuation (0~100%)	Max 0. 01%	For 17bit encoder, when the speed instruction is rated speed, the Speed Fluctuation Rate = (speed of no load – speed of rated load) / rated speed
		Power Supply Voltage Fluctuation(±10%)	Max 0. 01%	
		Ambient Temperature (0~50℃)	Max 0. 01%	
Torque Control Mode	Analog Instruction Input	Voltage Range	-10V~10V	
		Input Impedance	10KΩ	
		Time Constant	200us	
	Instruction Control Mode	External analog instruction Internal register instruction		
	Instruction Smoothing Mode	Low pass smoothing filter		
	Torque Limit	By setting internal register or analog given		
	Accuracy	±5% (current accuracy)		

10.2 Dimensions

Diagram of overall and installation dimensions

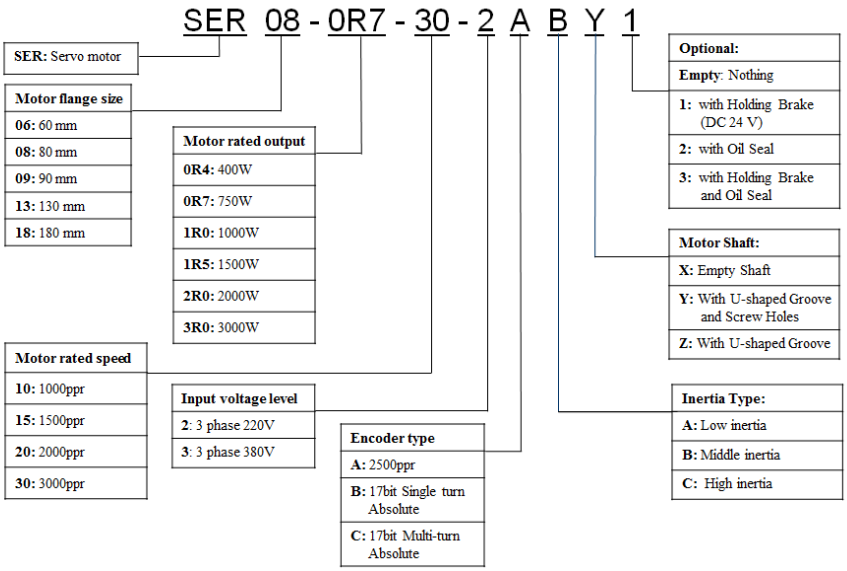


Overall Dimensions

Frame	L(mm)	H(mm)	D(mm)	L1(mm)	H1(mm)	d(mm)
SIZE A	65	170	171	55	160	5
SIZE B	90	170	184	80	160	5
SIZE C	110	283	233	95	272	5

Note: A mounting hole of SIZE C is 4, H is the maximum size of a mounting substrate.

10.3 Motor specification



10.3.1 SER series servo motor parameter

10.3.1.1 SER series series servo motor common characteristics:

Insulation class	F Class
Insulation and resisting voltage	1500V 60s
Insulated resistance	DC500V，10MΩ above
Motor temperature resistance grade	B
Protection class	Totally enclosed self cooling type IP65 (except shaft through part）
Ambient	Ambient temperature 0-40° Relative humidity 20-80%(no condensation）
Installation direction	Flange installation
Rotation direction	Clockwise rotation (CCW) at the load side in the forward command.

10.3.1.2 Holding Brake specification:

Motor flange dimension	60	80	86	110	130	180
Rated voltage	DC 24~26.4V					
Static friction torque	2 N.m	3 N.m	3 N.m	10 N.m	20 N.m	40 N.m*
Rated power	6.3W±7%	10.4W±7%	10.4W±7%	11.6W±7%	19.5W±7%	25W±7%*
Closed voltage	16V DC max					
Release voltage	1.5V DC min					
Calibration action time	150ms					

*：Regarding of 7.5KW servo motor, static friction torque of brake is 80N.m, rated power is 49W±7%

Note:

1：Holding brake can not be used to brake.

2：24V power supply prepared by users.

3：The action time of holding brake depends on circuit, please confirm based on product.

10.3.1.3 SER series servo motor parameter diagram:

Motor model		SER06-	SER08-			SER09-	SER11-
		0R4-30-2□AY□	0R7-30-2□AY□	0R7-20-2□AY□	1R0-30-2□AY□	0R7-30-2□BZ□	1R0-20-2□BY□
Voltage class(V)		AC 220					
Motor code*3	2500 encoder	101 / 102	201 / 202	205/206	301/302	209/210	319
	17 bit encoder	103 / 104	203 / 204	207/208	303/304	213/214	320
Rated power (W)*1		400	750		1000	750	1000
Rated speed (rpm)*1		3000		2000	3000	3000	2000
Maximum speed (rpm)*1		4000	4000	2500	3500	3700	2400

Rated current(A)*1	2.3	4.3	3.0	4.0	3.43	5.0
Instantaneous maximum current(A)*1	6.9	12.9	9.0	12.0	10.3	15.0
Rated torque(Nm)*1, *2	1.27	2.4	3.5	3.5	2.4	5.0
Instantaneous maximum torque（Nm)	3.81	7.2	10.5	10.5	7.5	15.0
Torque constant (Nm/A)	0.55	0.58	1.17	0.88	0.74	1.00
Rotational inertia($Kg.cm^2$)*4l	0.30	1.01	1.59	1.59	2.42	7.22
Line resistance (Ω)	5.51	2.12	3.70	2.02	2.16	0.89
Line inductance (mH)	14.82	7.92	17.00	8.68	7.44	4.00
Motor weight(Kg)	1.37 (1.78)	2.47 (3.33)	3.40 (4.10)	3.40 (4.10)	3.24 (3.94)	6.42 (7.88)
Appropriate drive EA100-	2R8-2□	5R5-2□				7R6-2□

*1:These items are the value of after combined with the EA100 series servo drive and the armature coil temperature is 100℃.

*2: The rated torque is continuous allowable torque when install following dimensions of the aluminum heat sink and the ambient temperature is 40℃.

SER09/11:300*300*10mm SER06/08:250*250*6mm

*3: If the motor code has two, the odd number indicates that the motor does not have holding brake, for even indicates that the motor has the holding brake.

*4: The motor with brake, the rotational inertia will increase by 0.02Kg.cm2

Note: ( ) the internal data is the value of the motor with the holding brake.

Motor model		SER11-	SER13-				
		1R2-30-2□BY□	0R7-20-2□BY□	1R0-10-2□BY□	1R0-20-2□BY□	1R0-30-2□BY□	1R5-10-2□BY□
Voltage class(V)		AC 220					
Motor code*3	2500 encoder	317	211/212	305/306	307/308	309/310	401/402
	17 bit encoder	318	215/216	311/312	313/314	315/316	403/404
Rated power (W)*1		1200	750	1000			1500
Rated speed(rpm)*1		3000	2000	1000	2000	3000	1000
Maximum speed(rpm)*1		3400	2500	1300	2500	3500	1500
Rated current(A)*1		4.9	3.88	4.72	4.72	4.96	6.76
Instantaneous maximum current(A)*1		14.7	11.64	14.16	14.16	14.88	20.28
Rated torque(Nm)*1, *2		4.0	3.65	9.55	4.77	3.27	14.32
Instantaneous maximum torque（Nm)		12.0	10.95	28.65	14.31	9.81	42.96
Torque constant(Nm/A)		0.81	0.94	2.02	1.01	0.66	2.12
Rotational inertia ($Kg.cm^2$)*4		5.54	6.17	17.14	8.71	6.17	25.58
Line resistance(Ω)		1.39	2.18	1.8	1.19	1.04	1.25
Line inductance(mH)		6.53	8.83	10.97	6.09	4.28	7.60
Motor weight(Kg)		5.46 (6.92)	5.20 (6.90)	10.12 (11.67)	6.41 (7.94)	5.31 (6.89)	13.82 (15.40)
Appropriate drive EA100-		7R6-2□	5R5-2□	7R6-2□			010-2□

Motor model		SER13-				
		1R5-20-2□BY□	1R5-30-2□BY□	1R5-20-3□BY□	2R0-20-3□BY□	3R0-20-3□BY□
Voltage class(V)		AC 220		AC 380		
Motor code*3	2500 encoder	405/406	407/408	409/410	501/502	601/602
	17 bit encoder	411/412	413/414	415/416	503/504	603/604
Rated power (W)*1		1500			2000	3000
Rated speed(rpm)*1		2000	3000	2000	2000	2000
Maximum speed(rpm)*1		2500	3500	2500	2500	2500
Rated current(A)*1		6.87	6.41	4.1	6.5	9.6
Instantaneous maximum current(A)*1		20.61	19.23	12.4	19.5	28.8
Rated torque(Nm)*1，*2		7.16	4.77	7.16	9.55	14.32
Instantaneous maximum torque（Nm)		21.48	14.31	21.48	28.65	42.96
Torque constant(Nm/A)		1.04	0.75	1.74	1.47	1.49
Rotational inertia (Kg.cm2)*4		12.08	8.71	12.08	17.14	25.58
Line resistance(Ω)		0.81	0.64	2.82	1.40	0.85
Line inductance(mH)		4.30	3.24	14.72	8.25	5.43
Motor weight(Kg)		7.89 (9.43)	6.40 (7.96)	7.89 (9.43)	10.12 (11.67)	13.81 (15.34)
Appropriate drive EA100-		010-2□		5R4-3□	8R4-3□	012-3□

*1:These items are the value of after combined with the EA100 series servo drive and the armature coil temperature is 100℃.

*2: The rated torque is continuous allowable torque when install following dimensions of the aluminum heat sink and the ambient temperature is 40℃.

SER09：300*300*10mm ； SER13：400*400*15mm

*3: If the motor code has two, the odd number indicates that the motor does not have holding brake, for even indicates that the motor has the holding brake.

*4: The motor with brake, the rotational inertia will increase by 0.02Kg.cm2

Note: ( ) the internal data is the value of the motor with the holding brake.

Motor model		SER18-				
		3R0-15-3BCZ□	4R5-15-3BBZ□	5R6-15-3BBZ□	7R5-15-3BBZ□	
Voltage class(V)		AC 380				
Motor code*3	2500 encoder	-	-	-	-	
	17 bit encoder	605	609	610	607/608	
Rated power (W)*1		3000	4500	5600	7500	
Rated speed(rpm)*1		1500				
Maximum speed(rpm)*1		2000				
Rated current(A)*1		11.5	17.0	19.0	28.7	
Instantaneous maximum current(A)*1		28.8	42.5	47.5	71.8	
Rated torque(Nm)*1, *2		19.1	28.8	34.9	48.0	
Instantaneous maximum torque（Nm)		47.8	72.0	87.3	120.0	
Torque constant(Nm/A)		1.66	1.69	1.84	1.67	
Rotational inertia ($Kg.cm^2$)*4		25.95（26.22）	35.37（35.64）	45.51（45.78）	79.89（81.01）	
Line resistance(Ω)		1.43	0.44	0.29	0.13	
Line inductance(mH)		22.77	7.15	5.48	2.82	
Motor weight(Kg)		13.50 (18.50)	15.10 (20.10)	17.70 (22.60)	25.60 (33.60)	
Appropriate drive EA100-		012-3B	018-3B	021-3B	026-3B	

*1:These items are the value of after combined with the EA100 series servo drive and the armature coil temperature is 100℃.

*2: The rated torque is continuous allowable torque when install following dimensions of the aluminum heat sink and the ambient temperature is 40℃.

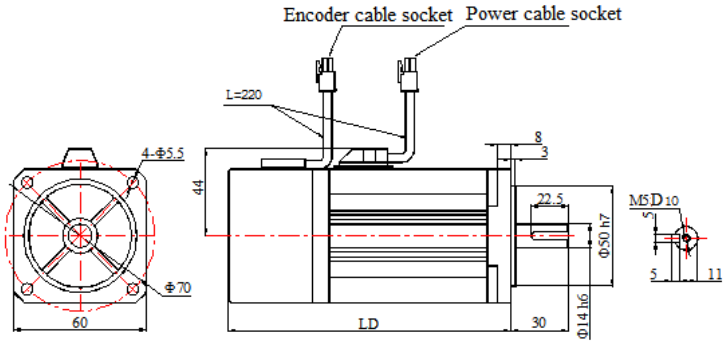
SER18：550*550*20mm

*3: SER18 series motor without 2500 encoder suitable motor.

Note: ( ) the internal data is the value of the motor with the holding brake.

10.4 SER series servo motor dimension

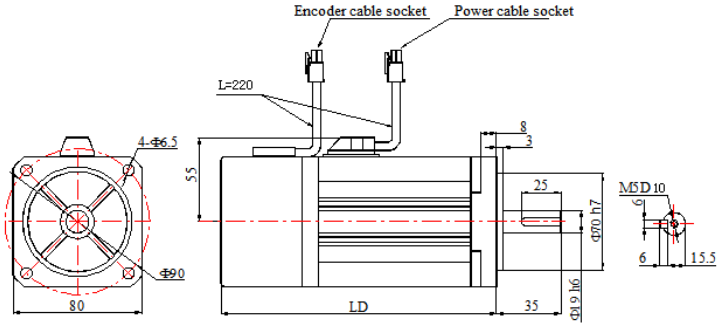
10.4.1 60 flange servo motor mounting dimensions: unit (mm)



LD size varies with different models

Motor model	SER06-0R4-30-2□AY	LD=134mm
	SER06-0R4-30-2□AY1	LD=169.5mm

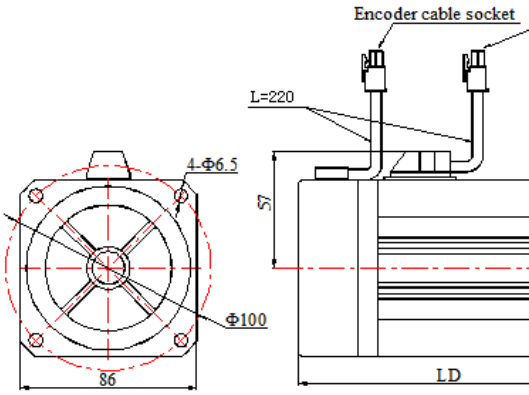
10.4.2 80 flange servo motor mounting dimensions: unit (mm)



LD size varies with different models

Model of motor	LD		Model of motor	LD
SER08-0R7-30-2☐AY	142.5mm		SER08-0R7-30-2☐AY1	173.0mm
SER08-0R7-20-2☐AY	171.5mm		SER08-0R7-20-2☐AY1	203.0mm
SER08-1R0-30-2☐AY	171.5mm		SER08-1R0-30-2☐AY1	203.0mm

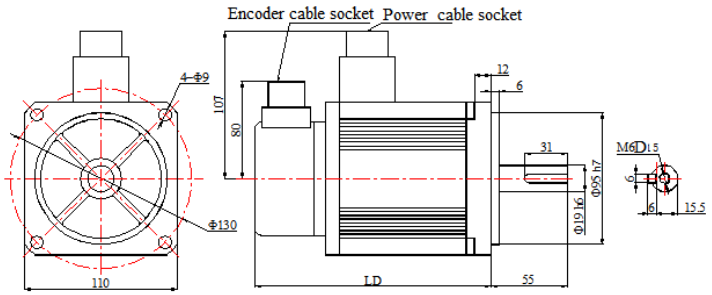
10.4.3 86 flange servo motor mounting dimensions: unit (mm)



LD size varies with different models

Motor model	SER09-0R7-30-2☐BZ	LD=148mm
	SER09-0R7-30-2☐ZY1	LD=183mm

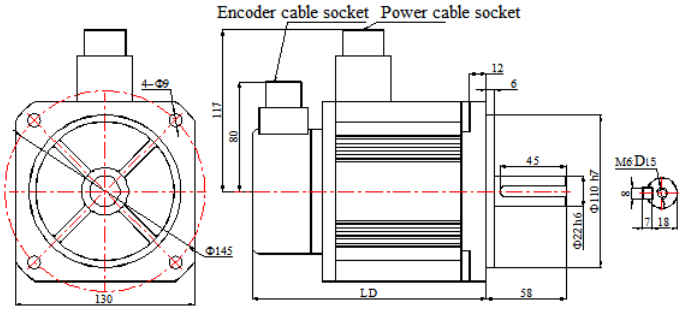
10.4.4 110 flange servo motor mounting dimensions: unit (mm)



LD size varies with different models

Model of motor	LD		Model of motor	LD
SER11-1R0-20-2☐BY	185.5mm		SER11-1R0-20-2☐BY1	240.5mm
SER11-1R2-30-2☐BY	205.5mm		SER11-1R2-30-2☐BY1	260.5mm

10.4.5 130 flange servo motor mounting dimensions: unit (mm)

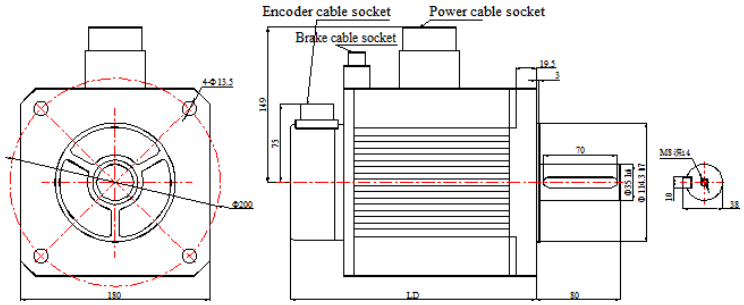


LD size varies with different models

Model of motor	LD		Model of motor	LD

SER13-0R7-20-2□BY	150mm		SER13-1R5-20-2□BY	185mm
SER13-1R0-10-2□BY	215mm		SER13-1R5-30-2□BY	165mm
SER13-1R0-20-2□BY	165mm		SER13-1R5-20-3□BY	185mm
SER13-1R0-30-2□BY	150mm		SER13-2R0-20-3□BY	215mm
SER13-1R5-10-2□BY	265mm		SER13-3R0-20-3□BY	265mm
Note: LD size increase 55mm with holding brake				

10.4.6 180 flange servo motor mounting dimensions: unit (mm)



LD size varies with different models

Model of motor	LD		Model of motor	LD
SER18-2R0-15-2BCZ	173.5mm		SER18-2R0-15-2BCZ1	222.0mm
SER18-3R0-15-3BCZ	173.5mm		SER18-3R0-15-3BCZ1	222.0mm
SER18-4R5-15-3BBZ	186.5mm		SER18-4R5-15-3BBZ1	235.0mm
SER18-5R6-15-3BBZ	202.5mm		SER18-5R6-15-3BBZ1	251.0mm
SER18-7R5-15-3BBZ	252.5mm		SER18-7R5-15-3BBZ1	323.5mm

10.5 SER series servo motor overload characteristics

10.5.1 Overload protection definition

The overload protection of the servo motor is to prevent the motor from overheating.

10.5.2 Reason for overload of servo motor

1) When the motor runs more than the rated torque, the operation time is too long.
2) Load and motor inertia ratio is too large and acceleration and deceleration too frequent.
3) Motor power cable or encoder wiring error.
4) Servo drive gain is set incorrectly, resulting in motor shock.
5) The motor with a holding brake, the brake will not be kept open but operate.

10.5.3 SER series servo motor relation for servo motor load and running time