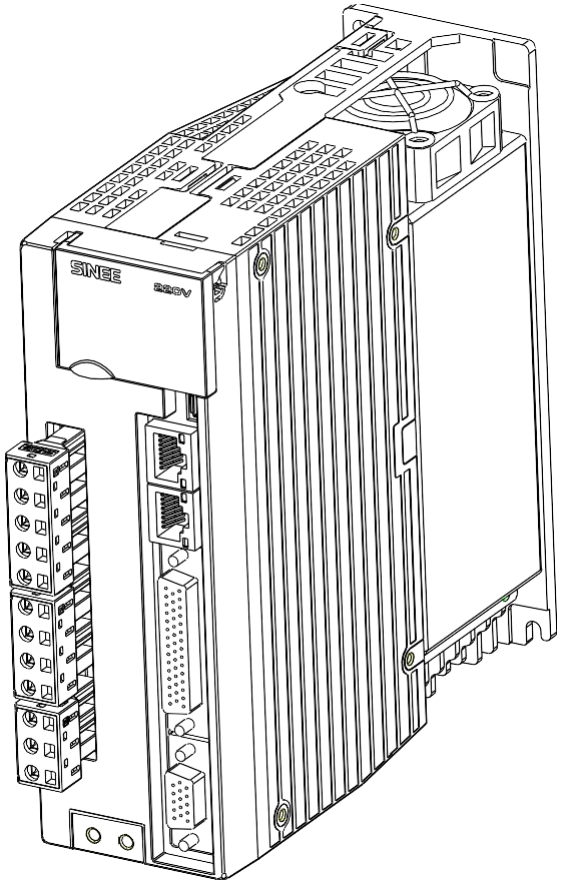
Technical Manual

EA300E EtherCAT Bus Servo Drive



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Preface

Thank you for choosing Sine Electric EA300E EtherCAT Bus type servo drive! Data number: 3101
Release time: 2022-8
Version :100

EA300E series servo drive products are high-performance small and medium-power bus-type AC servo drives developed by Sine Electric. The power range of this series of products is 50W~7.5KW , using Ethernet communication interface and supporting EtherCAT CoE (CA301, CA402) communication protocol, with the host computer to achieve multiple servo drives network operation. Provides rigidity table setting, inertia identification and vibration suppression functions, making the servo drive simple and easy to use, with 17 -bit increment
23 -bit absolute encoder is quiet and stable, responds quickly, and has precise positioning. It is suitable for semiconductor manufacturing equipment, robots , metal processing machine tools, conveyor machinery and other automation equipment to achieve fast and accurate collaborative control.

As we are always committed to the continuous improvement of our products and product information, the information provided by our company is subject to change without prior notice. For the latest changes and more information, please visit www.sinee.cn

Safety precautions

Safety Definition: In this manual, safety precautions are divided into the following two categories;

	Danger: Danger caused by failure to operate as required, which may lead to serious injury or even death;
	Note: Dangers caused by failure to operate as required may result in moderate or minor injuries, and equipment damage;

Please read this chapter carefully when installing, debugging and repairing this system, and be sure to operate in accordance with the safety precautions required by this chapter. Any damage or loss caused by illegal operation will not be the responsibility of our company.

Safety precautions before installation :

During installation :

 **Danger**
1. If you find that the packaging has water in it, parts are missing or parts are damaged when you unpack it, please do not install it! 2. If the outer packaging logo does not match the actual name, please do not install it!

 **Notice**
1、 Lift and place gently when moving, otherwise there is a risk of damaging the equipment! 2. Do not use a damaged servo drive or a servo drive with missing parts, as there is a risk of injury! 3. Do not touch the components of the control system with your hands, otherwise there is a risk of static electricity damage!

 **Danger**
1、Please install it on flame-retardant objects such as metal, and keep away from combustibles, otherwise it may cause a fire!

When wiring :

 **Notice**
1. Do not let the wire head or screw fall into the servo drive, otherwise it will cause damage to the servo drive! 2. Please install the servo drive in a place with less vibration and avoid direct sunlight. 3. When the servo drive is placed in a relatively closed cabinet or space, please pay attention to the installation gap to ensure the heat dissipation effect.

Danger
1. The instructions in this manual must be followed and the product must be used by professional electrical engineers, otherwise unexpected dangers may occur! 2. The servo drive and power supply must be separated by a circuit breaker, otherwise a fire may occur! 3. Before wiring, please make sure that the power supply is in a zero energy state, otherwise there is a risk of electric shock! Please properly ground the servo drive according to the standard, otherwise there is a risk of electric shock risk. 4. The grounding terminal must be reliably grounded, otherwise there is a risk of electric shock and fire.

 **Notice**
1. Never connect the input power to the output terminals (U, V, W) of the servo drive . Pay attention to the markings on the terminals and do not connect the wrong wires! Otherwise, the servo drive may malfunction. Service driver damaged! 2. Ensure that the wiring meets EMC requirements and the safety standards of the area. Please refer to the preferred recommendations for the wire diameters used. Otherwise, accidents may occur! 3. Never connect the brake resistor directly between the DC bus P+ and terminals. Otherwise, it may cause a fire! 4. Please use a screwdriver with specified torque to tighten the terminals, otherwise there is a risk of fire. 5. Do not connect phase-shifting capacitors and LC/RC noise filters to the output circuit. 6. Do not connect the electromagnetic switch or electromagnetic contactor to the output circuit. Otherwise, the overcurrent protection circuit of the servo drive will be activated, which may cause the servo drive to The inside of the device is damaged.

Before power on :

Notice
1、 Please confirm whether the voltage level of the input power supply is consistent with the rated voltage level of the servo drive; whether the wiring position on the power input terminals (L1, L2, L3) and output terminals (U, V, W) is correct; and pay attention to check whether there is a short circuit in the peripheral circuit connected to the servo drive, and whether the connected lines are tight, otherwise the servo drive will be damaged! 2. No part of the servo drive needs to be subjected to a withstand voltage test, as the product has been tested before leaving the factory. Otherwise, an accident may occur!

Notice
1、 The servo drive must be powered on after the cover is closed, otherwise it may cause electric shock! 2. The wiring of all peripheral accessories must comply with the instructions of this manual and be correctly wired according to the circuit connection method provided in this manual. Otherwise, it may cause accidents!

After power on :

Notice
1、 If parameter identification is required, please pay attention to the danger of injury from motor rotation, otherwise it may cause an accident! 2. Do not change the servo drive manufacturer parameters at will, otherwise it may cause damage to the equipment!

Danger
1、 Do not touch the servo drive and peripheral circuits with wet hands, otherwise there is a risk of electric shock! 2. If the indicator light is not on and the keyboard does not display after power-on, please turn off the power switch immediately. Do not touch the servo drive L1, L2, L3 and any terminals on the wiring terminals with your hands or screwdriver, otherwise there is a risk of electric shock. Contact our customer service staff immediately after turning off the power switch. 3. At the beginning of power-on, the servo drive automatically performs a safety check on the external strong current circuit. At this time, you must not touch the servo drive U, V, W wiring terminals or motor wiring terminals, otherwise there is a risk of electric shock!

Running :

Danger
1、 Do not touch the cooling fan, radiator, servo motor and discharge resistor to test the temperature, otherwise it may cause burns! 2. Non-professional technicians should not detect signals during operation, otherwise it may cause personal injury or equipment damage!

Notice
1、 When the servo drive is running, avoid objects falling into the device, otherwise it will cause damage to the device! 2. Do not use the contactor on-off method to control the start and stop of the servo drive, otherwise it will cause damage to the equipment! 3. Do not touch the rotating shaft of the running motor, otherwise it may cause injury!

During maintenance :

Danger
1. Do not repair or maintain the equipment while it is powered on, otherwise there is a risk of electric shock! 2. Cut off the main circuit power supply and make sure the CHARGE indicator light is off before performing maintenance and repair on the servo drive. Otherwise, the residual charge on the capacitor may cause harm to people. harm! 3. Personnel without professional training are not allowed to repair and maintain the servo drive, otherwise personal injury or equipment damage may occur! 4. After replacing the servo drive, parameters must be set, and all pluggable interfaces must be plugged in and out when the power is off!

Precautions

- **When there is a voltage-sensitive device or a capacitor to improve the power factor on the output side**
  The output of the servo drive is a PWM wave. If a capacitor to improve the power factor or a varistor for lightning protection is installed on the output side, it is easy to cause an instantaneous overcurrent or even damage to the servo drive.
  Do not use the damaged servo drive.
- **Lightning surge protection**
  This series of servo drives are equipped with lightning overcurrent protection devices, which have a certain self-protection ability against induced lightning. For areas where lightning frequently occurs, customers should also install a lightning overcurrent protection device in the servo drive.
  Add protection to the front end.
- **Altitude and derating**

In areas with an altitude of more than 1000m , the heat dissipation effect of the servo drive will be poor due to the thin air, and it is necessary to derating the use. In this case, please contact our company for technical consultation.
Technical consultation.

- **Notes on servo drive scrapping**

The electrolytic capacitors in the main circuit and on the printed circuit board may explode when burned. Plastic parts will produce toxic gases when burned. Please treat them as industrial waste.

Maintenance and inspection

Please perform regular maintenance and inspection on the driver and motor for safe use.

Precautions during maintenance and inspection

1) Please cut off the power supply by yourself. If an erroneous action occurs during the power-on process, please do not get close to the motor and the machine it drives.
2) After the power is turned off, the internal circuit remains in a high voltage charging state for a short period of time. Before checking, you must turn off the power and wait for 10 seconds. minutes, and make sure the charging light goes out completely.
3) If you must perform an insulation resistance test on the drive, you must cut off all connections to the drive. Performing an insulation resistance test with wires and motors connected to the drive will damage the drive.
4) Do not use gasoline, thinner, acidic or alkaline cleaners to avoid discoloration or damage to the casing.

Inspection items and cycle

Normal use conditions

Environmental conditions: annual average temperature 30°C, average load rate below 80%, daily operating time below 20 hours

Daily inspection and regular inspection should be carried out according to the following items

examine	cycle	Inspection items
Daily inspection	daily	● Confirm the use environment (temperature, humidity, dust, foreign matter) ● Are there any abnormal vibrations or sounds? ● Is the power supply voltage within the normal range? ● Is there any peculiar smell? ● Check whether there is fiber adhesion in the vents ● Are the connections clean and tight? ● Is the wiring damaged? ● Is the connection with the equipment loose or eccentric? ● Check whether there is any foreign matter in the mechanical transmission part
Regular inspection	1 Year	● Is the fastening part loose? ● Are there any signs of overheating? ● Check whether the transmission mechanism is leaking oil and whether the motor shaft extension is contaminated ● Are the wiring terminals intact? ● Are the fastening parts of each wire and the driver loose?

Table of contents

Chapter 1 Product Information

1.1 Opening confirmatior

In order to prevent negligence during the purchase and delivery of this product, please carefully check the items listed in the table below:

Inspection items	content
Does it match the model you ordered?	Check the product model numbers on the motor and driver nameplates respectively. If you ordered a cable, check the label on the cable for the model and length.
Was there any damage during transportation?	Visually inspect the exterior for any damage or scratches
Is the motor shaft running smoothly?	Rotate the motor shaft by hand. If it can run smoothly, it means the motor shaft is normal. (brake) cannot be operated by hand!

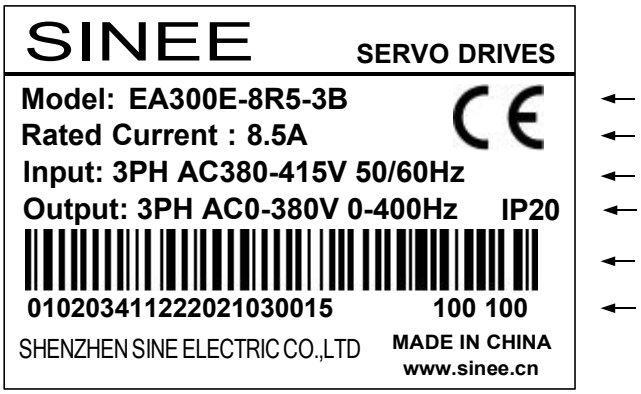
1.1.1 A complete and operational servo assembly shall include:

1) Servo drive and matching servo motor.
2) An encoder signal line connects the female socket of the motor-end encoder and the CN5 terminal of the driver.
3) A motor power line contains four core wires: U (red) V (white or blue) W (black or brown) and PE (yellow-green). (If it is a motor with a brake, there should also be two brake power lines.) The three wires U , V , and W must be connected to the corresponding terminals on the driver in sequence, and the PE wire is connected to the ground terminal of the driver.
4) AtCN4 Used DB44 Connector for making control line according to actual needs.

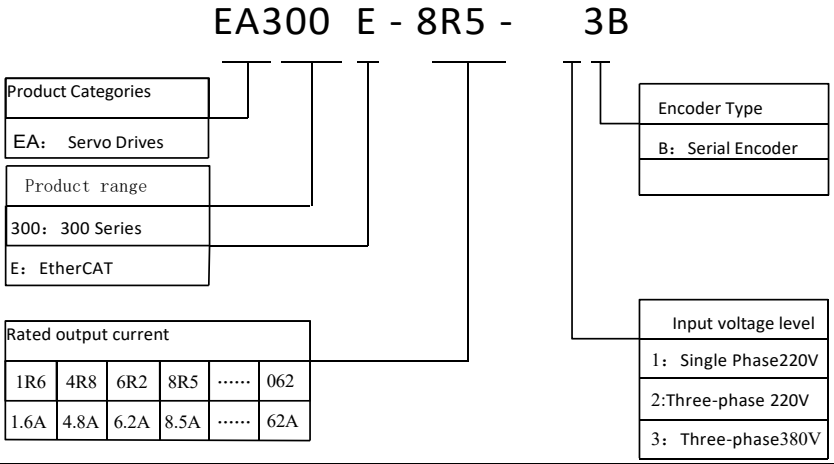
Note : 1) It is strongly recommended to purchase encoder signal cable from our company.
2) If you choose to buy a motor power cable, the color of the inner core wire may be different from the above description. Therefore, please do not distinguish by color, but by the core wire.

1.2 About the drive

1.2.1 Nameplate Description



1.2.2 Product model descrip



Notice :

1) : AC220V Voltage level, 4.8A , 6.2A Products, suitable for single-phase and three-phase AC220V Power supply, so there is no dedicated single-phase 220V product.

2 : AC220V Voltage level, 11A For products above this type, only those suitable for three-phase AC220V power supply are available.

3 : AC220V Voltage level, 2.5A The following products are only suitable for single-phase AC220V Type of power supply.

1.2.3 Servo drive parts names

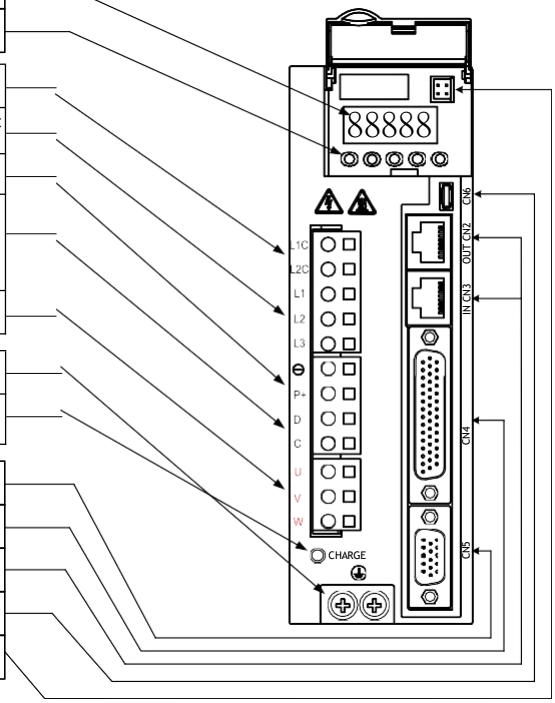
- EA300E-1R6, 2R5, 4R8, 6R2

Digital tube display	5-digit seven-segment LED digital tube displays servo operation status
Key operator	Parameter settings

L1C, L2C Control circuit	Refer to the nameplate rated voltage level Input control circuit power supply
L1, L2, L3 Main circuit power	Refer to the nameplate rated voltage level for input main circuit power supply
P+、 ⊖	DC bus voltage terminal, used for the drive to share the DC bus
P+, D, C External brake resistor	By default , a shorting piece is installed between P+ and D. When an external braking resistor is connected, remove the shorting piece, open the circuit between P+ and D, and connect an external resistor between P+ and C.
U, V, W Servo Motor	Connect the U, V, and W phases of the servo motor

PE grounding terminal	Connect the power supply and servo motor ground
CHARGE Bus voltage	It is used to indicate whether the bus capacitor is in a charged state.

CN5 encoder connection terminal	Connecting the encoder to the servo motor
CN4 control terminal	Connect to the host controller
CN2, CN3 Communication	ETHERCAT communication interface
CN6 USB communication	USB communication reserved
CN1 RS232	RS232 communication interface



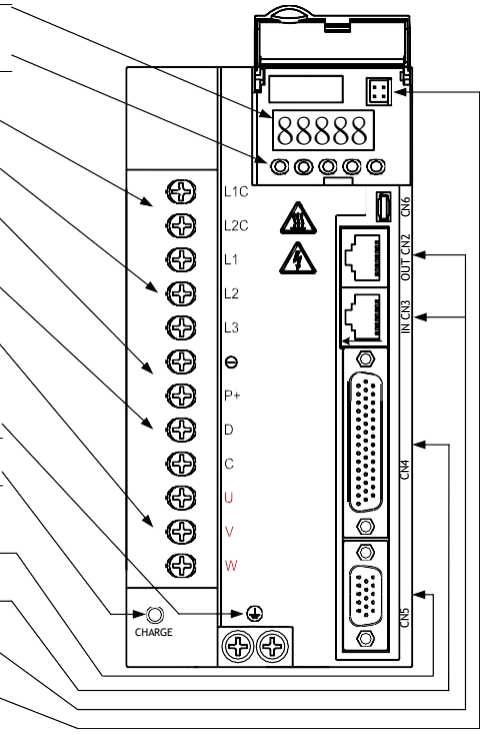
- EA300E -011, 5R6, 8R5, 013, 017, 022, 028

Digital tube display	5-digit seven-segment LED digital tube displays servo operation status
Key operator	Parameter settings

L1C, L2C Control circuit power	Refer to the nameplate rated voltage level Input control circuit power supply
L1, L2, L3 Main circuit power	Refer to the nameplate rated voltage level for input main circuit power supply
P+, ⊖	P+,⊖ DC bus voltage terminal, used for the drive to share the DC bus
P+, D, C external brake resistor	By default, a shorting piece is installed between P+ and D. When an external braking resistor is connected, remove the shorting piece, open the circuit between P+ and D, and connect an external resistor between P+ and C (SIZE D
U, V, W Servo Motor	Connect the U, V, and W phases of the servo motor

PE grounding terminal	Connect the power supply and servo motor ground (SIZE D The PE terminal of the chassis is in the same column with other terminals)
CHARGE Bus voltage indicator light	It is used to indicate whether the bus capacitor is in a charged state. Even if the main circuit power is turned off, the driver internal capacitor still has charge.

CN5 encoder connection terminal	Connecting the encoder to the servo motor
CN4 control terminal	Connect to the host controller
CN2, CN3 Communication	ETHERCAT communication interface
CN1 RS232 terminal	RS232 communication interface



- EA300E-038, 052, 062 models

C Braking resistor	Connect an external brake resistor to P+
L1, L2, L3 power supply	Refer to the nameplate rated voltage level for input main circuit power supply
P+ DC bus positive terminal	The positive terminal of the driver DC bus is used to connect the driver to the DC bus and the external braking resistor with the C terminal.

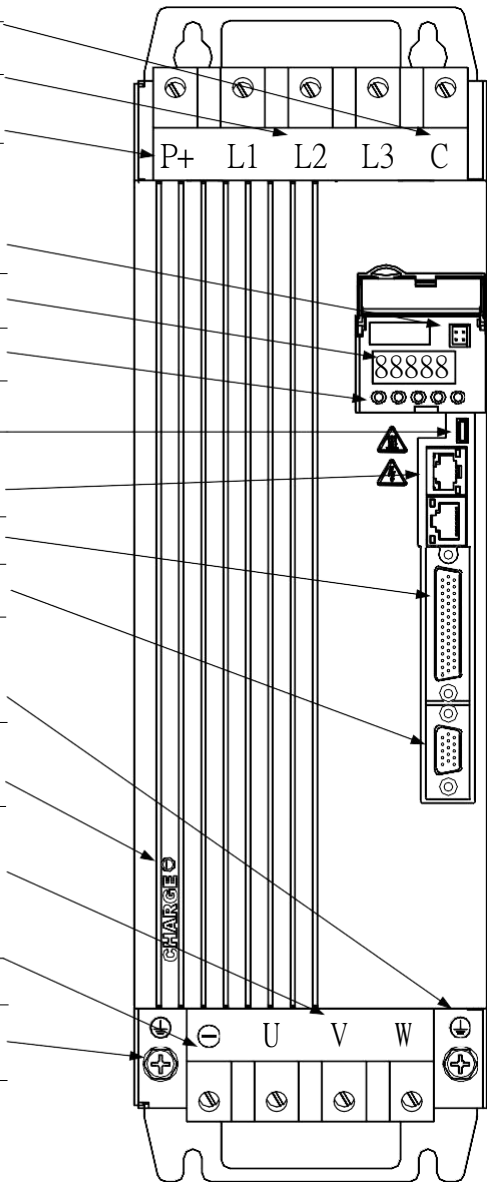
CN1 RS232 Terminal	RS232 communication interface
Digital tube display	5-digit seven-segment LED digital tube displays servo operation status
Key operator	Parameter settings

CN6 USB	MICRO USB communication terminal
CN2, CN3 Communication	ETHERCAT communication interface
CN4 Control Terminals	Connect to the host controller
CN5 Encoder connection	Connecting the encoder to the servo motor

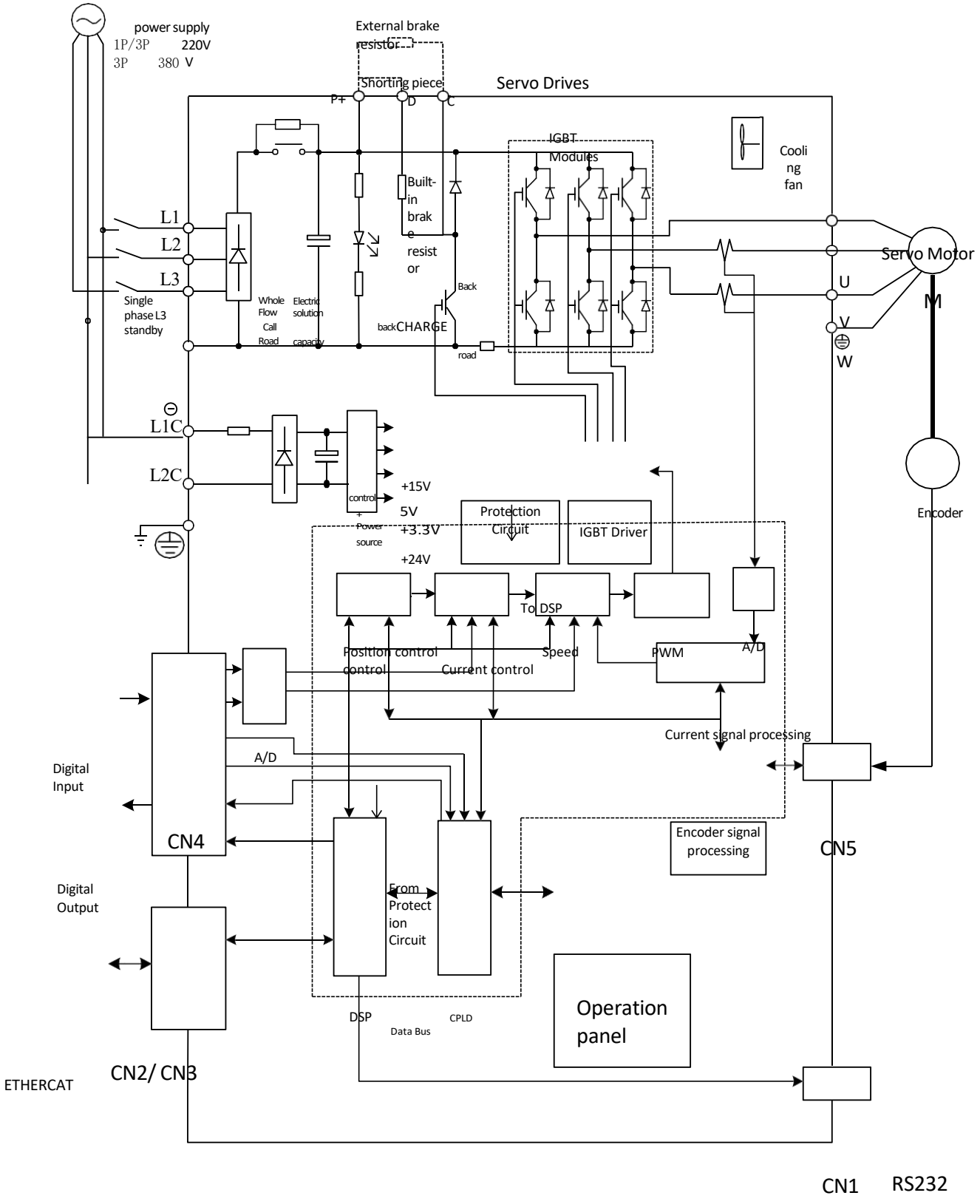
PE Ground terminal	Connect the power supply and servo motor ground

CHARGE Bus voltage indicator light	It is used to indicate whether the bus capacitor is in a charged state. Even if the main circuit power is turned off, the driver internal capacitor still has charge.

⊖ DC bus negative terminal	Negative terminal of the DC bus of the drive, used for sharing the DC bus of the drive
U, V, W Servo Motor	Connect the U, V, and W phases of the servo motor
PE Ground terminal	Connect the power supply and servo motor ground

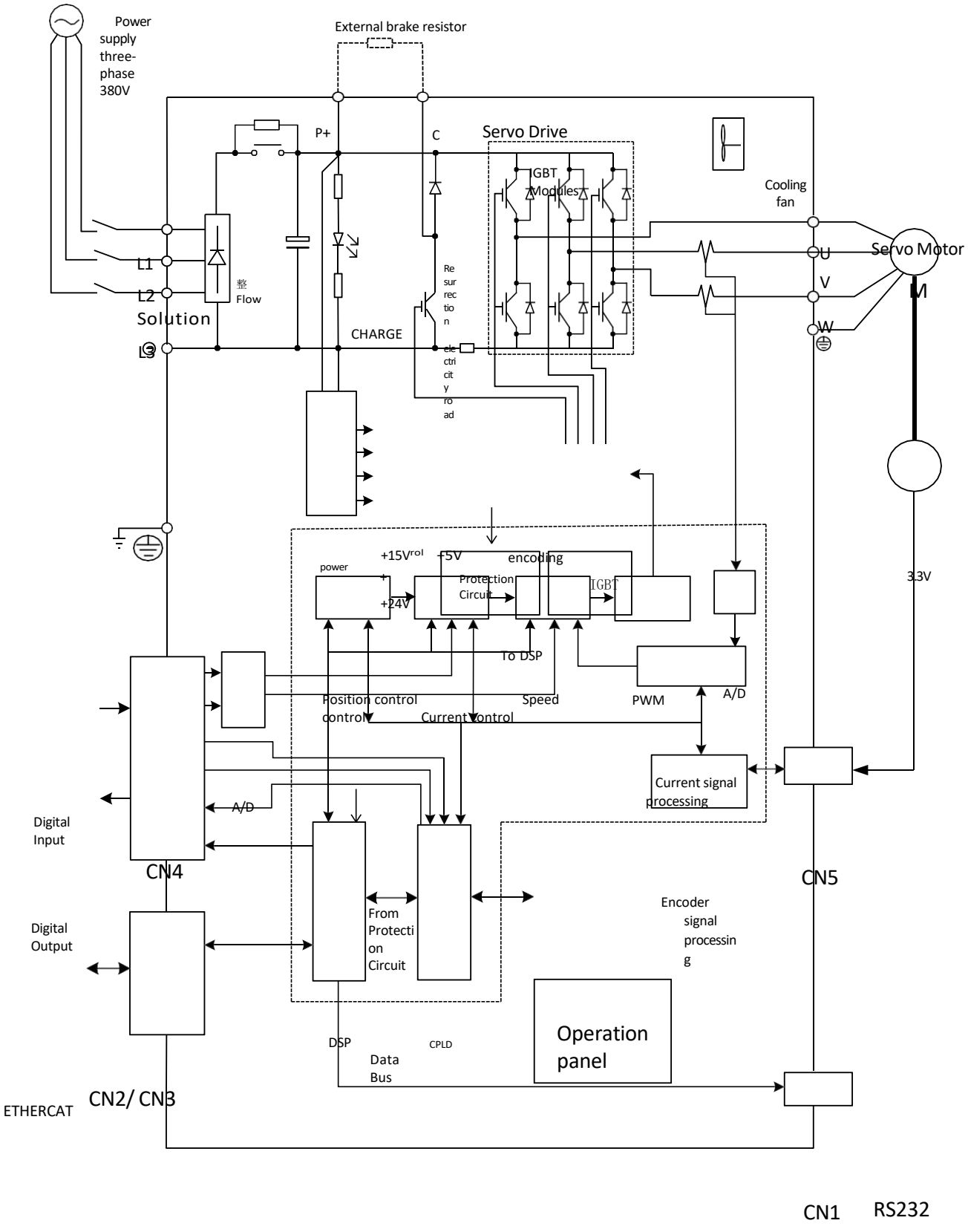


1.2.4 EA300E-028-3B And the following specifications servo drive block diagram



☞	1. EA300E-1R6/2R5/4R8/6R2 Specifications: AC220V Power supply type, no L3 Terminal. 2. EA300E-1R6/2R5/017/022/028 Specifications, without built-in brake resistor, without D Terminals, no shorting link.

1.2.5 EA300E-038-3B Block diagram of servo drives with specifications above



☞	1. EA300E-038/052/062 Specifications: AC380V Power supply type, no built-in braking resistor, no D Terminals, no shorting link. 2. EA300E-038/052/062 Specifications, no auxiliary power interface, does not support independent auxiliary power supply.

1.3 About Servo Motor

1.3.1 Nameplate Description

Note : The text arrangement and content on the actual product nameplate may differ from those shown in the illustration.

1.3.2 Model Description

SES 08 - 0R7- 30- 2 F B Y 1 - XX

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

No.1 Series	2nd digit motor flange size	third digit is the rated output power of the motor
SER : Standard servo motor	04:40mm	005: 50W
SES : High-performance servo motors	06: 60mm	0R1: 100W
SEC : High power servo motor	08: 80mm	0R2: 200W
	09:86mm	0R4: 400W
	11: 110mm	0R7: 750W
4th digit: Motor rated speed	13: 130mm	1R0: 1000W
10: 1000rpm	18:180mm	1R5: 1500W
15: 1500rpm	20: 200mm	2R0: 2000W
20: 2000rpm	23: 230mm	3R0: 3000W
25: 2500rpm	26:266mm	4R4: 4400W
30: 3000rpm	7th digit inertia type	5R5: 5500W
5th digit voltage level	A : Low inertia	7R5: 7500W
2: 220V	B : Medium inertia	011: 11kW
3: 380V	C : High inertia	029:29kW
		9th position option
6th bit encoder type	8th Output Axis Type	Empty: No option
B: 17-bit incremental encoder *3	X: smooth axis, without keyway *1	1: With holding brake (DC24V)
F: 23-bit absolute encoder	Y : With U- shaped keyway, with screw holes *2	2 : With oil seal
	Z : with double round keyway and screw hole	3 : With holding brake and oil seal
		4: With fan *4
		5: With fan and brake *4
		Special Specifications for the 10th Position

*1 : Non-standard variety, not recommended.

*2 : Some types may have double round keyways, but except for 130 Flange motor, key width and height with U The keyway is the same as that of the chapter.

*3 :80 only Motors with flanges of 200mm and below are available.

*4 : Only130 Motors with flanges of specifications above 3000 are available. No conventional products are available and need to be customized.

The above 10 model factors of servo motors cannot be combined at will. Please refer to the selection guide or consult our company.

1.4 Confirm the matching model of the driver and motor

1.4.1 Servo drive and common motor specifications corresponding reference table

Servo Drives			Servo Motor			
Driver Model	Supply voltage	size	Motor Model	Motor power	Rated speed	Rated torque
EA300E- 0R9-1B	Single phase AC220V	SIZE A	SES04-005-30-2 □AY□	50W	3000rpm	0.16Nm
EA300E- 1R6-1B			SES04-0R1-30-2 □AY□	100W	3000rpm	0.32Nm
			SES06-0R2-30-2□BY□	200W	3000rpm	0.64Nm
EA300E- 2R5-1B			SES06-0R4-30-2□BY□	400W	3000rpm	1.28Nm
EA300E- 4R8-2B	Single-phase or three-phase AC220V	SIZE B	SES08-0R7-30-2□BY□	750W	3000rpm	2.38Nm
EA300E- 6R2-2B			SES08-1R0-30-2 □BY□	1000W	3000rpm	3.18Nm
			SER13-1R0-10-2 □BY□	1000W	1000rpm	9.55Nm
			SER13-1R0-20- 2□BY□	1000W	2000rpm	4.77Nm
			SER13-1R0-30- 2□BY□	1000W	3000rpm	3.18Nm
EA300E- 011-2B	Three-phase AC220V	SIZE C	SER13-1R5-10-2 □BY□	1500W	1000rpm	14.32Nm
			SER13-1R5-20- 2□BY□	1500W	2000rpm	7.16Nm
			SER13-1R5-30-2 □BY□	1500W	3000rpm	4.77Nm
EA300E- 5R6-3B	Three-phase AC380V		SER13-1R5-10-3 □BY□	1500W	1000rpm	14.32Nm
			SER13-1R5-20- 3□BY□	1500W	2000rpm	7.16Nm
			SER13-1R5-30- 3□BY□	1500W	3000rpm	4.77Nm
			SES13-0R8-15-3□BY□	850W	1500rpm	5.4Nm
			SES13-1R3-15-3□BY□	1300W	1500rpm	8.3Nm
EA300E- 8R5-3B			SER13-2R0-20- 3□BY□	2000W	2000rpm	9.55Nm
			SES13-1R8-15-3□BY□	1800W	1500rpm	11.4Nm
EA300E- 013-3B			SER13-3R0-20- 3□BY□	3000W	2000rpm	14.32Nm
			SER13-3R0-30- 3□BY□	3000W	3000rpm	9.55Nm
			SES18-2R9-15-3FBY	2900W	1500rpm	19Nm
EA300E- 017-3B		SIZE D	SES18-4R4-15-3FBY	4400W	1500rpm	28Nm
EA300E- 022-3B			SES18-5R5-15-3FBY	5500W	1500rpm	35Nm
EA300E- 028-3B			SES18-7R5-15-3FBY	7500W	1500rpm	48Nm
EA300E- 038-3B		SIZE E	SEC23-015-15-3FBY	15KW	1500rpm	95.5Nm
EA300E- 052-3B			SEC23-022-15-3FBY	22kW	1500rpm	140Nm
EA300E- 062-3B			SEC23-029-15-3FBY	29kW	1500rpm	185Nm

Please note that the encoder type used by the servo motor must be consistent with the encoder type supported by the servo drive. The table only lists some commonly used servo motors. Please consult our company for more specifications.

1.4.2 Encoder cable

Motor flange size	Encoder Type	Cable Model
40~80	Serial incremental encoder	A10-LS-A000- m *1
	Absolute encoder	A10-LA-A000- m *2
110~230	Serial incremental encoder	A10-LS-H100-m/ A10-LS-H400- m
	Absolute encoder	A10-LA-H100-m/ A10-LA-H400-m *2

Note *1 : m Indicates the cable length in meters

Note *2 : The battery for the absolute encoder is installed on the cable. When the absolute encoder is used as an incremental encoder, a serial incremental encoder cable can be used.

1.4.3 Motor power cable / brake cable

Motor flange size	Motor power cable		Brake cable (holding brake)
	Motor power cable	Motor power belt brake (brake) cable	
40~80	A18-LM-A010- m *1	-	A10-LZ-A005- m
110~130	A10-LM-H120-m/A18-LM-H115- m	A10-LB-H120-m/A18-LB-H115- m	-
180(2.9~4.4KW)	A18-LM-M525- m *2	-	A18-LZ-H405- m
180(5.5~7.5KW)	A10-LM-M240- m	-	A18-LZ-H405- m

Note *1 : m Indicates the cable length in meters

Note *2 : For 180 Flange 2.9 and 4.4KW Specifications motor, when equipped with brake, the motor power cable needs to select A10-LM-M220- m

Our company only provides the above cables with odd lengths.
For motors with flange specifications of 200 and above, our company does not provide motor power cables.
If customers want to make cables by themselves, please read the instructions in Chapter 3 of this manual in detail.

Chapter 2 Installation

2.1 Precautions

Please pay special attention to the following:

- The cable between the servo drive and the servo motor should be kept loose and not tight. If the cable between the servo drive and the servo motor is longer than 20 meters, please thicken the UVW cable and the encoder cable.
- **When removing or installing the coupling on the motor shaft, it is strictly forbidden to hit it. Please use shrink-fit and appropriate tools** .
- When fixing the servo drive, the installation direction must be in accordance with the regulations and each fixing screw must be securely tightened.
- Make sure the servo motor shaft is concentric with the equipment shaft to prevent radial stress during operation.
- The four fixing screws of the servo motor must be tightened according to the specified torque.
- In order to ensure a good cooling cycle effect, when installing the AC servo drive, there must be enough space between it and adjacent objects and baffles (walls), otherwise it will cause an alarm.
- The servo drive must not be placed upside down during installation, and its air intake and exhaust holes must not be blocked, otherwise an alarm will occur.

2.2 Storage environment conditions

Please place this product in its packaging box before installation. If the drive is not used temporarily, in order to ensure that the product meets the warranty scope of our company and future maintenance, please pay attention to the following matters during storage:

project	describe
Storage temperature	-20 ℃～+65℃
Storage humidity	Relative humidity 0% to95 % without condensation
vibration	49m/s² or less
Shock	490m/s² or less

2.3 Installation environment conditions

2.3.1 EA300E Servo drive operating environment conditions:

project	describe
Dust and gas	It must be placed in a dust-free location and avoid using it in an environment containing corrosive gases or liquids.
Ambient humidity	Relative humidity 20%~90% (no condensation)
Ambient temperature	0℃～+45℃
vibration	4.9 m/s² or less
Shock	19.6 m/s² or less
altitude	1000m , please use at a reduced rating if above 1000m

2.3.2 SER Series servo motor operating environment conditions

Item	describe
humidity	Relative humidity 20%～80% non-condensing
Ambient temperature	0℃～+40℃
vibration	4.9m/s² below
altitude	Below 1000m, please use derating above 1000m

- Do not use the motor in a closed environment. A closed environment will cause the motor to overheat and shorten its service life.

2.3.3 Other considerations

In addition to the above environmental conditions, whether it is the drive or the motor, please observe the following precautions when selecting the installation location, otherwise the product may not meet the company's warranty scope and future maintenance:

- Places without high-heat devices
- Places free of water droplets, steam, dust and oily dust
- Places without corrosive, flammable gases or liquids
- A place without floating dust and metal particles
- A sturdy place without vibration and electromagnetic noise interference.

2.4 Servo drive installation direction and space

For the dimensions and weight specifications of the servo drive and servo motor, please refer to Chapter 10.

2.4.1 method

Please ensure that the installation direction is perpendicular to the wall. Use natural convection or fans to cool the servo drive. Fix the servo drive firmly on the installation surface through the mounting holes.

When installing, please place the front of the servo drive (the actual installation surface for the operator) facing the operator and make it perpendicular to the wall.

2.4.2 cool down

To ensure air convection, please refer to Figure 2-1 and leave enough space around the servo drive.
In order to prevent the ambient temperature of the servo drive from being locally too high, the temperature inside the electric cabinet must be kept uniform. Please be sure to install a cooling fan above the servo drive in the electric cabinet .

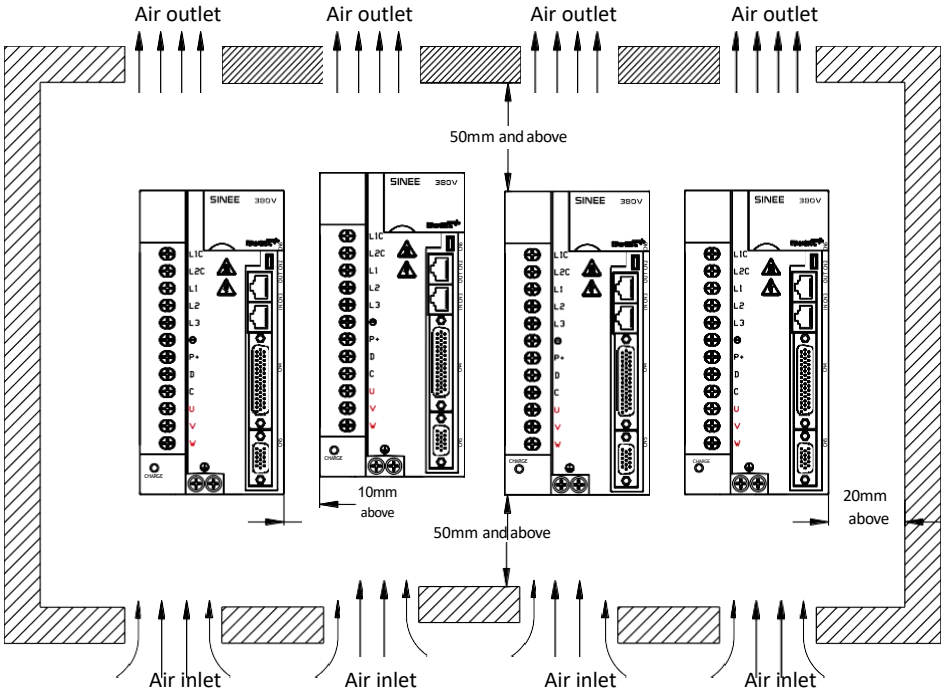


Figure 2-1 Servo drive installation space

2.4.3 Grounding

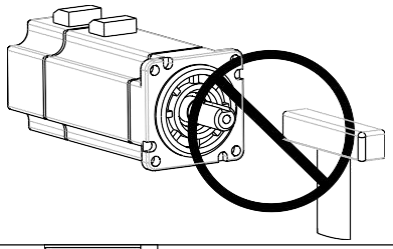
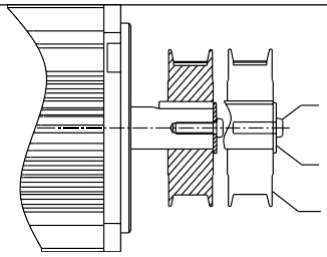
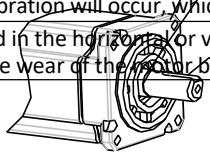
Please make sure to ground the ground terminal, otherwise there may be a risk of electric shock or interference causing malfunction. **Please refer to the instructions in Section 2.8**

2.5 Servo motor installation direction and space

2.5.1 Motor installation

SER series servo motors must be properly installed on a dry and solid platform. During installation, please maintain good ventilation and heat dissipation circulation, and keep good grounding. **For the motor's appearance size and weight specifications, please refer to Chapter 10 Specifications.**

2.5.2 Installation Diagram

Item	describe
Anti-rust treatment	Please wipe clean the "rust preventive" on the shaft end of the servo motor before installation, and then do relevant anti-rust treatment
Encoder Note	● **During the installation process, it is forbidden to hit the shaft end, otherwise the internal encoder will be broken.** 
Pulley installation	●  ● When installing a pulley on a servo motor shaft with a keyway, use a screw hole at the end of the shaft. To install the pulley, first insert the stud into the screw hole of the shaft, use a washer on the coupling end surface, and gradually lock the pulley with a nut. ● For a servo motor shaft with a keyway, use the screw hole at the end of the shaft to install. For a smooth shaft without a keyway, use a wear coupling or similar method. ● When removing the pulley, use the pulley to remove it to prevent the bearing from being impacted. ● To ensure safety, a protective cover or similar device must be installed in the rotating area.
centering	● When connecting to the machine, please use a coupling and keep the axis of the servo motor and the axis of the machine in a straight line. The radial runout of the coupling should not be greater than 0.03mm. If the centering is not sufficient, vibration will occur, which may damage the bearings and encoders, etc.
Installation direction	● The servo motor can be installed in the horizontal or vertical direction. Do not install it in an inclined direction, otherwise it may cause wear of the motor bearings. 
Oil and Water Countermeasures	When using in a place where water drops are dripping, please use it after confirming the protection level of the servo motor (except for the shaft penetration part). When using in a place where oil drops may drip onto the shaft penetration part, please specify to use a servo motor with an oil seal. ● Usage conditions of servo motors with oil seals: ● Make sure the oil level is lower than the lip of the oil seal when using. ● Please use it in a state where the oil seal can maintain a good degree of oil splashing. ● When installing the servo motor vertically upward, be careful not to let oil accumulate on the lip of the oil seal.
Cable stress conditions	Do not bend the wires excessively or apply tension to them, especially the encoder signal wire, which has a very thin core wire of 0.14mm or 0.2mm, so do not stretch it too tight during wiring and use.
Connector processing	**Regarding the connector, please note the following:** 1.When connecting the connector, please confirm that there is no foreign matter such as garbage or metal debris in the connector. 2.When connecting the connector to the servo motor, be sure to connect it from the servo motor main circuit cable side first, and the ground wire of the main cable must be reliably connected. If the encoder cable side is connected first, the encoder may generate an alarm due to the potential difference between PE. 3.When wiring, please confirm that the pin arrangement is correct. The connector is made of resin or aluminum alloy. Do not apply impact to avoid damaging the connector. 4.When carrying the servo motor with the cable connected, be sure to hold the servo motor body. If you only hold the cable for transportation, the connector may be damaged or the cable may be broken. If you need to bend the cable, pay full attention during the wiring operation and do not apply pressure or tension to the connector part, otherwise it may cause damage to the connector or poor contact.

2.6 Circuit Breaker and Fuse Recommendations

If the driver is equipped with a leakage circuit breaker as a leakage alarm protection, in order to prevent the leakage circuit breaker from malfunctioning, please select a model with a sensitivity current of more than 200mA and an action time of more than 0.1 seconds.

Please use a fast-blow fuse, and its rated current should be selected at about 1.5 times the drive capacity. **Strongly recommended: Use UL / CSA Acceptable fuses and circuit breakers.**

2.7 Selection of brake resistor

When the output torque and speed of the motor are in opposite directions, energy will be transferred back to the driver from the load end. This energy will be injected into the capacitor in the busbar, causing the voltage value of the busbar inside the driver to rise. The amount of recharged energy depends on the inertia of the motor rotor and the load. If the system inertia is small, the recharged energy may be absorbed by the capacitor inside the driver, but if the system inertia is large and exceeds the energy that the capacitor can absorb, the voltage value may rise too high, causing the driver to shut down or even damage. Therefore, when the voltage rises to a certain value, the recharged energy must be consumed by the braking resistor.

The following table 2-1 The rotor inertia of common servo motors and the absorption capacity of the internal capacitor of the EA300E drive are listed, as well as the calculation formula for regenerative energy.

Table2-1 Common servo motor rotor inertia and regenerative energy that can be absorbed by capacitors

Driver Model	Motor	Rotor inertia J(10 ^{4}kg m^2)	Regenerative energy from no-load rated speed to standstill *Eo* (joule)	Maximum regenerative energy of capacitor *Ec* (joule)
EA300E- 0R9-1B	SES04-005-30-2 □ AY	0.02	0.1	9.5
EA300E- 1R6-1B	SES04-0R1-30-2 □ AY	0.04	0.2	9.5
	SES06-0R2-30- 2 □ BY	0.29	1.43	9.5
EA300E- 2R5-1B	SES06-0R4-30- 2 □ BY	0.58	2.87	19
EA300E- 4R8-2B	SES08-0R7-30- 2 □ BY	1.56	7.71	20.2
EA300E- 6R2-2B	SER13-1R0-20- 2 □ BY	8.71	19.1	twenty four
EA300E- 011-2B	SES13-0R8-15-2FBY	13.95	17.25	45.7
EA300E- 5R6-3B	SES13-1R3-15-3FBY	19.95	24.66	31.4
EA300E- 8R5-3B	SES13-1R8-15-3FBY	26.1	32.27	51.7
EA300E- 013-3B	SES18-2R9-15-3FBY	46.0	56.87	51.7
EA300E- 017-3B	SES18-4R4-15-3FBY	67.5	83.45	110.7
EA300E- 022-3B	SES18-5R5-15-3FBY	89	110.0	110.7
EA300E- 028-3B	SES18-7R5-15-3FBY	125	154.53	138.4
EA300E- 038-3B	SEC23-015-15-3FBY	380	469.78	207.6
EA300E- 052-3B	SEC23-022-15-3FBY	500	618.13	276.8
EA300E- 062-3B	SEC23-029-15-3FBY	620	766.48	276.8
● **Regeneration energy calculation formula:** *Eo* *J* ^{2} /182(j) :rpm, generally the rated speed of the motor				
The motor rotor inertia of a servo motor with a holding brake is very similar to that of a servo motor without a brake and can be considered the same.				

2.7.1 Built-in brake resistor

Some specifications of EA300E The series drivers contain a brake resistor, which is suitable for general load inertia conditions. Table 2-2 For EA300E Series built-in brake resistor specifications.

Table2-2 EA300E The minimum resistance of the driver's built-in brake resistor and the allowable external brake resistor

Driver Model	Built-in brake resistor specifications		Built-in brake resistor to handle regenerative capacity	Minimum allowable resistance value of external braking resistor
	Resistance value (P8-10)	Capacity (P8-11)		
EA300E- 0R9-1B	none	none	none	50Ω
EA300E- 1R6-1B	none	none	none	50Ω
EA300E- 2R5-1B	none	none	none	50Ω
EA300E- 4R8-2B	50Ω	100W	50W	40Ω
EA300E- 6R2-2B	50Ω	100W	50W	40Ω
EA300E- 011-2B	50Ω	100W	50W	40Ω
EA300E- 5R6-3B	50Ω	100W	50W	50Ω
EA300E- 8R5-3B	50Ω	100W	50W	50Ω
EA300E- 013-3B	50Ω	100W	50W	45Ω

EA300E- 017-3B	none	none	none	30Ω
EA300E- 022-3B	none	none	none	30Ω
EA300E- 028-3B	none	none	none	25Ω
EA300E- 038-3B	none	none	none	10Ω
EA300E- 052-3B	none	none	none	10Ω
EA300E- 062-3B	none	none	none	10Ω

2.7.2 Calculation of external braking resistor capacity

- When the regenerative capacity exceeds that which the built-in brake resistor can handle (for example, when an alarm occurs R) 0 7, an external brake resistor should be used .
- N times the motor rotor inertia , the regenerative energy is N*Eo when the motor is braked from rated speed to 0 , and the action cycle is T (s), then

$$\text{Power of brake resistor} = \frac{2(\times 0 -}{)}$$

E , E Please see Table 2-1 .

0 c

2.7.3 Precautions when using an external braking resistor

- P + and C terminals of the driver . At the same time , the short-circuit sheet installed on the P+ and D terminals must be removed to make the P and D terminals in an open circuit state.
- The resistance of the external braking resistor cannot be less than that listed in Table 2-2, otherwise the drive may be damaged.
- Please correctly set the resistance value and capacity of the external braking resistor used in the function parameters of the drive, otherwise it will affect the execution of this function.
  - P8-10 (brake resistor value), P8-11 (brake resistor power), P8-13 (brake resistor derating percentage) .
- In natural environment, when the regenerative capacity (average value) that the brake resistor can handle is used at the rated capacity, the temperature of the resistor will rise to above 120 ℃ (under continuous braking). For safety reasons, please use forced cooling to reduce the temperature of the brake resistor; or it is recommended to use a brake resistor with a thermal switch.

☞
1. **The resistance of the external braking resistor should not be less than that specified in Table 2-2, otherwise the driver may be damaged.**
2. **When using an external braking resistor, if the short-circuit between P and D is not removed, the driver may be damaged。**

For the load characteristics of the brake resistor, please consult the manufacturer.

2.8 Anti-interference measures

Important

Since the servo unit is an industrial device, no radio interference prevention measures are taken.
Since the main circuit of the servo unit uses high-speed switching devices, its peripheral devices may be affected by the electromagnetic noise generated by the switching devices during the switching process. When using it near a residence or in other places where radio interference is a concern, please take measures to prevent noise interference.

The servo drive has a built-in microprocessor and may be affected by electromagnetic noise from peripheral devices of the drive.
To suppress noise interference between the servo drive and peripheral equipment, the following anti-electromagnetic noise measures can be taken as needed.

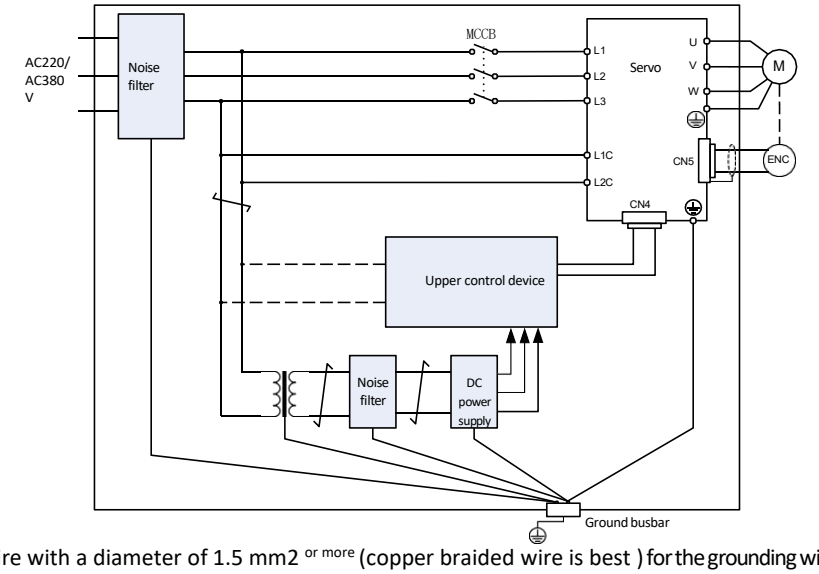
- Place the input command device and electromagnetic noise filter as close to the servo drive as possible.
- Be sure to install a surge absorber on the coil of a relay, solenoid, or electromagnetic contactor.
- Do not put the following cables into the same conduit or duct, and do not bundle them together. In addition, keep 30cm apart when wiring. The interval above.
  - Main circuit cables and input and output signal cables.
  - Main circuit cable and encoder cable.
- Do not use the same power supply as an EDM machine, electric welder, high-frequency induction furnace, etc. Even if it is not the same power supply, if there is a high-frequency generator nearby, please connect a noise filter to the input side of the main circuit power cable and the control power cable. Please refer to Section 2.8.1 for the method of connecting the noise filter .
- Please perform proper grounding.

2.8.1 Noise Filters (EMI Filters

All electronic devices (including servo drives) will generate some high-frequency or low-frequency noise during normal operation, which will interfere with the surrounding environment through conduction or radiation.
If it can be matched with appropriate EMI Filters (EMI Filter) and the correct installation method will minimize interference.
Servo Drives and EMI When installing the filter, provided that the installation and wiring are carried out in accordance with the instructions in the user manual, we can be sure that it meets the following specifications:

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

The following is a wiring example



Note: Please use a wire with a diameter of 1.5 mm2 $^{\text{or more}}$ (copper braided wire is best) for the grounding wire.

2.8.2 Noise Filters (EMI Filter) Installation Notes:

To ensure EMI Filters (EMI Filter) can play the greatest role in suppressing servo drive interference. In addition, the servo drive must be installed and

In addition to wiring, the following points should be noted:

1) Servo Drives and EMI The filter must be mounted on the same well-grounded metal plane.
2) Keep all wiring as short as possible.
3) Servo Drives and EMI The metal shell of the filter must be reliably connected to the metal plane, and the contact area between the two should be as large as possible.
4) The input and output wiring of the noise filter should be arranged separately. Do not put them in the same conduit or wire duct, and do not bundle them together.
5) The ground wire of the noise filter is arranged separately from the output wiring.
6) The ground wire of the noise filter should be connected to the ground busbar separately and not shared with other ground wires.

2.8.3 Selection of motor wire and installation precautions

Whether the motor line is selected and installed correctly is related to the EMI filter (EMI Filter) can play the greatest interference suppression effect. Please note the following points:

1) Use cables with isolated copper mesh (preferably with double isolation layers)
2) The isolated copper mesh at both ends of the motor wire must be grounded with the shortest distance and maximum contact area.
3) The connection method between the motor line isolation copper mesh and the metal plane must be correct. The isolation copper mesh at both ends should be fixed to the metal plane using a U- shaped metal piping bracket.

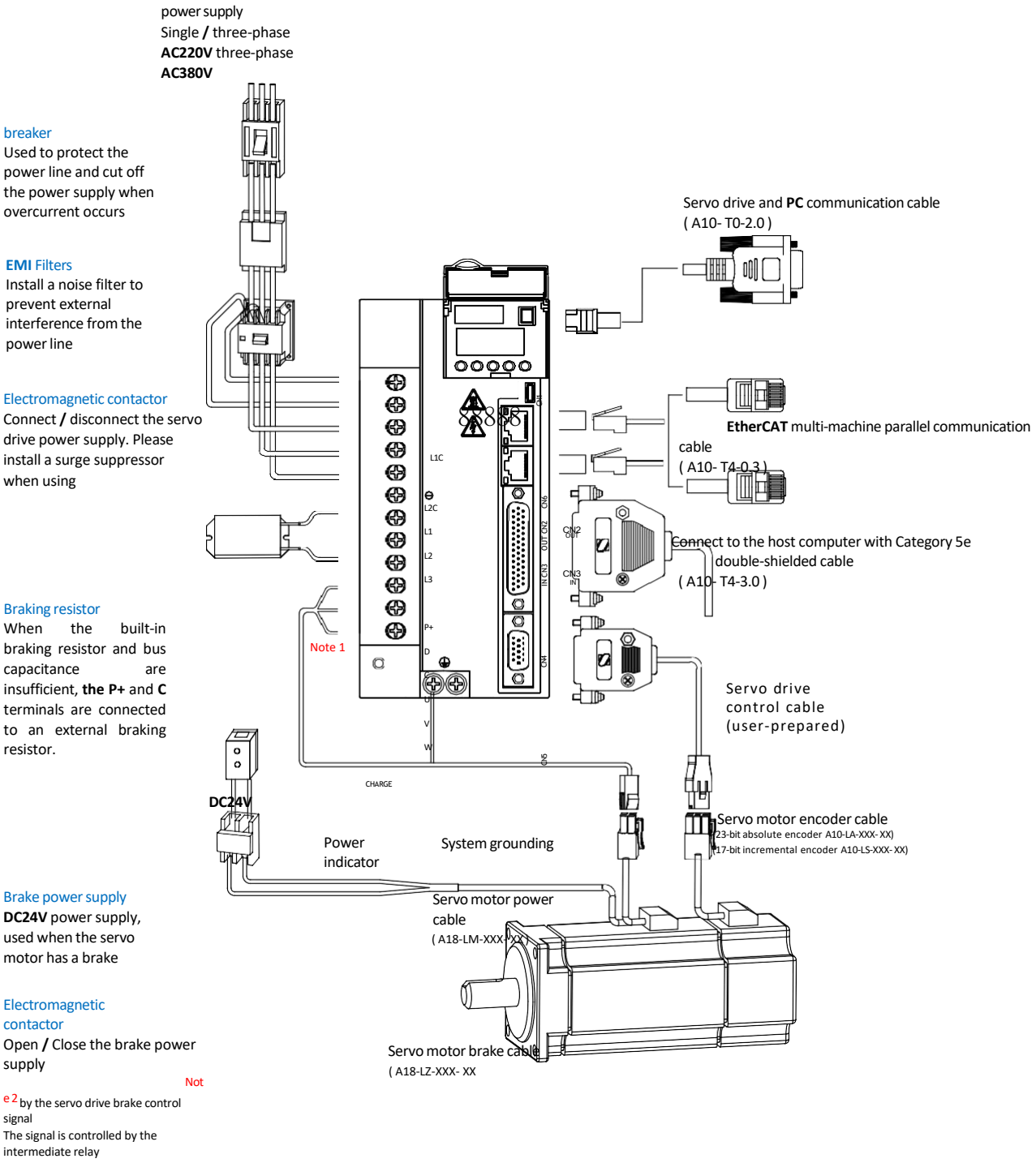
2.8.4 Grounding

Please follow the following instructions for grounding. Proper grounding can prevent malfunctions caused by electromagnetic interference.

- Must be single point grounded
- The grounding resistance should be less than 100 Ω .
- When the servo motor and the machine are insulated from each other, ground the servo motor directly.
- PE o f servo motor The terminal must be connected to the ground terminal of the servo drive.⏚connected .
- Servo drive ground terminal "⏚" must be grounded .

Chapter 3 Wiring

3.1 Peripheral device connection



Note:

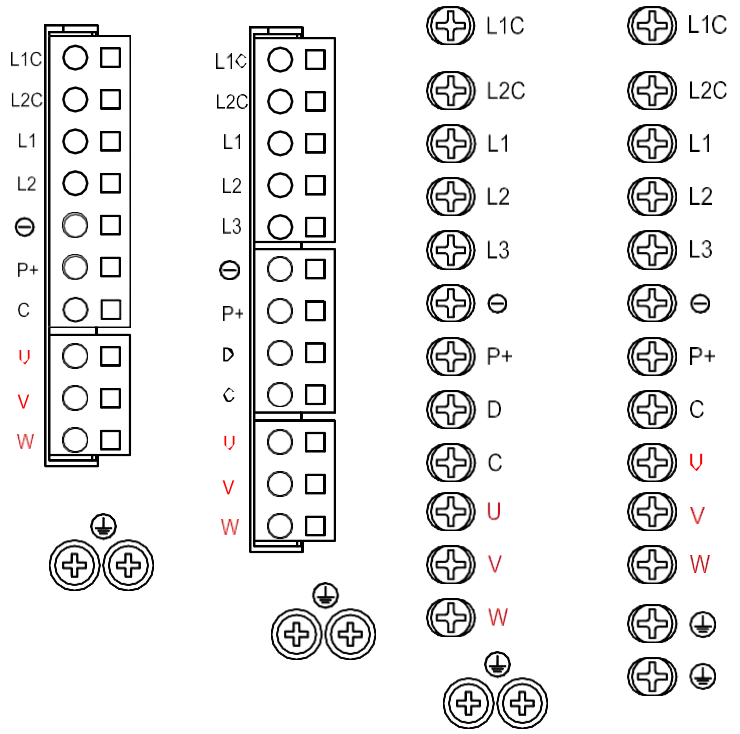
1) The servo drive is directly connected to the industrial power supply without using a transformer or other power isolation. To prevent cross electric shock accidents in the servo system,
   Use fuses or circuit breakers for wiring.
2) It is strictly forbidden to install an electromagnetic contactor between the driver and the motor, as this will cause damage to the driver.
3) When connecting external control power and holding brake power, please pay attention to the power capacity, especially when powering several drivers or holding brakes at the same time. Insufficient power capacity will lead to insufficient power supply current and damage to the driver or holding brake. Please note that the holding brake power supply is 24V A DC power supply whose capacity should meet the power requirements of the holding brake. For the power of the holding brake, please refer to the instructions of the servo motor.

4) Confirm the servo motor output U , V , W The terminal phase sequence wiring is correct. Incorrect wiring may cause the motor to not rotate or rotate randomly, which may cause an alarm or even damage the motor.
5) When using an external braking resistor, connect P+ and D The end is open circuit, and the external braking resistor should be connected to P+ , C If you use the internal braking resistor, you need to connect P+ and D The terminals are short-circuited and P+ , C End open circuit (refer to Section 2.7)
6) In single-phase 220V When wiring, the main power supply terminals are L1 and L2 , and the empty L3 Do not connect wires to the terminals.
7) The electromagnetic contactor of the holding brake should be controlled by the DO Terminal control, and pay attention to the allowable voltage and current of the DO terminal.

3.2 Main circuit terminal wiring

The main circuit (power part) terminal arrangement and screw size are shown below.

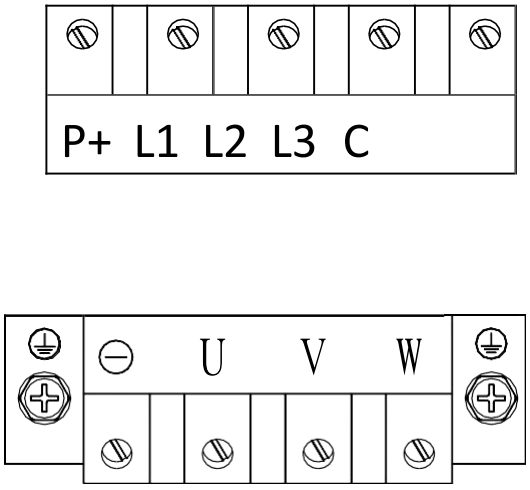
EA300E-0R9-1B EA300E-1R6-1B EA300E- 2R5-1B	EA300E-4R8-2B EA300E- 6R2-2B	EA300E- 011-2B EA300E-5R6-3B EA300E-8R5-3B EA300E- 013-3B	EA300E-017-3B EA300E-022-3B EA300E- 028-3B



Specifications	Main circuit terminal	
	Screw size	Tightening torque
EA300E-0R9-1B EA300E-1R6-1B EA300E-2R5-1B	none	-
EA300E-4R8-2B EA300E-6R2-2B	none	-
EA300E-011-2B EA300E-5R6-3B EA300E-8R5-3B EA300E-013-3B	M4	2.5N.m
EA300E-017-3B EA300E-022-3B	M4	2.5N.m

Specifications	PE ground terminal	
	Screw size	Tightening torque
EA300E-0R9-1B EA300E-1R6-1B EA300E-2R5-1B	M4	2.5N.m
EA300E-4R8-2B EA300E-6R2-2B	M4	2.5N.m
EA300E-011-2B EA300E-5R6-3B EA300E-8R5-3B EA300E-013-3B	M4	2.5N.m
EA300E-017-3B EA300E-022-3B EA300E-028-3B	M4	2.5N.m

EA300E-038-3B
EA300E-052-3B
EA300E- 062-3B



Driver Specifications	Main circuit terminal	
	Screw size	Tightening torque
EA300E- 038-3B EA300E- 052-3B EA300E- 062-3B	Wiring frame	3.5Nm

Driver Specifications	PE Ground terminal	
	Screw size	Tightening torque
EA300E- 038-3B EA300E- 052-3B EA300E- 062-3B	M5	3Nm

The main circuit cable does not require cold-pressed terminals, and the stripping length is 19mm .

3.2.1 main circuit (strong current) terminals

Table3-1 Description of the main circuit terminals of the servo drive

Terminal marking	Terminal name	Terminal Function	
L1C , L2C	Control power input terminal	Input single-phase voltage consistent with the main circuit power level (EA300E-038 , 052 , 062 Specifications do not have this terminal)	
L1 , L2 , L3	Main circuit AC power input terminal	EA300E- 0R9-1B EA300E- 1R6-1B EA300E- 2R5-1B	L1 , L2 Single-phase 220V enter
		EA300E- 4R8-2B EA300E- 6R2-2B	L1 , L2 Single-phase 220V enter or L1 , L2 , L3 Three-phase 220V Power Input
		EA300E- 010-2B	L1 , L2 , L3 Three-phase 220V power input
		EA300E- 5R6-3B EA300E- 8R5-3B EA300E- 013-3B EA300E- 017-3B EA300E- 022-3B EA300E- 028-3B EA300E- 038-3B EA300E- 052-3B EA300E- 062-3B	Three-phase 380V Power Input
P+ 、 D 、 C	External brake resistor connection terminal	Default P+ , D If the braking capacity is insufficient, please connect P+ and D Open the circuit between P + and C, and connect an external braking resistor between P+ and C. Please purchase the external braking resistor separately. (EA300E-0R9 , 1R6 , 2R5 , 017 , 022 , 028 , 038 , 052 , 062 Specification No D Terminal block, no shorting wire)	
P+ 、 ⊖	Common DC bus terminal	The DC bus terminals of the servo drive can share the bus when multiple machines are connected in parallel.	
U , V , W	Servo motor connection terminals	Servo motor connection terminals and motor U , V , W are connected.	
⏚	PE Grounding	Two grounding terminals are connected to the power supply and motor grounding terminals.	

3.2.2 Power Wiring

The servo drive power supply wiring method is divided into single-phase and three-phase. Single-phase is only allowed to be used for output current 6.2A And the following models.

- Single-phase power wiring method (applicable to drivers with rated output current of 6.2A and below)

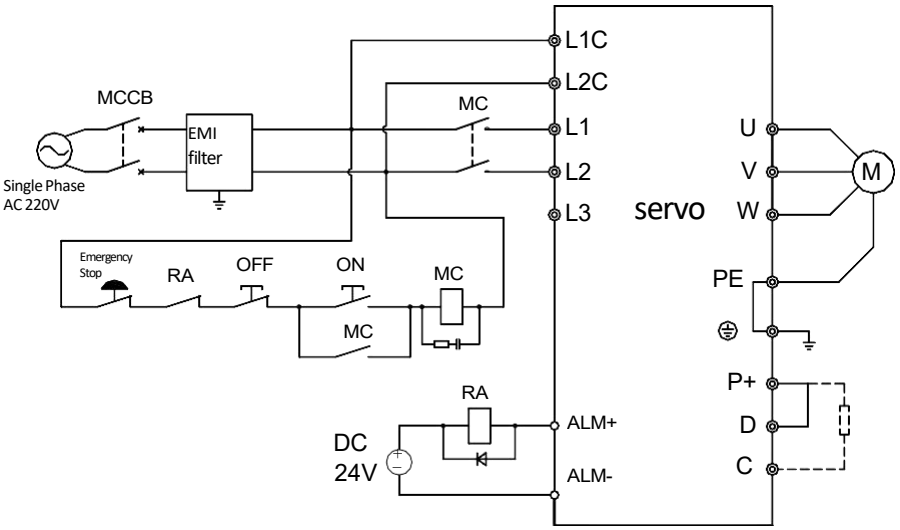


Figure 3-1 Single-phase power supply wiring diagram

- Three-phase power wiring method (applicable to drivers with rated output current of 4.8A to 28A)

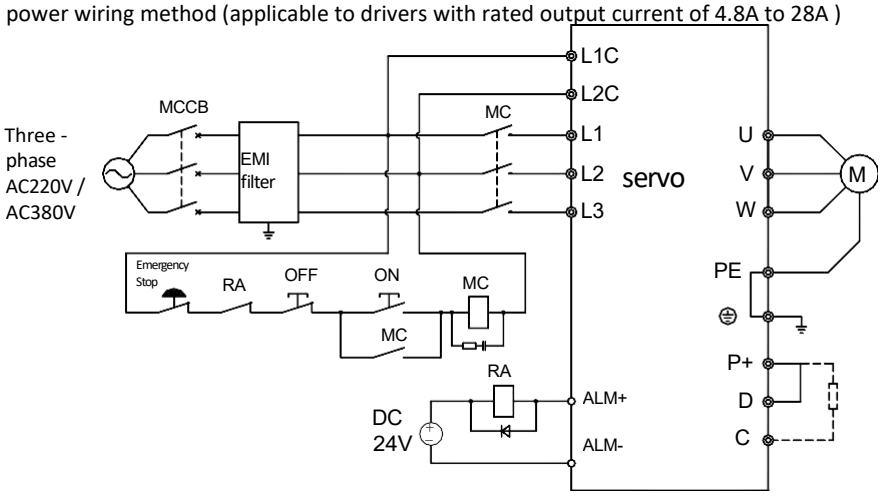
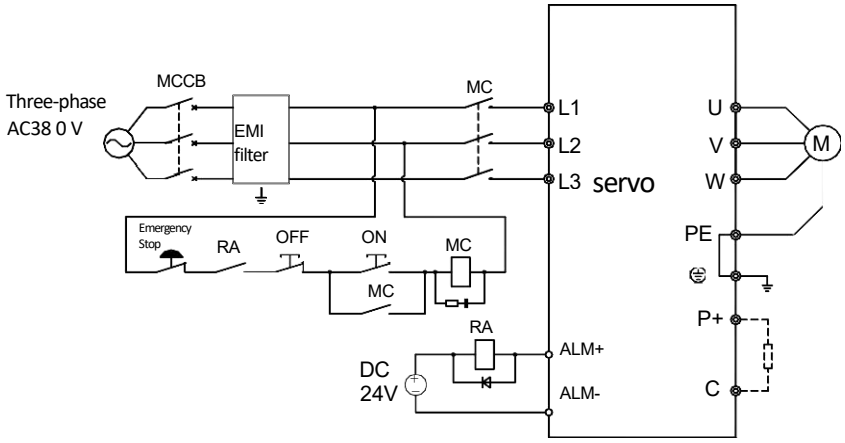


Figure 3-2 Three-phase power supply wiring diagram (4.8~28A specifications)

☞	**1. If you do not want to cut off the main circuit power supply when an alarm occurs, there is no need to use the RA relay.** 2. **L1C and L2C do not need to use external power supply, but can be connected to P+ and - terminals respectively (no need to distinguish polarity) .**

- Three-phase power wiring method (for rated output current 38A and above)



3.2.3 Power on timing diagram

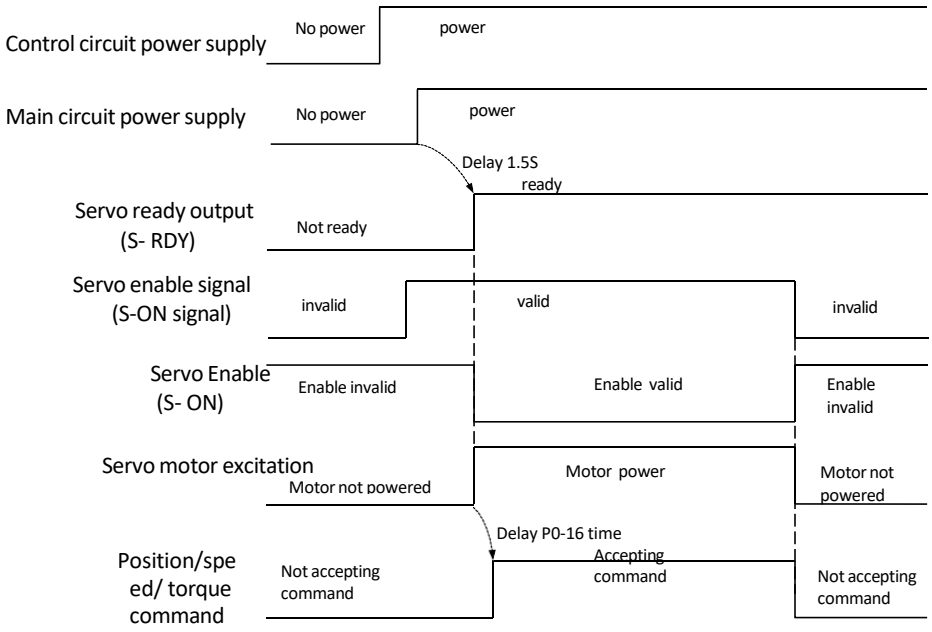


Figure 3-4 Power-on

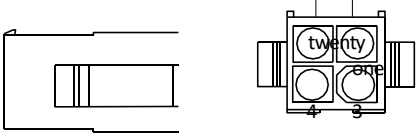
Sequence Diagram For power connection, please refer to Figure 3-1 , Figure 3-2

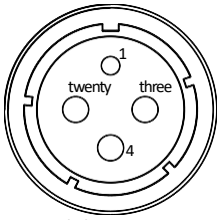
and Figure 3-3, and connect the power in the following order:

1) L1C , L2C of control circuit It must be turned on before or at the same time as the main circuit power supply. If only the control circuit power supply is turned on, the servo ready signal (S-RDY) will not be effective.
2) (three-phase to L1 , L2 , L3 , single-phase to L1 , L2) through the electromagnetic contactor .
3) After the main circuit power is turned on, there is a delay of about 1.5 seconds, and the servo ready signal (SRDY) is valid. At this time, the servo enable (S-ON) signal can be received. After the servo enable signal is detected to be valid, the motor is excited and in the running state. If the servo enable is detected to be invalid or there is an alarm, the driver output is turned off and the motor is in a free state.
4) When the servo enable is turned on together with the power supply, the motor is energized after approximately 1.5 seconds.
5) Frequent on and off of the main circuit power supply may damage the soft start circuit and the energy consumption braking circuit. The on and off frequency should be limited to 5 per hour. times, 30 per day Second-rate
   If the drive unit or motor is overheated, after eliminating the alarm cause, it will take 30 seconds . Allow to cool down for minutes before reconnecting to the power source.
6) Never connect the input power line to the output terminals U , V , W , as this will damage the servo drive.
7) It is absolutely forbidden to connect the brake resistor to the DC bus P+ , ⊖terminals, otherwise it may cause a fire .
8) CHARGE indicator on the servo drive panel is off before performing inspection operations.

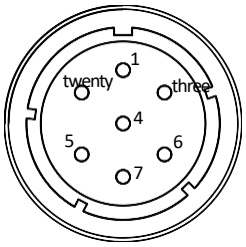
3.2.4 Specifications of motor power cable connector

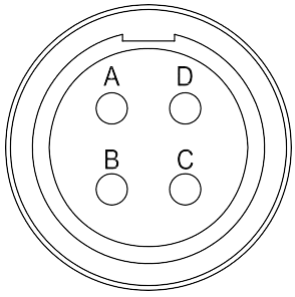
Table3-2 Terminals for connecting motor power cables to servo motors

<table>
<tr><th>Connector shape and model</th><th>Terminal pinout</th><th>Motor flange</th></tr>
<tr><td> 

Housing Model: 172159-1 TE MATE-N- LOCK
Plug spring model: 170362-1 TE MATE-N- LOCK</td><td>4PIN Amp connector (without brake)
<table><tr><th>Pin Number</th><th>Function Definition</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></table></td><td>40
60
80
86</td></tr>
<tr><td> 

Model: YD28K4TS</td><td><table><tr><th>Pin Number</th><th>Function Definition</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></table>
Aviation plug (without brake)</td><td>110
130 (SER series)</td></tr>
</table>

<table>
<tr><th>Connector shape and model</th><th>Terminal pinout</th><th>Motor flange</th></tr>
<tr><td> 

Model: YD28K7TS</td><td>Aviation plug (including brake)
<table>
<tr><th>Pin Number</th><th>Function Definition</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>
<tr><td>5</td><td>24V (brake)</td></tr>
<tr><td>6</td><td>0V (brake)</td></tr>
<tr><td>7</td><td>null</td></tr>
</table></td><td>110
130 (SER series)</td></tr>
<tr><td> 

Model: MS3108A32-17S
MS3108A18-10S
MS3108A22-22S</td><td><table>
<tr><th>Pin Number</th><th>Function Definition</th></tr>
<tr><td>A</td><td>U</td></tr>
<tr><td>B</td><td>V</td></tr>
<tr><td>C</td><td>W</td></tr>
<tr><td>D</td><td>PE</td></tr>
</table>
Aviation plug</td><td>130 (SES series)
180 (SES series)</td></tr>
<tr><td>Barrier Terminal Blocks</td><td></td><td>200
220
230
266</td></tr>
</table>

1. For40 , 60 , 80 , 86 The motor with flange brake has an independent 2P brake power supply Amp plug, no need to distinguish polarity.
2. ForSES Series motors with brakes, the brake power supply uses a CM10-SP2S-MD Plug, no polarity required.
3. The graphics drawn in the table are the cable ends.

3.2.5 Recommended specifications of main circuit connection cables

Tabl e3-3 Recommended specifications of main circuit connection cables

Driver Model	L1C , L2C	L1 , L2 , L3	U， V， W	P+， C	PE
EA300E- 0R9-1B	0.5mm ^{2}	0.5mm ^{2}	0.5mm ^{2}	0.5mm ^{2}	1.0mm ^{2}
EA300E- 1R6-1B		0.75mm ^{2}	0.75mm ^{2}	0.75mm ^{2}	1.0mm ^{2}
EA300E- 2R5-1B		1.0mm ^{2}	1.0mm ^{2}	1.0mm ^{2}	2.5mm ^{2} above
EA300E- 4R8-2B					
EA300E- 6R2-2B					
EA300E- 011-2B		2.5mm ^{2}	2.5mm ^{2}	2.5mm ^{2}	
EA300E- 5R6-3B		1.5mm ^{2}	1.5mm ^{2}	1.5mm ^{2}	
EA300E- 8R5-3B		2.5mm ^{2}	2.5mm ^{2}	2.5mm ^{2}	
EA300E- 013-3B					
EA300E- 017-3B		4.0mm ^{2}	4.0mm ^{2}	2.5mm ^{2}	
EA300E- 022-3B					
EA300E- 028-3B		6.0mm ^{2}	6.0mm ^{2}	4.0mm ^{2}	
EA300E- 038-3B	none	10.0mm ^{2}	10.0mm ^{2}	6.0mm ^{2}	10mm ^{2} above
EA300E- 052-3B		16.0mm ^{2}	16.0mm ^{2}	6.0mm ^{2}	
EA300E- 062-3B		25.0mm ^{2}	25.0mm ^{2}	6.0mm ^{2}	

P+ , C are the wires connected to the brake resistor. The recommended specifications are calculated based on a 30% brake utilization rate. In actual applications, please adjust according to the actual working conditions. For example, if the vehicle is dragged at a high speed for a long time, you need to choose a cable with a specification larger than the recommended value.

3.3 CN5 Encoder signal terminal

CN5 It is the encoder signal terminal, which is a DB15 socket. Its location is shown in Figure 3-5 :

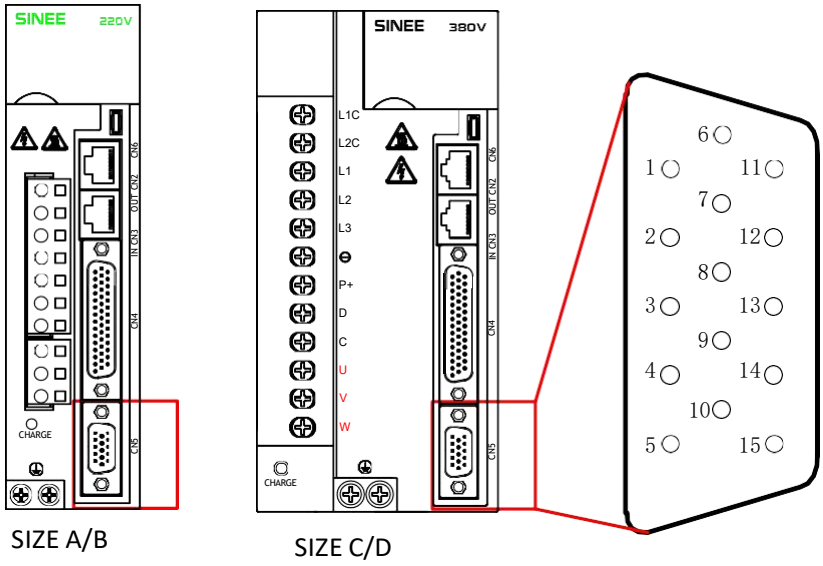
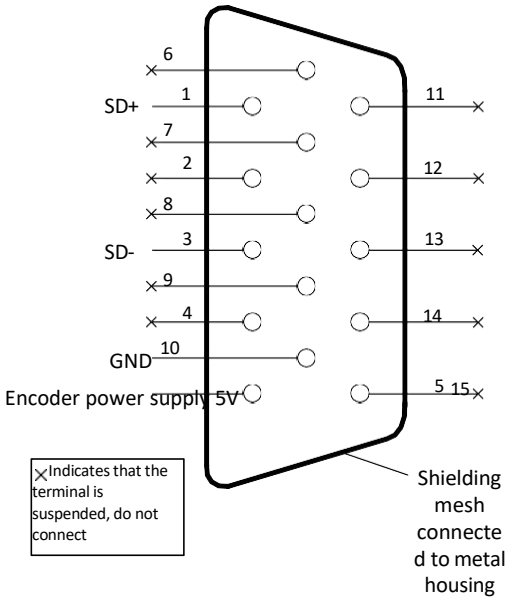


Figure3-5 CN5 Terminal location

3.3.1 Definition of encoder terminals on the driver side



CN5 17/23 bit encoder terminal definition

Figure3-6 CN5 Terminal pinout

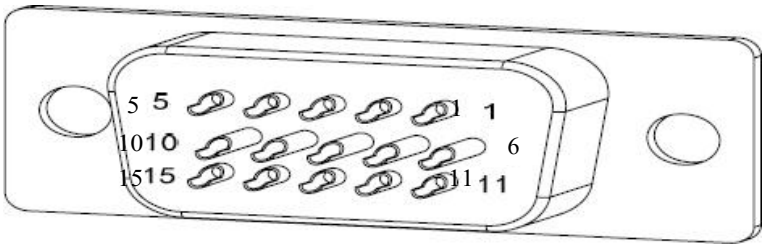
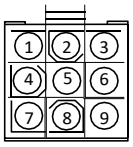
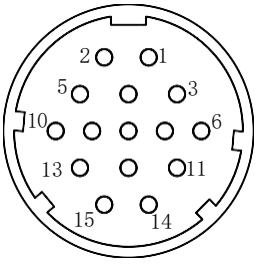
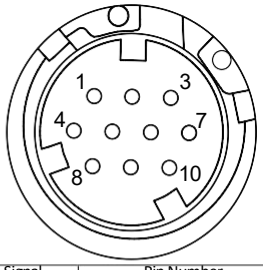


Figure3-7 CN5 Terminal welding pin layout

3.3.2 Definition of servo motor side encoder terminal

4 on the servo motor side Encoder terminals in various shapes

	TE 172161-1		YD28K15TS		CM10-SP10S-MD	
Connectors type						
17/23bit Serial Encoder	Signal	Pin Number	Signal	Pin Number	Signal	Pin Number
	+5V	1	+5V	2	+5V	4
	GND	2	GND	3	GND	9
	SD+	5	SD+	4	SD+	1
	SD-	6	SD-	7	SD-	2
	VD+	3	VD+	14	VD+	6
	VD-	4	VD-	15	VD-	5
	PE	9	PE	1	PE	10
	Note: The figures in the table are when looking toward the motor side.。					

Encoder wiring precautions:

i. **Please make sure that the shielding layer on the drive side and the motor side is reliably grounded, otherwise it will cause the drive alarm.**

ii. Please make sure that the differential signal corresponds to the two twisted wires in the connection cable. For example, SD+ and SD- are a set of differential signals and a pair of twisted wires should be used.

iii. When a serial incremental encoder is selected, there are no VD+ a n d VD- signals (VD+ and VD- are the positive and negative terminals of the battery)

iv. **Use 17/23bit For serial encoders, the wire length is 5 For meters or less, please use a cross-sectional area of 0.2 ^{mm2} If more than 5 Meter, every additional 1 m, the cross-sectional area of the wire core should be increased by 0.05 ^{mm2} .**

☞ **The encoder cable provided by our company has a different connection method for the shield layer than the above description, please note. When using an absolute encoder, please use a 3.6V disposable lithium battery of ER14505 specification .**

3.4 CN4 Control signal terminal

CN4 The signal terminal provides the signal required to connect to the host controller, using DB44 socket:

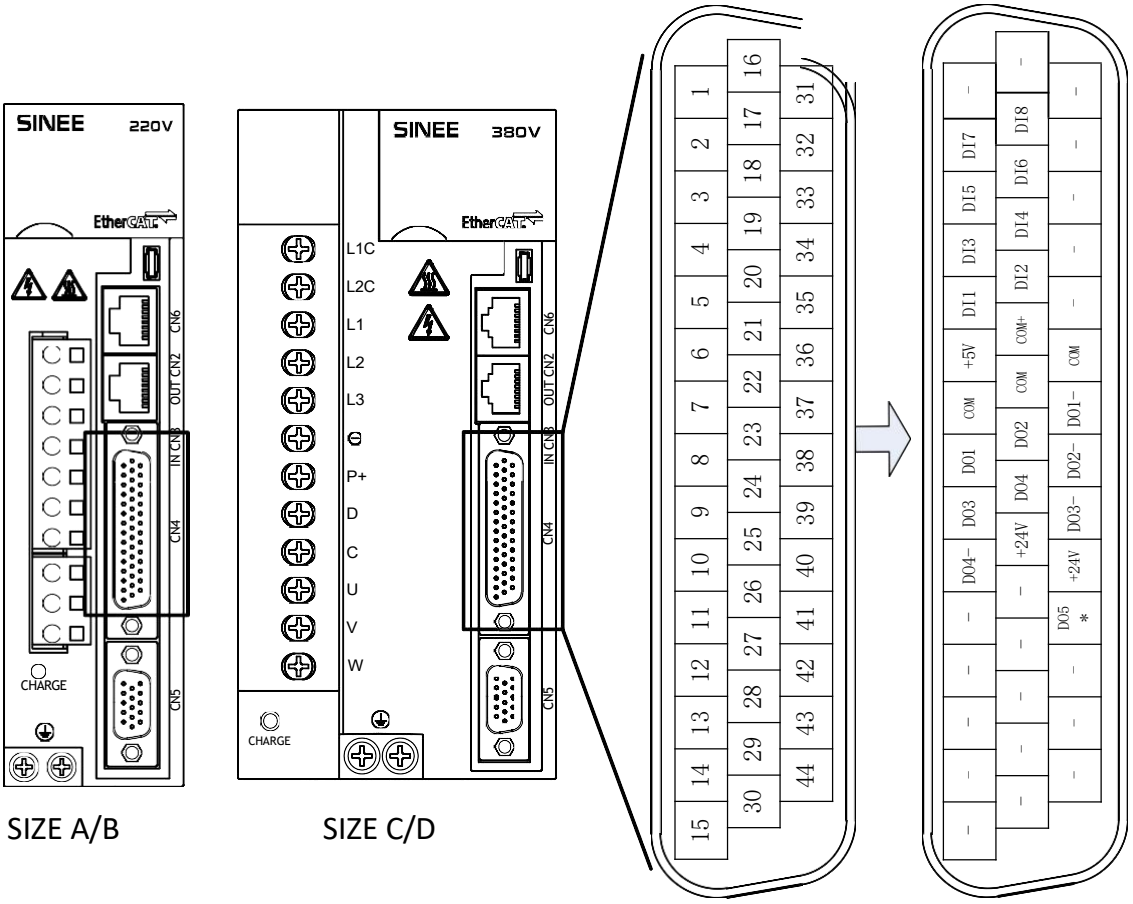


Figure3-7 Driver control circuit terminal position and pin assignment diagram

3.4.1 Control signal terminal plug pin layout

Signal name		Pin number	Default functionality	
Digital Input	DI1	5	P- OT	Forward drive disabled
	DI2	20	N- OT	Reverse drive prohibited
	DI3	4	OPRG	Origin return detection signal
	DI4	19	ALM- RST	Alarm reset
	DI5	3	GAIN- SEL	Gain switching
	DI6	18	J- SEL	Inertia ratio switching
	DI7	2	P- CLR	Pulse deviation counter cleared
	DI8	17	INHIBIT	Pulse Disable
	COM+	twenty one	Digital input common positive terminal (12~24V)	
power supply	+24V	25/40	Internal 24V Power supply, voltage range +20V ~ 26V , maximum output current 200mA .	
	COM	7/22/36	Internal 24V Power ground; digital input common negative terminal	
Digital Output	DO1	8	S- RDY+	Servo is ready to receive S-ON The signal state is on
	DO1-	37	S- RDY-	
	DO2	twenty three	BK+	Brake control signal
	DO2-	38	BK-	
	DO3	9	COIN+	Position arrival signal
	DO3-	39	COIN-	
	DO4	twenty four	ALM+	Conductive when an alarm occurs
	DO4-	10	ALM-	
			-	

3.4.2 Digital input (DI) function definition table

Settings	name	Function Name	describe	Trigger method	Operation Mode
0	Disabled	Invalid terminal			
1	reserve				
2	ALM- RST	Alarm reset	ON - resets the resettable alarm when the abnormal condition has been resolved	Edge Trigger	P S T
3~11	reserve				
12	INHIBIT	Pulse Disable	ON- prohibit position command input OFF- allow position command input	Level trigger	P
13	P- OT	Forward drive disabled	ON- Forward drive is prohibited OFF- Forward drive is allowed	Level trigger	P S T
14	N- OT	Reverse drive prohibited	ON- reverse drive is prohibited OFF- reverse drive is allowed	Level trigger	P S T
15	GAIN- SEL	Gain switching	ON - switch to the second gain OFF - use the first gain	Level trigger	P
16	J- SEL	Inertia ratio switching	ON- Load inertia ratio 2 efficient OFF- Load inertia ratio 1 efficient	Level trigger	P S T
17~21	reserve				
twenty two	ORGP	External (origin) detector input	Rising edge: External detector is valid Falling edge: External detector is invalid	Edge Trigger	P S T
twenty three	SHOM	Origin return start signal	OFF → ON : Start the origin return function	Edge Trigger	P S T
twenty four	TL2	External torque limit	ON : External torque limit enabled OFF : External torque limit disabled	Level trigger	P S T
25	EMGS	Emergency Stop	ON : Emergency stop OFF : No function	Level trigger	P S T
45	TouchProbe1	Probe1 (Fixed DI7)	Rising edge: latch position (0X60BA) Falling edge: latch position (0X60BB)	Edge Trigger	P S T
46	TouchProbe2	Probe2 (Fixed DI8)	Rising edge: latch position (0X60BC) Falling edge: latch position (0X60BD)	Edge Trigger	P S T

3.4.3 Digital output (DO) function definition table

Settings	name	Function Name	describe	Operation Mode
0	Disable	Invalid terminal		
1	S- RDY	Servo ready	Valid : Servo is ready and can receive S-ON command. Invalid : Servo is not ready and does not receive S-ON command. instruction	P S T
2	BK	Brake control	Valid - release the holding brake. Invalid - close the holding brake.	P S T
3	TGON	Motor rotation	Valid - the motor is rotating. Invalid - the motor stops rotating.	P S T
4	ZER0	Motor zero speed	Valid - the motor speed is zero. Invalid - the	P S T

			motor speed is not zero.	
5	V_CLS	Speed arrival	Valid: The actual motor speed reaches or exceeds P2-08 Setting value	S
6	V-CMP	Consistent speed	Valid: During speed control, the absolute value of the difference between the actual motor speed and the speed command value is less than the setting value of P2-09.	S
7	PNEAR	Location close to	Valid: In position control mode, the number of position deviation pulses is less than the setting value of positioning approach width P1-23	P
8	COIN	Location Arrival	Valid: In position control mode, the number of position deviation pulses is less than the setting value of positioning completion width P1-24	P
9	C-LT	Torque limit signal	Valid - Motor torque is limited. Invalid - Motor torque is not limited.	P S
10	V-LT	Speed limit signal	Valid - Motor speed is limited. Invalid - Motor speed is not limited.	T
11	WARN	Warning Output	Valid: A warning event occurred	P S T
12	ALM	Alarm output	Valid: An alarm event has occurred	P S T
13	T-cmp	Torque arrival signal	Valid: The motor output torque reaches the set value. Invalid: The motor output torque does not reach the set value.	T
14	Home	Origin return signal	Valid: Return to origin completed Invalid: Origin return has not been completed	P S T

3.4.4 Digital input terminal wiring

EA300E The digital (DI) input terminal of the series servo drive adopts a full-bridge rectifier circuit. The current flowing through the terminal can be positive (NPN mode) , you can also
is inverted (PNP mode) .

Taking DI1 as an example, the interface circuits of DI1 to DI8 are the same.

1) When the upper device is a relay output:

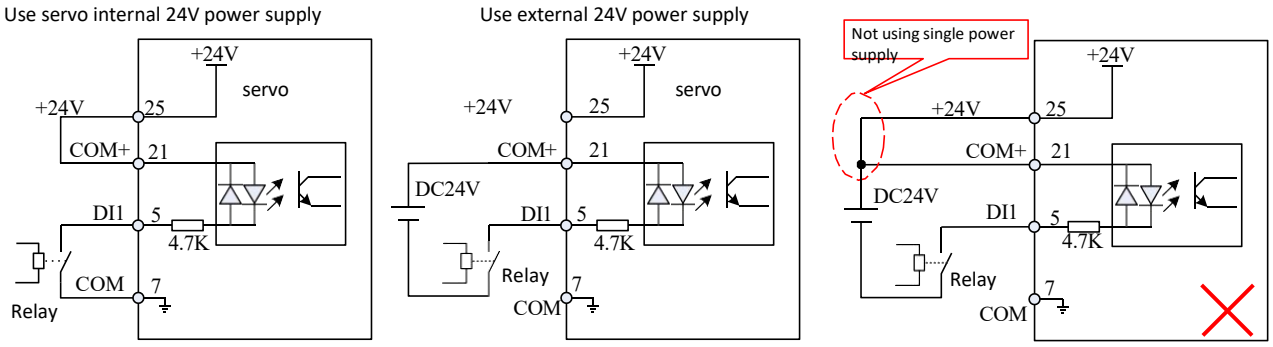


Figure3-9 Wiring of digital input terminals when the host device is relay output

This manual assumes the following:

- COM terminal uses pin 7 , and users can also use pin 22/36 .
- GND terminal uses pin 14 , and users can also use pin29
- The internal +24V of the servo uses pin25 , and users can also use pin40

2) When the upper device is NPN open collector output:

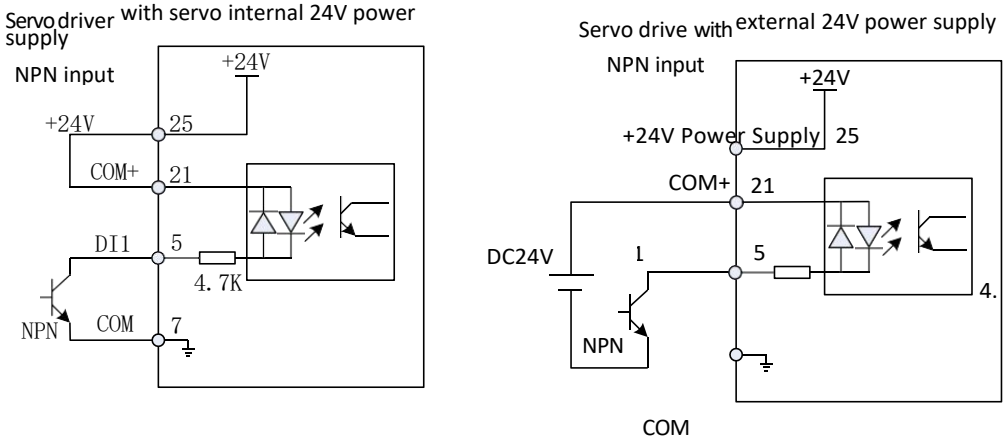


Figure3-10 (a) The upper device is NPN Digital input terminal wiring for open collector output

3) When the upper device is a PNP open collector output:

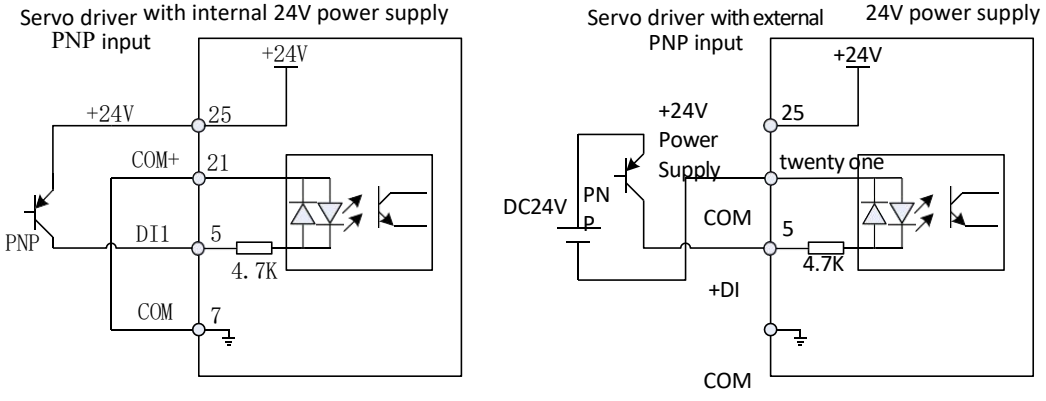


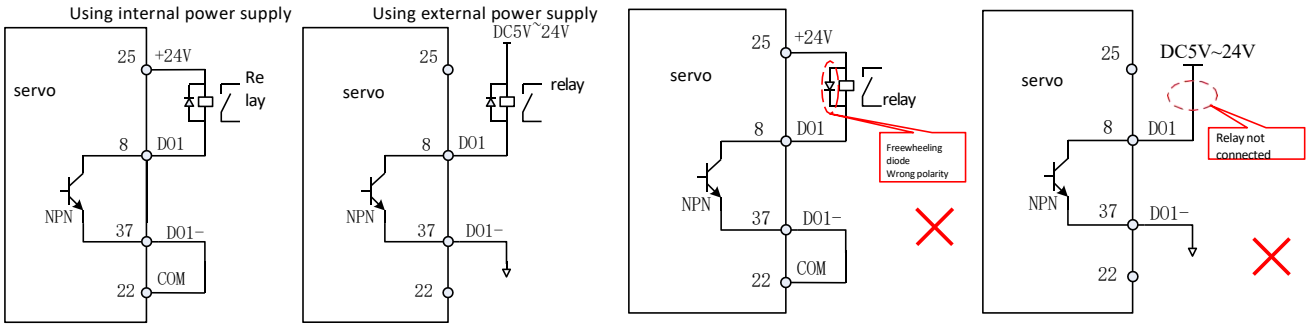
Figure3-10 (b) The upper device is a collector PNP Digital input terminal wiring for open output

1. **When using an external power supply, make sure 24V and Keep the COM+ terminals open,Not supported PNP and NPN Input mix**

3.4.5 Digital output terminal wiring

DO1 For example, DO1 to DO4 The interface circuit is the same.

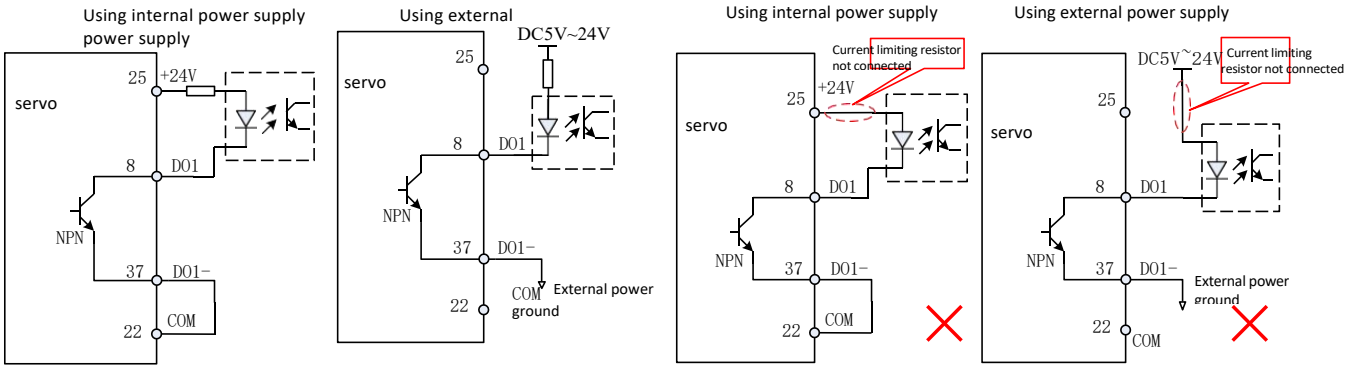
1) When the upper device is a relay input



picture3-11(a) When the host device is a relay inputDO Terminal correct wiring diagram3-11(b) When the host device is a relay inputDO Terminal wiring error

When the upper device is a relay input, please be sure to connect a freewheeling diode, otherwise the DO may be damaged. port

2) When the upper device is an optocoupler input



picture3-12 (a) Correct wiring diagram for digital output terminals when the upper device is optocoupler input 3-12 (b) Incorrect wiring of digital output terminals when the host device is optocoupler input

The maximum allowable voltage and current capacity of the internal optocoupler output circuit of the servo drive are as follows:

- Voltage: DC30V (max)
- Current: DC50mA (max)
- If driving an inductive load (such as a relay or contactor), a surge voltage absorption circuit should be installed; such as : RC absorption circuit (note that its leakage current should be less than the holding current of the controlled contactor or relay) varistor, or freewheeling diode (used in DC electromagnetic circuits, be sure to pay attention to the polarity when installing) The components of the absorption circuit should be installed close to the two ends of the coil of the relay or contactor.

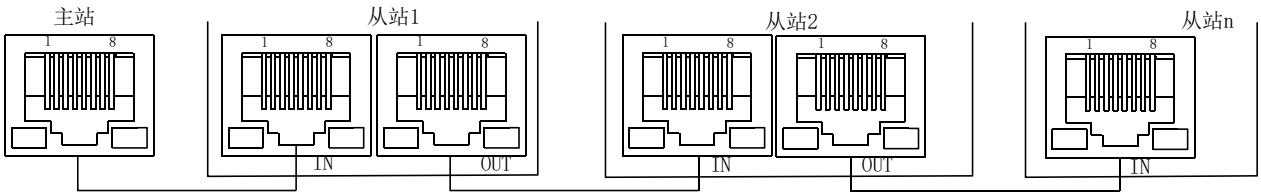
3.5 CN2, CN3 EtherCAT Communication terminal wiring

3.5.1 Installation and connection

EtherCAT The network is generally composed of a master station (such as IPC) and a series of slave stations (such as servo controllers, bus terminals, etc.) . From the station
Two standard Ethernet ports, one input and one output.

3.5.2 Topology

Generally, a linear topology connection is used, as shown below:

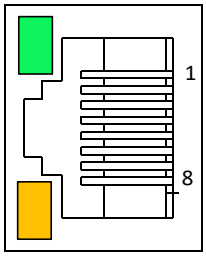


3.5.3 EtherCAT Connector Specifications

Electrical characteristics: According to IEEE802.3 standard
Connector structure: RJ45 8 - pinmodular connector (accordingtoISO8877)

Table3-5 RJ45 Pin Description

CN3 EtherCAT IN		CN2 EtherCAT OUT		Function
Signal name	Pin number	Signal name	Pin number	
TD+	1	TD+	1	Send Data +
TD-	2	TD-	2	Send Data -
RD+	3	RD+	3	Receive Data +
-	4	-	4	Not used
-	5	-	5	
RD-	6	RD-	6	Receiving Data -
-	7	-	7	Not used
-	8	-	8	
FG	Connector cover	FG	Connector cover	Protective grounding



3.5.4 EtherCAT Communication cable specifications

- Category5e(inclusive) and above, shielded Ethernet cable.

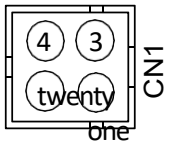
> ☞ ➢ **Using cables with shielded networks can enhance the system's anti-interference capabilities;**
> ➢ **When multiple drives are connected in series, the maximum distance between each drive is 30 rice;**

3.6 CN1 RS232 communication terminal

CN1 terminal signal description is as follows:

Table3-6 RS232 communication terminal definition

Signal name	Pin number	Function	Terminal pinout
RS232- TXD	1	RS232 Signal sending end	
RS232- RXD	2	RS232 Signal receiving end	
GND	3	RS232 Communication signal reference ground	
reserve	4	Cannot be connected to any signal line	



> ☞ **If the host computer is not equipped with a serial port, you can use a serial port to USB conversion module for conversion**

3.7 Holding brake

When the motor is used to drive a vertical axis or in similar situations (such as external force), a motor with a holding brake is required to prevent the moving parts from moving due to gravity or external force when the power is off.

1. **The holding brake is only used to keep the motor stationary and should never be used to stop the motor.**
2. **When a motor with a holding brake is running, the brake may make a clicking sound, which has no functional impact.**

The holding brake requires an external 24V supply The wiring diagram of power supply, brake signal and brake power supply is as shown below:

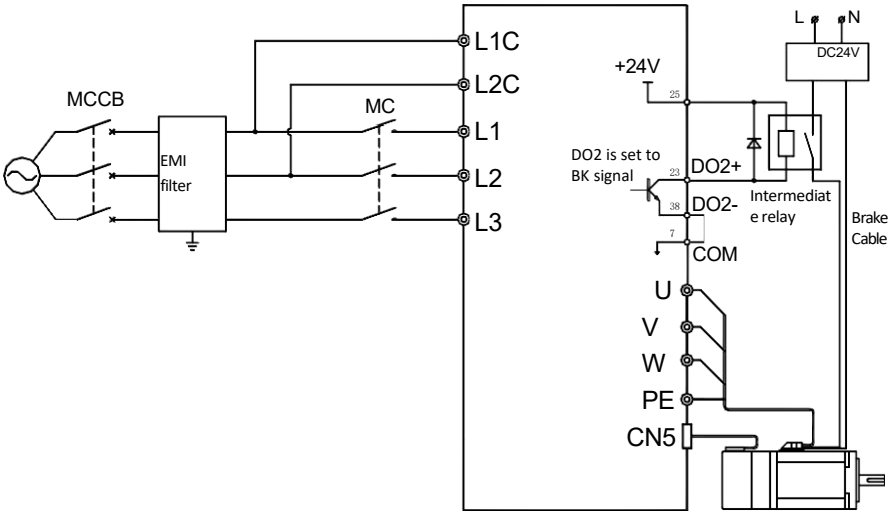


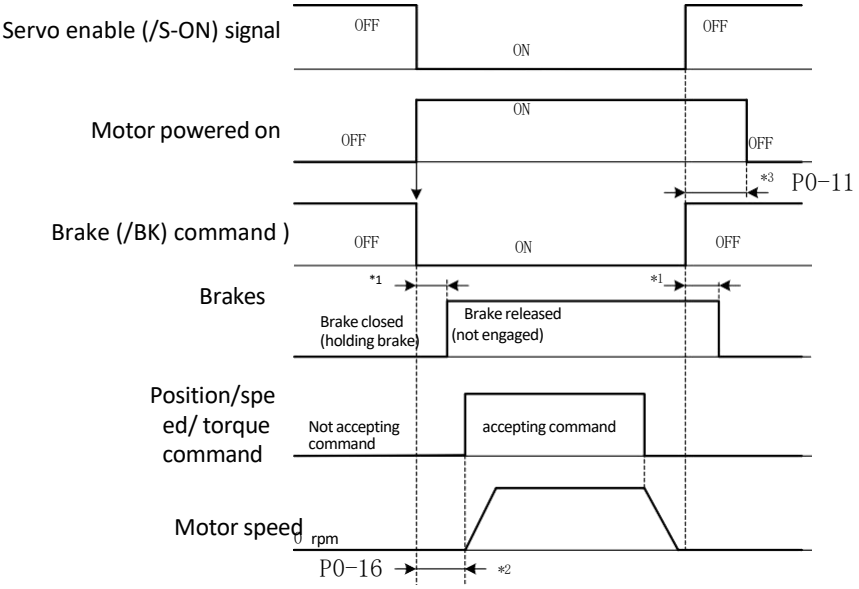
Figure3-13 Brake signal and brake power wiring

3.7.1 Precautions for holding brake wiring:

1) **must be controlled through the signal terminal (DO2+ and DO2- in the figure above) defined as function No. 2 (BK) of the EA300E servo drive , and the normally open contact of the intermediate relay is used to connect and disconnect the holding brake power supply.**
2) The holding brake coil has no polarity distinction, and when it is energized it is in the brake release state (at this time the brake pads are separated and there is no braking force)
3) **Please be sure to use an external power supply for the holding brake.** The DC24V power supply for the intermediate relay coil can use the power supply of the servo drive itself, and it is not recommended to share the same power supply with the holding brake when using an external power supply.
4) When using an external power supply to power the intermediate relay coil, please note that the DO2+ terminal should be connected to the positive terminal of the power supply, and the DO2- terminal should be connected to the negative terminal of the power supply.
5) 21.5V to keep the brake working . Therefore, the voltage drop caused by the resistance of the cable supplying power to the brake must be fully considered. It is recommended to use
   0.5mm ^{2} For details on the holding brake power, see page 12 . chapter.
6) It is best not to share the power supply of the holding brake with other electrical appliances to prevent the voltage or current from decreasing due to the operation of other electrical appliances, which may eventually cause the holding brake to malfunction.

3.7.2 Holding brake action sequence

3.7.2.1 The holding brake has an action delay time. Please refer to the following figure for the release and closing time of the holding brake.



*1 : The delay time of the holding brake varies depending on the motor model. Please refer to page 12. Chapter, and the actual situation shall prevail.

*2 : P0-16 The time from when the servo drive receives the enable (/S-ON) command to when it can receive position, speed, and torque commands is specified. This time must be greater than the time required to release the holding brake. When the host device outputs commands to the servo drive, please wait for this time after the /S-ON signal is turned on before outputting.

*3 : Please go through P0-09 , P0-10 , P0-11 To set the holding brake action and servo OFF time.

3.7.2.2 /BK) output time when the servo motor stops

When used for vertical axes, the deadweight or external force of the mechanical moving parts may cause slight movement of the machine . By setting P0-11 , the motor can be de-energized only after the brake is closed to eliminate slight movement of the machine.

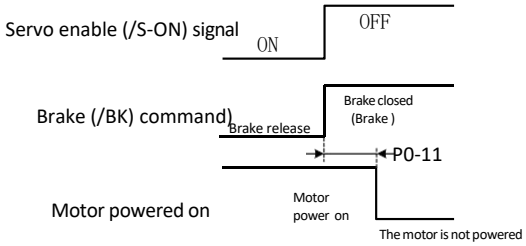


Figure3-15 When the servo is disabled, the **brake action sequence is in any case. When an alarm occurs, P0-11 is invalid and the servo motor will immediately enter the power-off state. At this time, the moving parts of the machine may Free movement before brake application.**

3.7.2.3 /BK) output time during servo motor rotation

When an alarm occurs during the rotation of the servo motor, or the enable signal is forcibly cancelled during the rotation of the servo motor, the servo motor will immediately enter the non-powered state. At this time, the output time of the brake signal (/BK) can be adjusted by setting the brake command output speed value P0-10 and the servo OFF - brake command waiting time P0-09.

Brake action conditions when the servo motor is rotating

When any of the following conditions is met, the brake signal will be activated:

- After the motor enters the non-powered state, the motor speed is lower than the set value of P0-10 .
- the set time of P0-09 has passed .

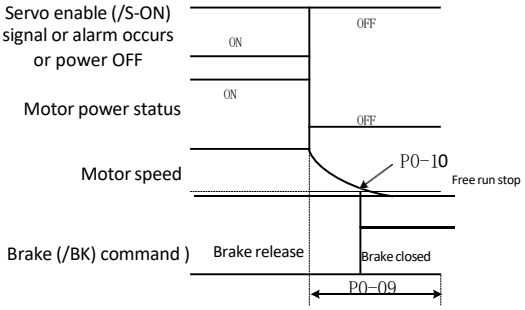


Figure3-16 Brake action when servo motor rotates

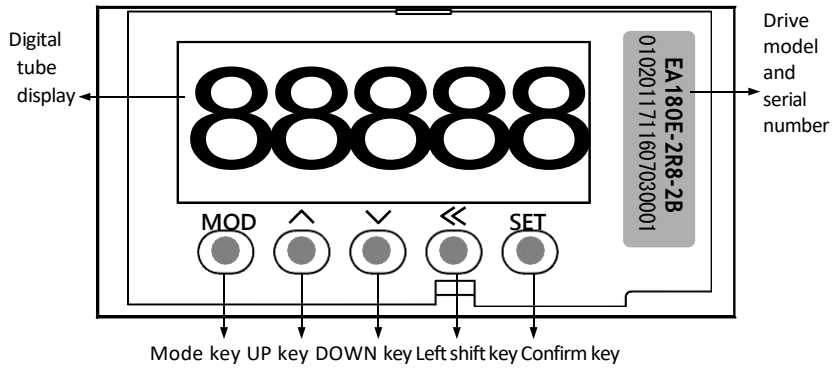
1. Even in P0-10 If a value exceeding the maximum speed of the servo motor is set, it will be limited to the maximum speed of the servo motor.
2. Do not assign the motor rotation signal (TGON) and the brake signal (BK) to the same terminal. If they are assigned to the same terminal, the TGON signal will be turned on due to the falling speed of the vertical axis, and the brake may not work.

3.8 Control circuit wiring precautions

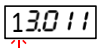
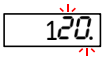
- Please ensure that the control circuit cables and power cables are routed separately, with a spacing of at least 30 cm .
- If the control loop cable needs to be extended because of insufficient length, please ensure that the shielding layer is reliably connected to ensure reliable shielding and grounding;
- The +24V of the servo driver is referenced to COM , and the + 5V is referenced to GND . Do not exceed the maximum allowable current, otherwise the driver will not work properly.
- Try to use command input and encoder cables with the shortest connection length possible.
- Use a 1.5mm2 grounding cable The above cables.
- Single-point grounding is required.

Chapter 4 Display and Operation

4.1 Display and key operation area appearance



Part Name	Figures in this document	Functional Description
Mode key	M	◆ Switching between different operating modes ◆ Exit current parameter / function operation ◆ from AL mode to normal operating mode
UP key	3210 ^	◆ The current cursor value increases ◆ AF-02 When the auxiliary function is at the second level, the forward rotation is ◆ dS and CU When in the second level mode, the first level of the next parameter is displayed directly ◆ AL Mode, and the alarm is currently on, switch down to view the alarm information ◆ St Mode, AF-07 Select parameter and drive status switching monitoring
DOWN key	V	◆ The current cursor value decreases ◆ AF-02 When the auxiliary function is at the second level, the reverse jog ◆ AL Mode, and the alarm is currently in progress, switch up to view the alarm information ◆ dS and CU When the mode is at the second level, the first level of the previous parameter is directly displayed
Shift keys	<	◆ dS , P and AF mode level 1, the cursor moves right (>) ◆ Pr AF When the mode is at the second level, the cursor moves left (<) ◆ dS and CU Mode level 2, and parameter 1 When the screen cannot fit all the content, switch the display;
Confirm key	S	Confirm the current operation
Digital tube 4 LED0 LED1 LED2 LED3 LED4	jI dt	◆ The information in the box is the content displayed by the digital tube;
	120.	◆ The entire digital tube flashes at the corresponding position indicated on the top of the box; ◆ The lower right dot of the digital tube corresponding to the position indicated in the box below will flash;
	-. 11	◆ SingleLED4 If the lower right point ". " is always on, it means the current displayed data is the second screen of current information The key switches back and forth between the two screens of data;
	-.11 13.011	◆ LED4 The symbol "—" indicates that the current data is a negative number (the number of data digits on the current screen ≤ 4); ◆ LED4 and LED3 The lower right dot " .. " is always on, indicating that the current data is a negative number (the number of data digits on the current screen =5);

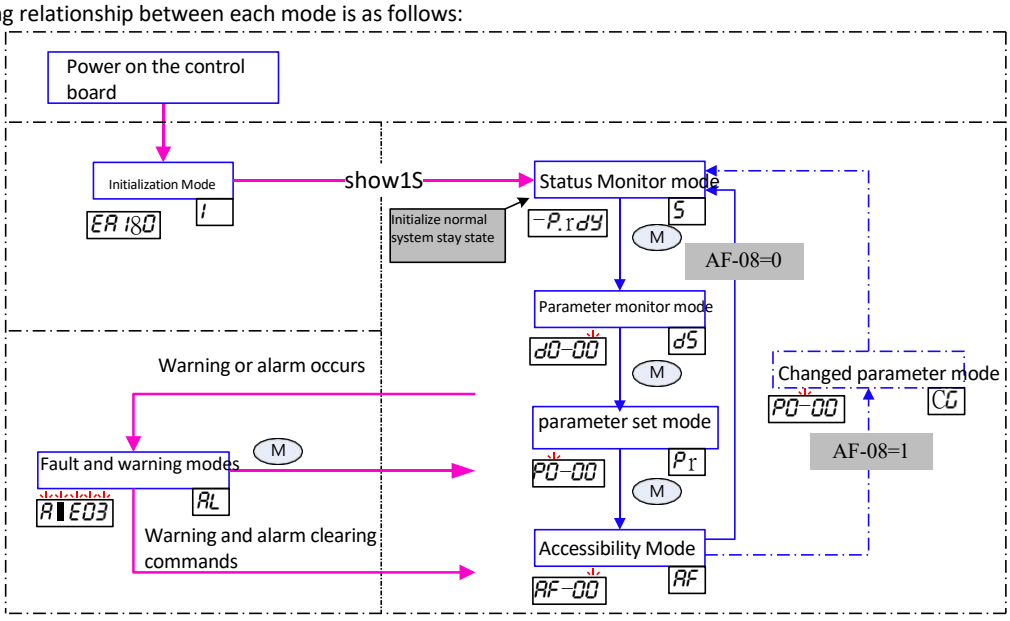
		◆ LED4 The lower right dot " . " flashes, and LED3 The lower right point " . " is always on, indicating that the current data is the current signal. The second screen can be switched by SHIFT The key switches back and forth to display two screens of data, and the current data is negative;
		◆ When digital display is on, LED3 , LED2 The dot " . " at the bottom right of LED1 indicates the decimal point position of the current parameter.
		◆ LED0 The lower right dot " . " flashes, indicating that an alarm or warning is currently occurring.

4.2 Display and operating modes

EA300E The servo drive has 7 operating modes:

Operation Mode		Function	Menu level display example		
name	Logo		First level	Level 2	Level 3
Initialization Mode	it	Display driver model	-	EA 180	-
Status monitoring mode	St	Displays the current drive status	-	-rP dy	-
Parameter monitoring mode	dO	Select monitoring parameters and monitor their values	dO-00	- 100	-
Parameter setting mode	Pr	Select Change Parameter and change its value	P0-00	1	-6-d
Accessibility Mode	AF	Select auxiliary functions and perform corresponding operations	AF-05	jitd	jitd
Changed parameter mode (hidden by default)	CG	You can view all parameters that are different from the factory values (through auxiliary function AF-08=1 To achieve display viewing, Still hidden after power on again)	P1-00	0	-
Warning and Alarm Modes (Displayed when abnormal)	AL	Display warning and alarm messages	-	AlE03	-

The switching relationship between each mode is as follows:



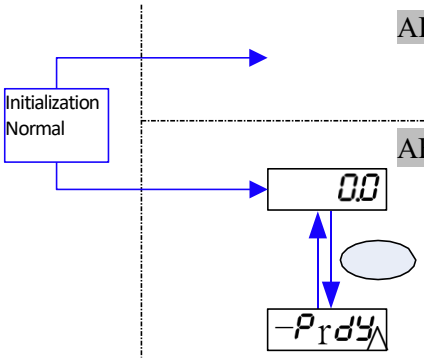
4.3 Initialization it Mode

Driver control board (L1C When the power is first supplied to the L2C or theAF-00 software is reset, the system EA 180 , 1 Automatically first enters the initialization mode and then the status monitoring mode. enter after seconds

4.4 Status St monitoring mode

it will After a few seconds, it will automatically enter the status monitoring mode:

-Prdy



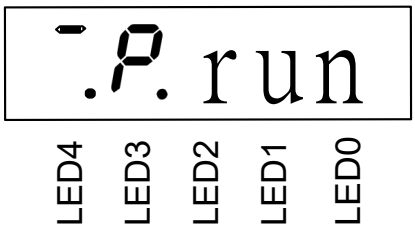
AF-07=0000

Display drive status only

AF-07≠0 AF-07=2001

The value of the parameter corresponding to the address set by AF-07 is displayed first. The UP key can be used to switch back and forth with the drive status display.

The following figure shows the status monitoring mode, the driver LED Display indication



LED2 LED0 displays the current working status of the driver, which is divided into five types :

	ndY		The current drive is not ready (please check the control circuit / drive circuit bus voltage, whether there is an alarm, etc.)
	rdY		The current drive is ready and can be enabled
	run		The current drive is in the enabled state
	Poo		The current drive is returning to the origin
	PAL		The current drive has a warning or alarm

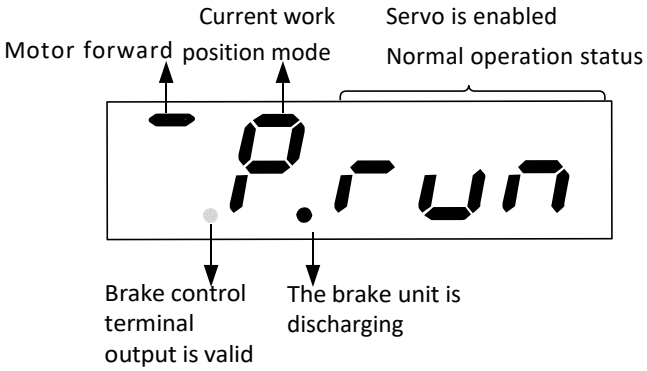
LED3 Displays the current control mode of the servo drive, and the decimal point shows whether the brake unit is in the discharge state.

P	The servo is in position control mode and the brake unit is not working.	P.	The servo is in position control mode and the brake unit is discharging.
S	The servo is in speed control mode and the brake unit is not working.	S.	The servo is in speed control mode and the brake unit is discharging.
t	The servo is in torque control mode and the brake unit is not working.	t.	The servo is in torque control mode and the brake unit is discharging.

LED4 Displays the direction of the current motor speed, and the decimal point displays the state of the holding brake terminal (BK)

8	The motor reverses, and the BK terminal output is valid	8.	Motor reverse, BK Terminal output is invalid
8	Motor zero speed, BK Terminal output valid	8.	Motor zero speed, BK Terminal output is invalid
8	Motor forward rotation, BK Terminal output valid	8.	Motor forward rotation, BK Terminal output is invalid

Example: The LED monitor displays the following information:



1 : AF-07 The parameter is in hexadecimal. For example, d0-01 The communication address is 2001H , so when entering through the keyboard, enter 2001 However, if writing via communication, 2001H should be written .

2 : AF-07 It cannot be set to a non-existent address, otherwise the displayed content may be unknown.

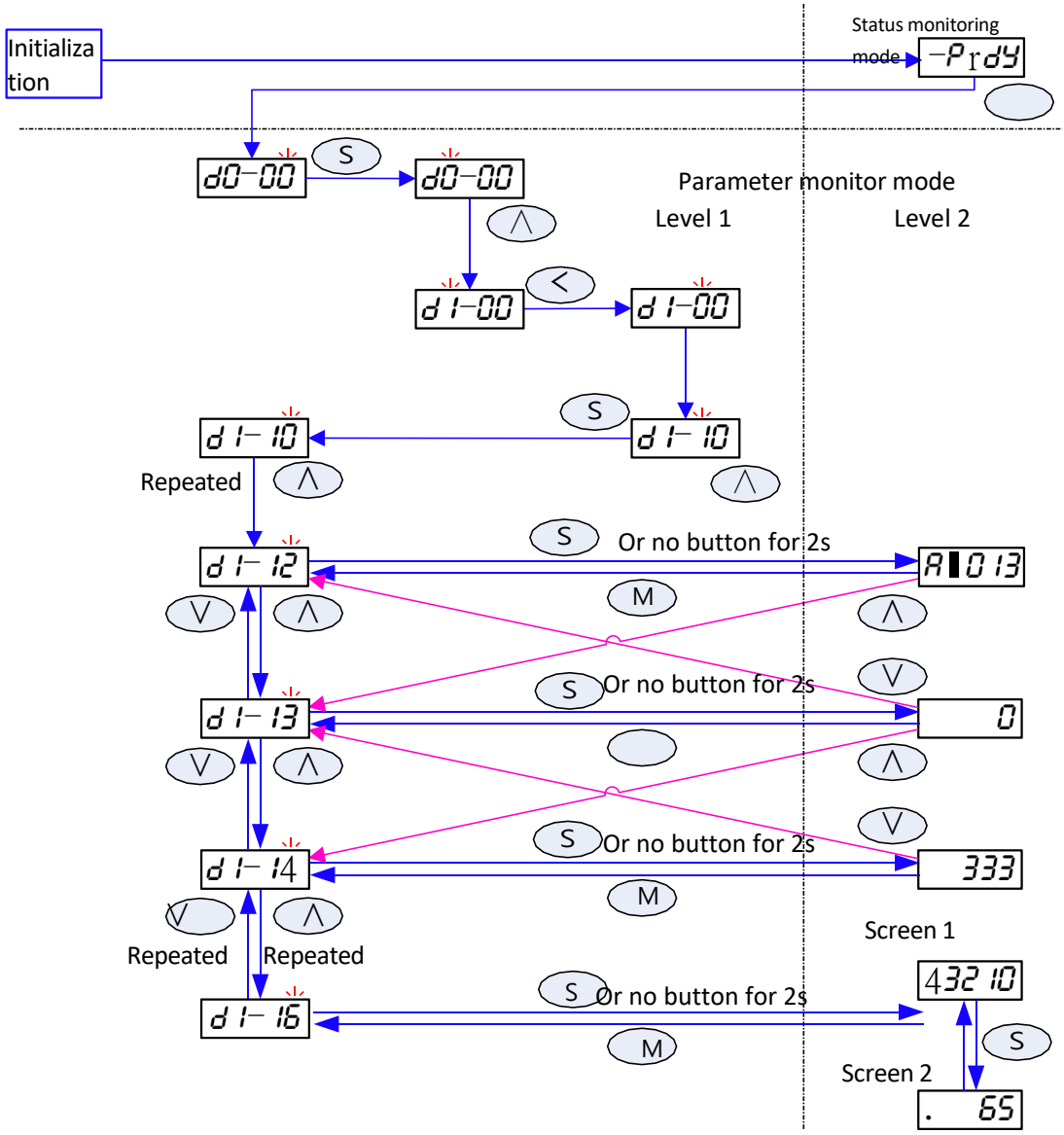
3 : If it is not enabled, LED3 It will be displayed as position control mode, and once enabled, it will be displayed as the actual operating control mode.

4 : In speed mode, LED3 Should display S However, if it is at zero speed and the zero speed command is turned on, the zero position is fixed, then LED3 Will switch to location mode P .

4.5 Parameter monitoring mode d5

After the system is initialized normally, it will automatically enter the status monitoring mode. Press once M key to switch to parameter monitoring mode.

The following figure shows part of the previous alarm information (d0-12 ~ d0-14 a n d d0-16) as an example to illustrate the keyboard operation in parameter monitoring mode.

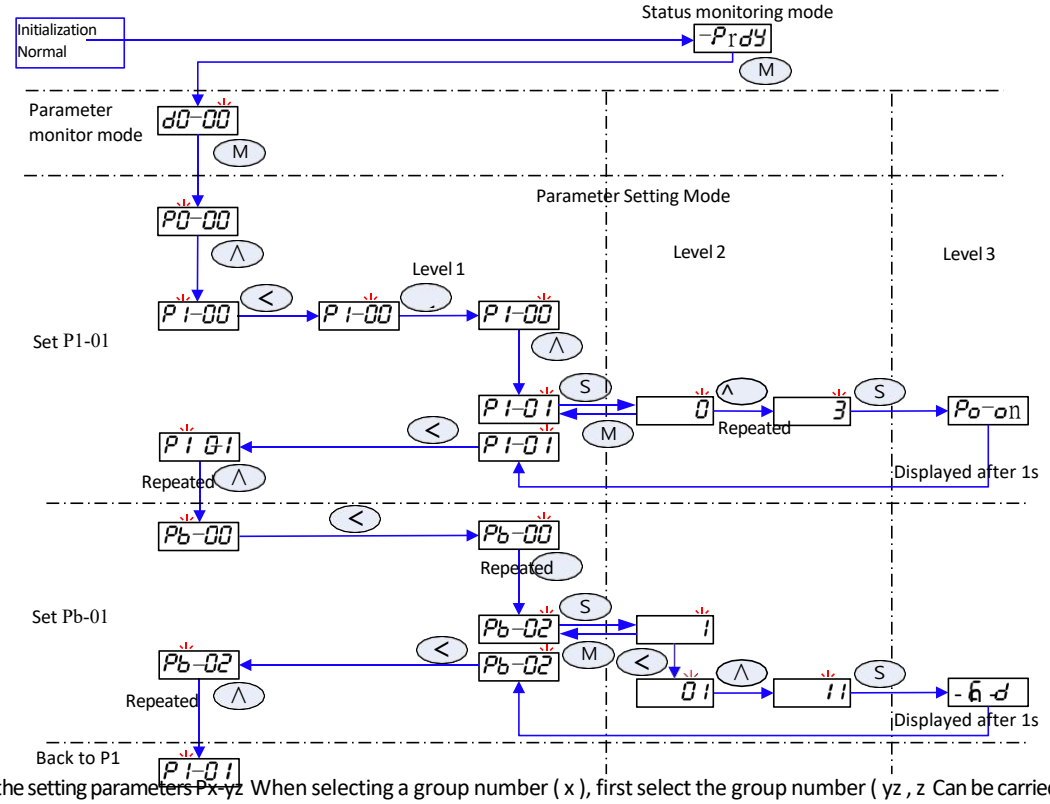


- Select monitoring parameters dx-yz When selecting a group number (x), first select the group number (yz , z Can be carried to y) .
- shift key S controls the cursor to move right in a circular motion in the first level interface of this mode. The position pattern is as follows: LED0 (initial position) → LED3 → LED1 → LED0... ;
  In this mode, the second level interface controls the display of data on the first and second screens back and forth.
- You can check the monitoring parameter values more quickly. In this mode, if the current interface is the second level, Λ The key can directly switch to the first level interface display of the next parameter (equivalent to
  Yu An M + Λ) V The key can directly switch to the first level interface display of the previous parameter (equivalent to pressing M + V)
- In this mode, when the first level interface is displayed, it can be displayed by pressing the level interface. S Press the key to enter the second level interface. If no key is pressed for 2 seconds The above will automatically enter the second

4.6 Parameter [Pr] setting mode

The system initializes normally and enters the status monitoring mode. Press twice (M) key to switch to parameter setting mode.

Next, set P1-01=2 , Pb-01=1 , and then return to P1 The following is an example of group parameters.



- Select the setting parameters Px-yz When selecting a group number (x), first select the group number (yz , z Can be carried to y

  When selecting a group, the last operation group number of the group will be automatically transferred (such as returning to P1 again group, directly displays P1-01) .

- shift key (<) controls the cursor to move right in a circular motion in the first level interface of this mode. The position pattern is as follows: LED3 (initial position) →LED1→LED0→LED3… ;
  In this mode, the second-level interface controls the cursor to move circularly to the left, and the position pattern is LED0 (initial position) →LED1→LED2→LED3→LED4→ (second screen LED0→ second screen LED1→second screen LED2→ second screen LED3 → second screen LED4) →LED0→LED1… The leftmost position of the cursor is determined by the number of digits displayed by the current parameter;

- When entering parameter setting mode from other modes, the cursor stops at LED3 by default ;

  From the second level (M) or (S) key to enter the first level, the cursor stops at LED0 by default ;
  of this mode, press

- When entering the second level of a parameter, its current value is automatically cached and displayed. If this value is changed through other means (such as communication), the display will not be automatically refreshed;

  the parameters via the (M) key, return to the first level, the parameter value remains the previous value;

  keyboard , press (S) Press key to confirm the current setting, and the third level will be displayed for 1s Then it automatically returns to the first level and the parameters are modified to the new values.

- Set the parameters by (S) After pressing the key, the current parameter is immediately valid and the third level displays what is related to the parameter attributes.

Parameter properties	(S) key displays	Effective Date
○	-bd-d	Set at any time, effective immediately
●	Po-on	The value after the change is different from the value before the change: set at any time and take effect after powering on again
	-bd-d	The value after the change is the same as before the change: the initial

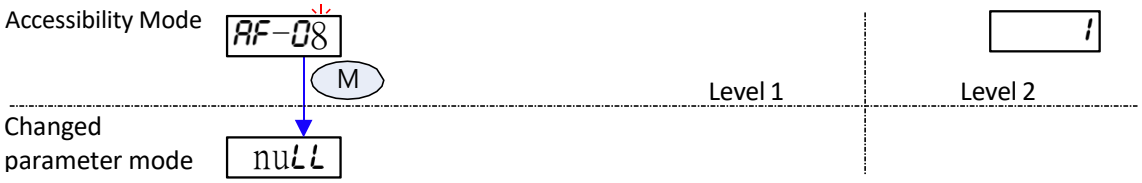
		value is always valid
☆	HALt	The value after the change is different from the value before the change: set at any time, the motor stops for 1 Effective in seconds
	-Ab-d	The value after the change is the same as before the change: the initial value is always valid
▲	-	Read-only parameter, cannot be set

4.7 Changed parameter mode

Each time the control board is powered on, the changed parameter mode is hidden by default, and AF-08 needs to be set to 1 After passing (M) key to switch to this mode.

The following describes two situations:

- No function code is different from the factory value: When entering nuLL the changed parameter mode, the LED show .



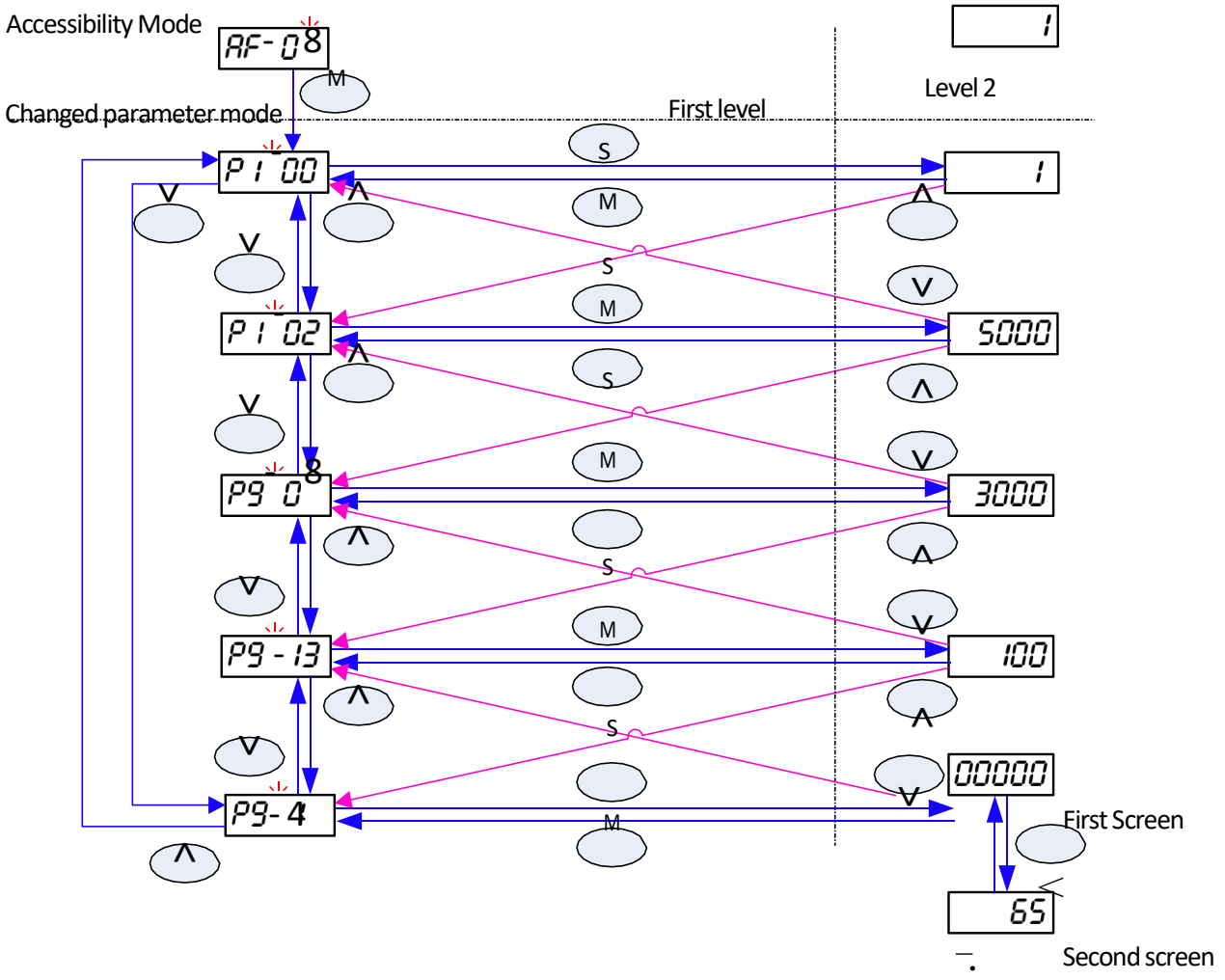
- The following function codes (P1-00/P1-02/P9-08/P9-13/P9-14) are different from the factory values:

  A. To distinguish from normal function display, in this mode, LED2 flashes The character " - " is used for distinction;

  B. Through (∧) or (∨) key to search forward / backward for changed function codes;

  C. To view the changed parameters more quickly, if the second level interface is currently displayed in this mode, (∧) The key can directly switch to the first level interface display of the next parameter (equivalent to (M) + (∧))key pressing (∨) You can directly switch to the first level interface display of the previous parameter (equivalent to (M) + (∨)) pressing

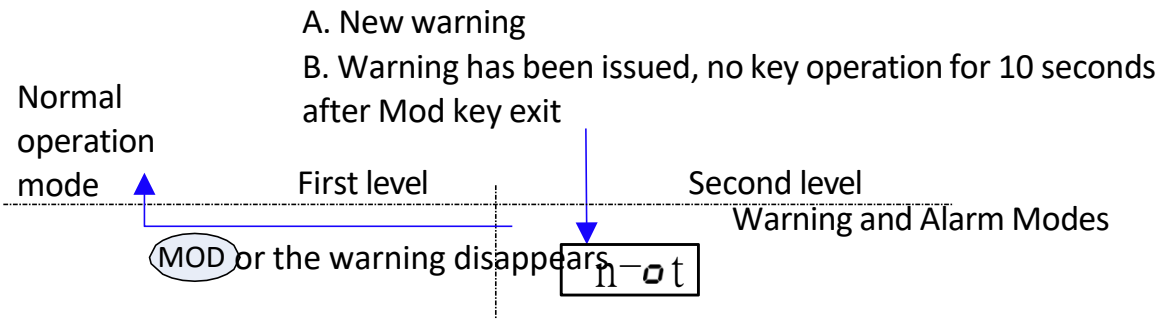
  D. Entering the second level, you can only view the current changed value. Parameter changes are not supported in this interface.



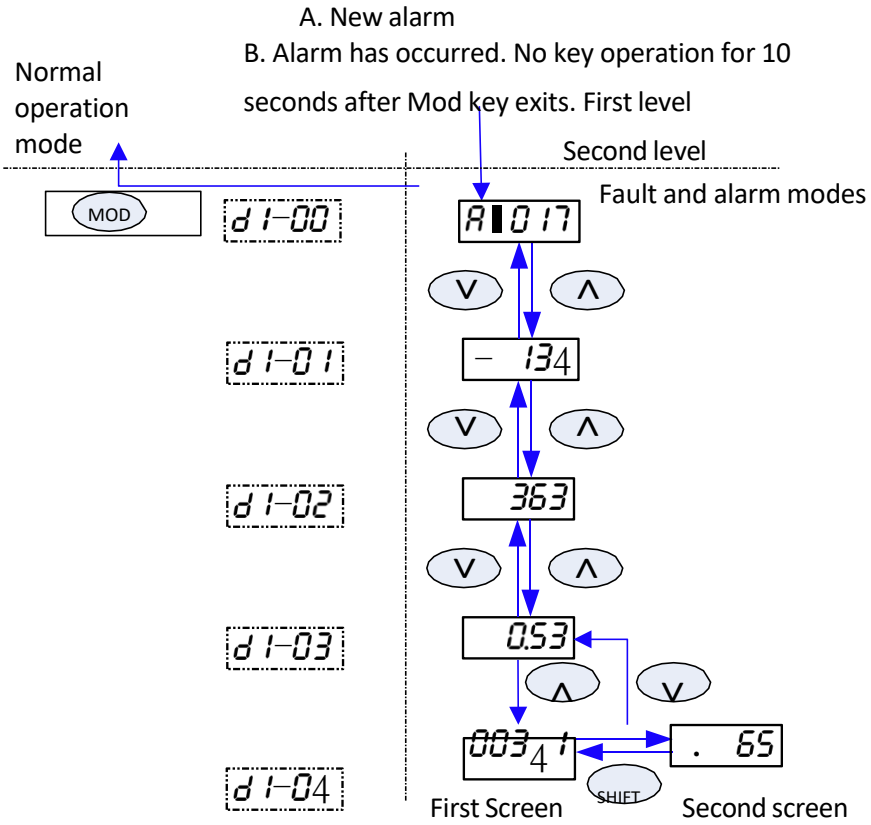
4.8 Warning and Alarm Modes AL

In any mode, once a warning or alarm occurs, the system will directly enter the warning or alarm mode. At this time, you can press the lower right dot to see it flashing to distinguish it . However, if there is no key operation for 10 seconds , the system will still jump back to the warning or alarm mode.

M key to temporarily switch to normal operation mode (LED0



The above figure shows the keyboard operation diagram when a warning exists. In warning mode, only the warning mark (n - ot) is displayed. When the warning disappears, the normal operation mode is automatically restored .



The above figure shows the keyboard operation diagram when an alarm exists. In the warning and alarm modes, you can ∧ and ∨ key to switch to view alarm information (alarm code AL.017 , When the alarm occurs, the motor speed is -134rpm , the bus voltage is 363V , the motor current is 0.53A , and the cumulative running time is 6500341min) .

When an alarm occurs, the alarm source must be cleared first, and the warning and alarm modes will not be exited until the alarm is reset or the control power is turned on again.

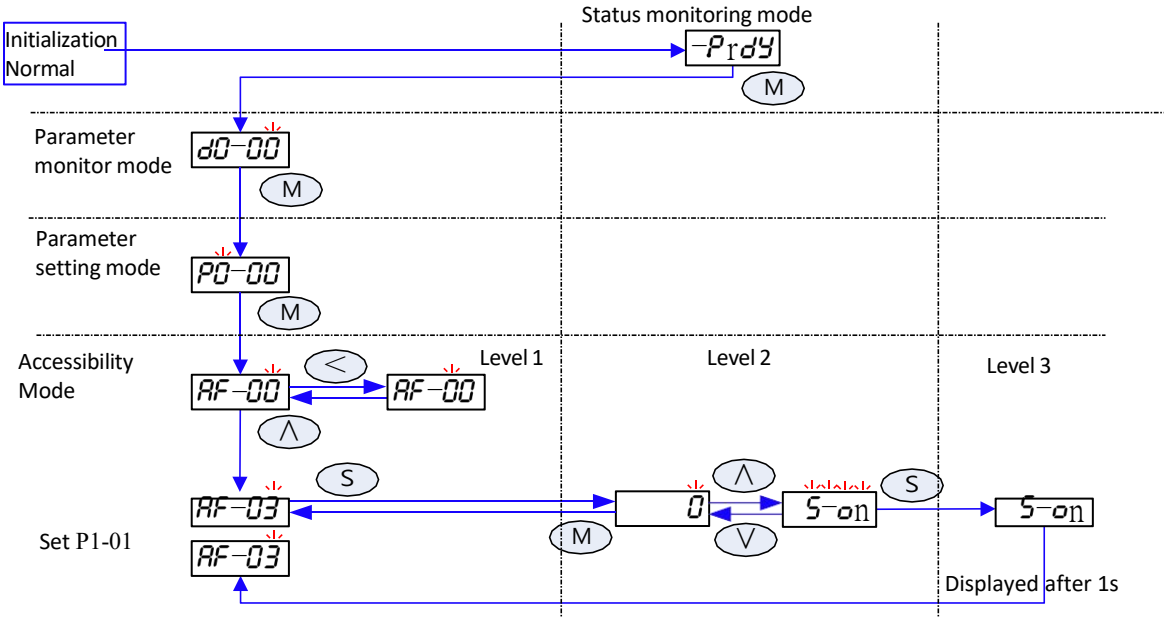
Display example	Contents
Ann0	When the drive generates an alarm, the panel displays the alarm symbol " AL0" and the alarm number " nn " .
Annt	When the drive generates a warning, the panel displays the warning symbol " ALt" and the warning code " nn " . * : Forward overtravel and reverse overtravel are directly displayed as " - T -"" - T- ".

Note: For specific warning and alarm information, please refer to the Warning and Alarm Handling section

4.9 Accessibility Mode AF

After the system is initialized normally, it will automatically enter the status monitoring mode. Press three times M key to switch to auxiliary function mode.

The following only takes the AF-03 (internal S-ON) auxiliary function as an example for operation. The operation methods of other functions are the same, only the displays and meanings of different levels are different.



- Select AF-yz Since there are not many parameters in this group, we can directly use When the position cursor is flashing, press and Press the key to select, and it will automatically turn to y Enter Bit and borrow. You can also set them separately by moving the cursor with the key ;
- shift keys in this mode control the cursor in the first level interface.z (initial position) andy Position cyclic movement ;
- When entering the second level of a parameter, its current value is automatically cached and displayed. If this value is changed through other means (such as communication), the display will not be automatically refreshed;

After changing the parameters via the keyboard, press M key to return to the first level, and the parameter value will be the value before the change;

S Press key to confirm the current operation, and display the third level for at least 1s Then it automatically returns to the first level.

- After changing the parameters via the keyboard, press

Important: Auxiliary functions are parameters set for performing specific functional operations. The keyboard display content is not the value of the internal register.
When operating with the keyboard, the displayed symbol shall prevail. When operating in communication mode, write the register value at the corresponding address. If the register value is "-", it means that the operation cannot be performed using the communication mode.

4.10 Accessibility Operation

AF-00	Software reset	Data size	16bit	Correspondence address	3F00H
		Register value storage	Automatically reset to zero after completion		

Register Value	Keyboard Display	operate
0	0	S Ed key display - n - , do not perform any operation
1	rESE	S to perform a software reset (equivalent to restarting the control power supply)

	Alarm reset	Data size	16bit	Correspondence address	3F01H

AF-01			Register value storage	Automatically reset to zero after completion
	Register Value	Keyboard Display	operate	
	0	0	according to s Ed key display - n - , do not perform any operation	
	1	A1 lCr	according to s key to reset the alarm * Must be a resettable alarm and the current alarm cause must have been eliminated.	

AF-02	JOG Jog function	Data size	16bit	Correspondence address	3F02H
		Register value storage	-		

Register Value	Keyboard Display	operate
-	-jS oG	^ key, the motor runs forward and j is displayed ; press v if you press the key, S oG the motor will reverse and display _ j S oG . If you do not press the key, S oG the motor will stop and display - j * The speed of jog operation is determined by P8-00 The acceleration and deceleration time is determined by P8-01 . * Please Prdy (Not enabled and ready) state, if a warning occurs during the jog process, it will automatically exit.

AF-03	Internal S_ON command	Data size	16bit	Correspondence address	3F03H
		Register value storage	save		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - If there is no other enable input, the driver enters the enable state.OFF state
1	S- no	If the enabling conditions are met, press S o key display - n , the driver enters the enable stateON state .

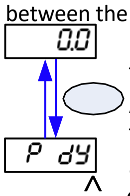
* This parameter will be stored and will be enabled immediately at the next power-on . If you do not want this, please change this parameter value to 0 before powering off .

AF-04	FFT Test	Data size	16bit	Correspondence address	3F04H
		Register value storage	Automatically reset to zero after completion		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - , do not perform any operation
1	EydFt	according to S key display EydF t , cooperate with the host computer software identification system to perform speed bandwidth test, and automatically exit after the test is completed The data is output and uploaded to the host computer for analysis and display. * The motor will vibrate slightly and make some sound.

AF-05	Offline Inertia Identification	Data size	16bit	Correspondence address	3F05H
		Register value storage	Automatically reset to zero after completion		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - , do not perform any operation
1	j I d	according to S key display j I dt , and start to identify the current system inertia. After successful identification, the system inertia (relative to the motor inertia) The amount (in multiples) is automatically stored in P4-10 . * Please refer to Section 6.6 Detailed description of inertia identification.

AF-07	**Status power-on default display**		Data size	16bit	Correspondence address	3F07H
			Register value storage	storage		
	Register Value	Keyboard Display	operate			
	0000H	0000	according to S E d key display - n - , at this time the status monitoring mode only displays the drive status			
	2001H (example)	2001	according to S key display -n- E d IfAF-07 Isnon-zero value, the status monitoring mode displays the corresponding communication address by default Function code value (suchasd0-01) , through ^ The key can directly switch the display back and forth between the monitoring value and the drive status.  The corresponding parameter value of AF-07 setting address is displayed first . The UP key can be used to switch back and forth with the drive status. ^ Change display -r			

1 : -07 16 Displayed in hexadecimal format, it means the communication address. If the set address does not have a corresponding function code, the displayed value is unknown.

2: If it is not enabled, LED3 will display the position mode ( ). Once it is enabled, it will display the actual control mode.

P

AF-08	Non-factory value display	Data size	16bit	Correspondence address	3F08H
		Register value storage	Automatic reset on power on		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - , normal display
1	1	according to S key display -n- Ed , then press Press M to enter the changed parameter mode. The difference from the normal function code display is The middle " - " flashes. ∧ or ∨ key to view the changed parameters in turn. Press S key to view the changed value .

AF-09	System parameter initialization	Data size	16bit	Correspondence address	3F09H
		Register value storage	Automatic reset on power on		

Register Value	Keyboard Display	operate
1	1 65535	likeAF-09 ≠ 65535 , press S key display Po- no , do not perform any operation
65535	65535	likeAF-09=65535 , press S key display Po- no , and restore the function code to the factory state.

☞ **1 : After using this function, the control power supply must be restarted.**

2 : This operation will not restore the motor parameters.

AF-10	Display motor group parameters	Data size	16bit	Correspondence address	3F0A
		Register value storage	Automatic reset on power on		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - ,hide Pd Group Parameters
1	1	according to S Ed key display - n - ,showPd Group Parameters

AF-16	Absolute encoder multi-turn data and alarm processing	Data size	16bit	Correspondence address	3F10H
		Register value storage	Complete automatic zeroing		

Register Value	Keyboard Display	operate
0	0	according to S Ed key display - n - , do not perform any operation
1	1	To clear a multi-turn encoder alarm: Press Ed S key display - n - , and perform the corresponding operations
2	2	Clear multi-turn encoder multi-turn data and alarms: Ed Press S key display - n - , and perform the corresponding operations

Important : This function can only be operated in the disabled state

Chapter 5 Running and Debugging

Before connecting the load, follow the instructions in this manual and make the motor run normally before connecting the load of the servo motor. Usually, a driver can be put into operation after the following tests:
Enter for use.

1) Wiring, check.
2) Power on the drive and adjust the parameters.
3) No-load operation.
4) Control function debugging.

Strongly recommend: Please let the servo motor work normally without load first, and then connect the load to avoid unnecessary danger !

5.1 Drive power on

5.1.1 Check before power on

1) Whether the drive and motor specifications match.
2) L1, L2, L3 and U, V, W must not be connected reversely and must not be loose.
3) The U, V, W of the motor must correspond one to one with the U, V, W of the driver .
4) Check whether the input voltage is consistent with the voltage level indicated on the drive nameplate or panel.
5) Check whether the encoder terminals are properly connected.
6) Are the servo motor and driver well grounded?

5.1.2 Power-on sequence

1) Please refer to Section 3.3.2 to ensure the correct power-on sequence.

5.2 Trial run

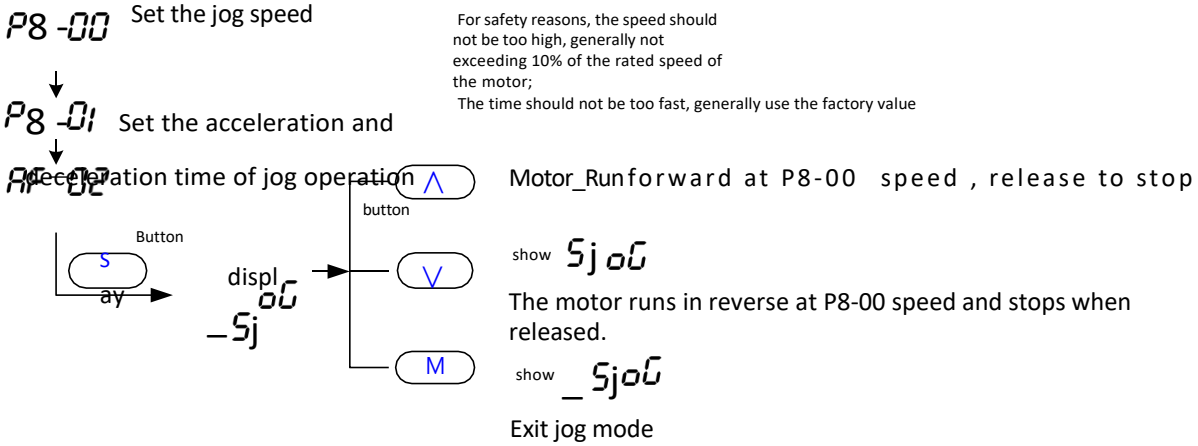
5.2.1 Jog operation parameter setting

When the servo is not enabled, set the following parameters

parameter	name
P8-00	JOG speed setting (usually the factory value can be used)
P8- 01	JOG acceleration and deceleration time (usually the factory value can be used)

5.2.2 Jog operation

Follow the picture below



If the motor jog runs normally, it indicates that the wiring and the basic functions of the driver and motor are normal.
If the motor does not rotate or does not run normally, please check whether the system wiring is correct, including whether the motor control line UVW phase sequence is correct and the contact is good, whether the encoder wiring is correct and the contact is good, and then confirm whether the motor CODE (d2-01) is consistent with the actual motor. Repeat the above steps and still run abnormally, please contact the manufacturer for a solution.

Chapter 6 EtherCAT communication

6.1 EtherCAT Communication specifications

EtherCAT Communication function	Physical Layer	100BASE- TX
	Communication interface	RJ45 (IN/ input -CN3 , OUT/ output - CN2)
	Network Architecture	Concatenation
	Transfer rate	2*100Mbps(full duplex)
	Data frame length	Maximum Bytes
	SyncManager	SM0 : Mailbox output SM1 : Mailbox input SM2 : Periodic data output SM3 : Periodic data input
	Application layer protocols	CoE : CANopen over EtherCAT
	Synchronous Mode	DC Synchronous mode (SYNC0)
	Communication object	SDO : Acyclic Data Object PDO : Periodic Data Object
	led Indicator Lights (Located at RJ45 interface)	EtherCAT ERR(ER)x1 EtherCAT Link/Activity(L/A)x2 EtherCAT RUN(RN)x1
	Application layer specifications	IEC61800-7 CiA402 Drive Profile
Supported CiA402 Operation Mode	1 : Profile position control mode Position Mode (PP) 2 : Profile speed control mode Velocity Mode (PV) 3 : Profile Torque Mode Mode (TQ) 4 : Homing Mode Mode(HM) 5 : Interpolated Position Mode (IP) 6 : Cycle Synchronized Position Mode (CSP) 7 : Cycle synchronous speed mode Synchronized Velocity Mode(CVP) 8 : Cycle synchronous torque mode Synchronized Torque Mode(CTP)	

6.2 EtherCAT Structure

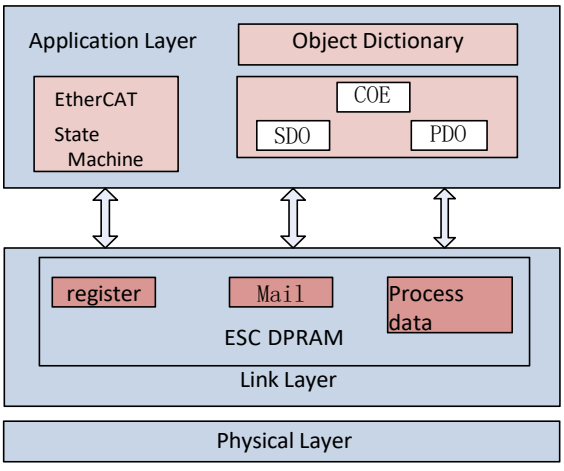
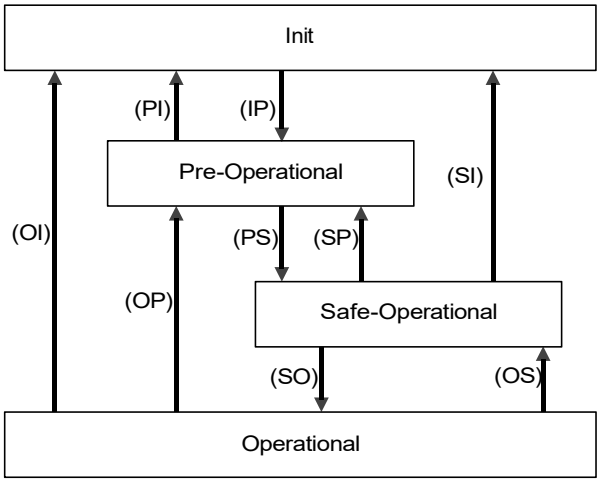


Figure6-1 BasedonCANOpen CIA402 EtherCAT at the application layer Communication Structure

In the structure diagram, the application layer object dictionary includes: communication parameters, application data, and PDO mapping data, etc.; the PDO process data object contains real-time data during the operation of the servo drive, and is read and written periodically; SDO mailbox communication accesses and modifies some communication parameter objects and PDO process data objects aperiodically.

6.3 EtheCAT State Machine

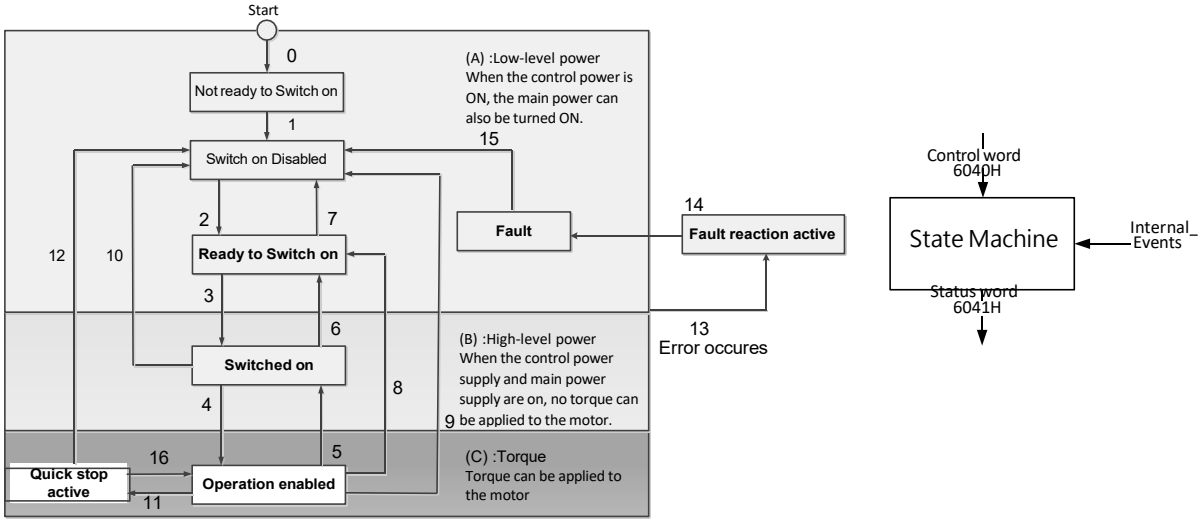
The following is EtherCAT State transition diagram:



When converting from the initialization state to the running state, the conversion must be carried out in the order of "initialization - pre-operation - safety operation - operation" and no skipping is allowed. When returning from the running state, skipping is allowed. The state conversion operation and initialization process are shown in the following table

state	illustrate
Init	There is no communication at the application layer, the master station can only read and write ESC register.
Pre- Operational	Mailbox communication is available in the current state.
Safe-Operational	Can read PDO Input data (TxPDO) . Unable to receive PDO Output data (RxPDO) .
Operational	Perform periodic I/O communication and process PDO Output data (RxPDO) .
State Migration	illustrate
IP	Start mailbox communication.
PI	Interrupt mailbox communication.
PS	Start updating input data.
SP	Terminates updating of input data.
SO	Start updating output data.
OS	Terminates updating of output data.
OP	Terminates updating of input / output data.
SI	Terminates updating of input data and mailbox communication.
OI	Terminates all input / output data updates and mailbox communications.

The state machine describes the state of the servo and the operations that can be performed in each state. The state machine is changed by control words or internal events and read by status words.



6.3.1 6040H Control Word

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Factory customized					reserve		stop	alarm Reset	Special operating modes			Enable	Emergency Stop	Power on	Power on
Manufacturer specific					Retain		Halt	Fault reset	Operation mode specific			Enable Operation	Quick stop	Voltage enabled	Switch on

Command	Bits of the Controlword					Transitions
	Bit7	Bit3	Bit2	Bit1	Bit0	
Shutedown	0	X	1	1	0	2,6,8
Switch on	0	0	1	1	1	3
Switch on + enable operation	0	1	1	1	1	3+4 (Note)
Disable Volatile	0	X	X	0	X	7,9,10,12
Quick stop	0	X	0	1	X	7,10,11
Disable operation	0	0	1	1	1	5
Enable operation	0	1	1	1	1	4,16
Fault reset	0- >1	X	X	X	X	15
Note : Automatic transition to Enable operation state after executing Switched On state functionality.						

6.3.2 6041H Status word

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Manu-facturer specific		Operation mode specific		Internal limit active	Target reached	Remote	Manu-facturer specific	Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Statusword	PDS FSA state
xxxx xxxx x0xx 0000b	Not ready to switch on
xxxx xxxx x1xx 0000b	Switch on disabled
xxxx xxxx x01x 0001b	Ready to switch on
xxxx xxxx x01x 0011b	Switched on
xxxx xxxx x01x 0111b	Operation enabled
xxxx xxxx x00x 0111b	Quick stop active
xxxx xxxx x0xx 1111b	Fault reaction active
xxxx xxxx x0xx 1000b	Fault

bit4

Whenbit4=1 When it is on, it indicates that the bus voltage has been established; otherwise, it indicates that the bus voltage is abnormal.

bit5

Whenbit5=1 When the state machine is processing Quick Stop ask.

bit7

Whenbit7=1 It indicates a warning has occurred, not an alarm.

bit9

Whenbit9=1, it indicates that the control word is valid.

bit11

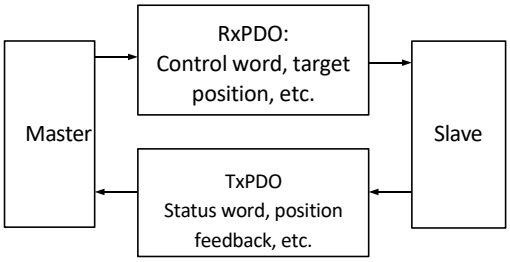
Whenbit11=1 When it is on, it means the internal limit module is effective. The internal limit refers to position, speed, and acceleration.

6.4 Process Data PDO

PDO The transmission of real-time process data follows the producer - consumer model. PDO Can be divided into:

RPDO (Reception PDO) , the slave station through RPDO Receive instructions from the master station;

TPDO (Trasmission PDO) , the slave station uses TPDO Feedback on your own status.



6.5 Mailbox Data SDO

EtherCAT mailbox data SDO is used to transmit non-periodic data, such as communication parameter configuration, servo drive operation parameter configuration, etc.

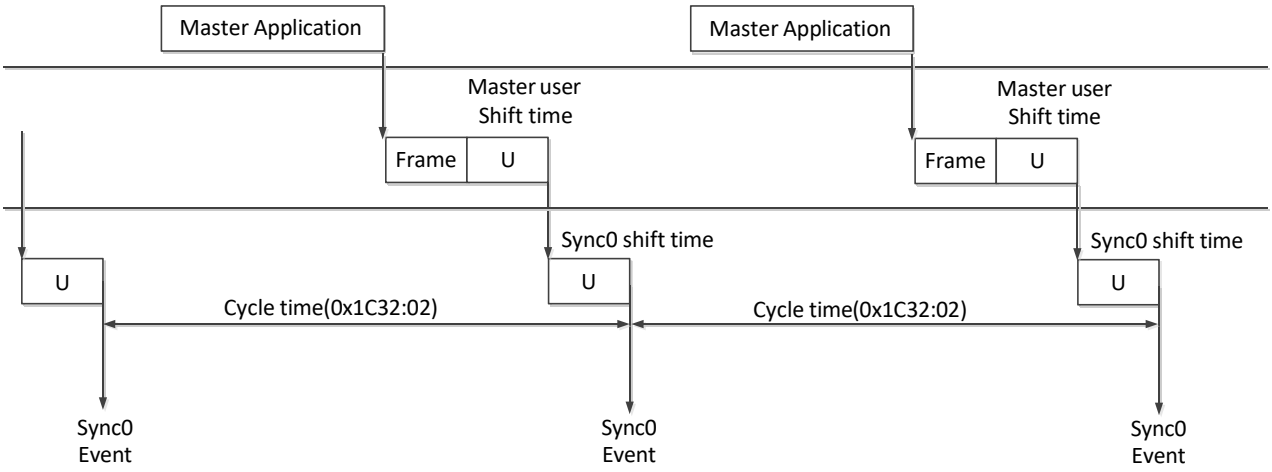
EtherCAT 's CoE service types include: 1) Emergency information; 2) SDO request; 3) SDO response; 4) TxPDO; 5) RxPDO; 6) Remote TxPDO send request;

7) Remote RxPDO sending request; 8) SDO information.

EA300E series drivers currently support 2) SDO request; 3) SDO response; 8) SDO information.

6.6 Distributed Clock

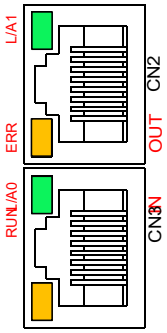
Distributed clocks enable all EtherCAT The devices use the same system time to control the synchronous execution of tasks of each device. The slave device can generate synchronization signals according to the synchronized system time. In the EA300E series drive, only DC synchronization mode is supported, and the synchronization cycle is controlled by SYNC0 .



6.7 Status indicator (Link Activity led

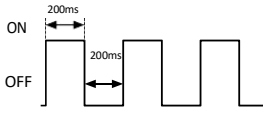
The following figure shows RJ45 LEDs on the terminals

Definition of indicator light:



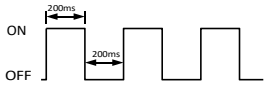
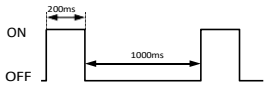
6.7.1 L/A0 and L/A1 (green light)

L/A0 DisplayCN3 Status of the communication interface, L/A1 LED Displays the statusof the CN2 communication interface:

L/A0 L/A1	describe	illustrate
Off		Communication not connected
Flash		Communication connected and activated
Always on		Communication is connected but not yet activated

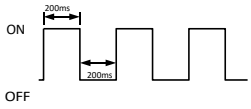
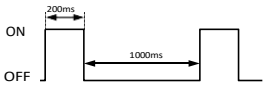
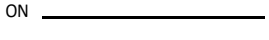
6.7.2 RUN (yellow light)

RUN Display Servo Drive EtherCAT CommunicationState Machine In which state.

RUN led	describe	illustrate
Off		The state machine is in INIT state.
Continuous flashing (200ms)		The state machine is in Pre-Operational state.
Intermittent flashing (1s)		The state machine is in Safe-Operational state
Always on		The state machine is in the Operational state

6.7.3 ERR (yellow light)

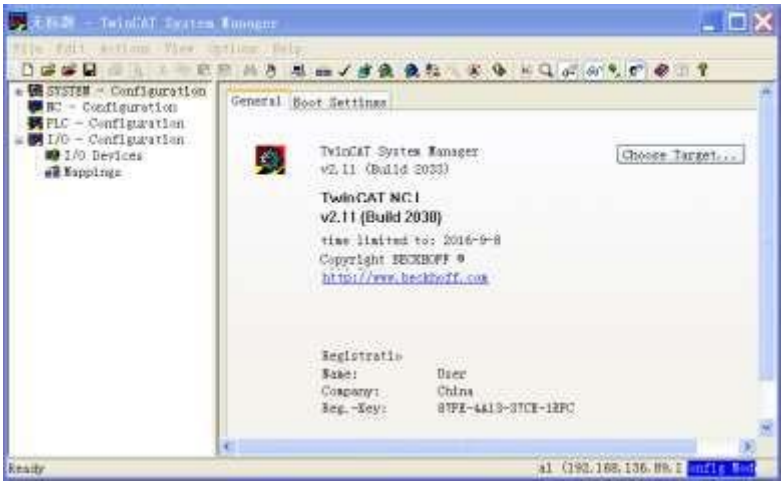
ERR DisplayEtherCAT The status of the communication.

ERR LED	describe	illustrate
Off		EtherCAT Communication is normal.
Continuous flashing (200ms)		FromEtherCAT Receive State Unable to set Object Setinstruction (state machine transition cannot be completed)
Intermittent flashing (1s)		Sync Error / SyncManager mistake
Always on		PDO Monitoring timeout

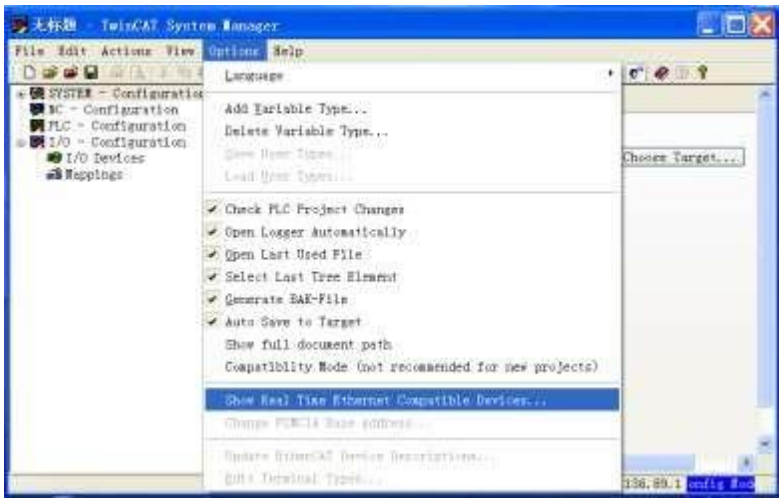
6.8 TwinCAT set up

EtherCAT using different software The following example uses the Beckhoff TwinCAT Before configuring the software, please install TwinCAT correctly .

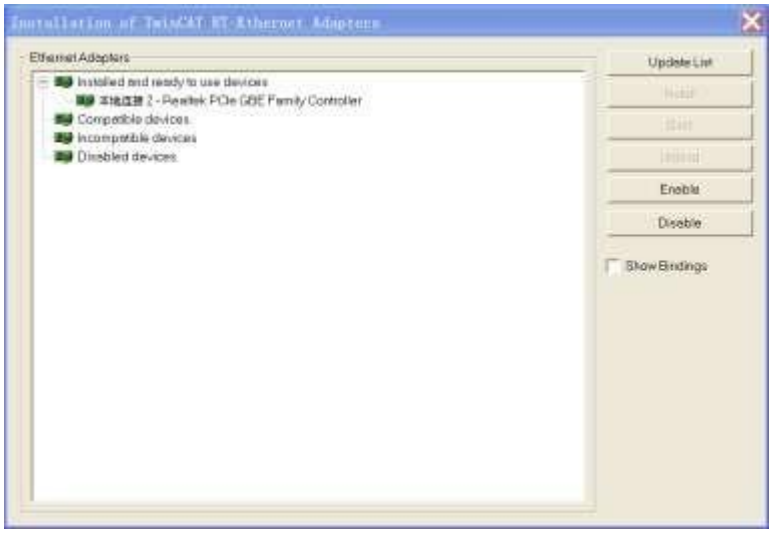
1. SINEE_EA300Y_EtherCAT_version(actual version).xml Copying syntax to TwinCAT The installation folder (usually the path is C:\TwinCAT\Io\EtherCAT) .
2. Restart TwinCAT .
3. TwinCAT as shown below System Manager Start the configuration procedure.



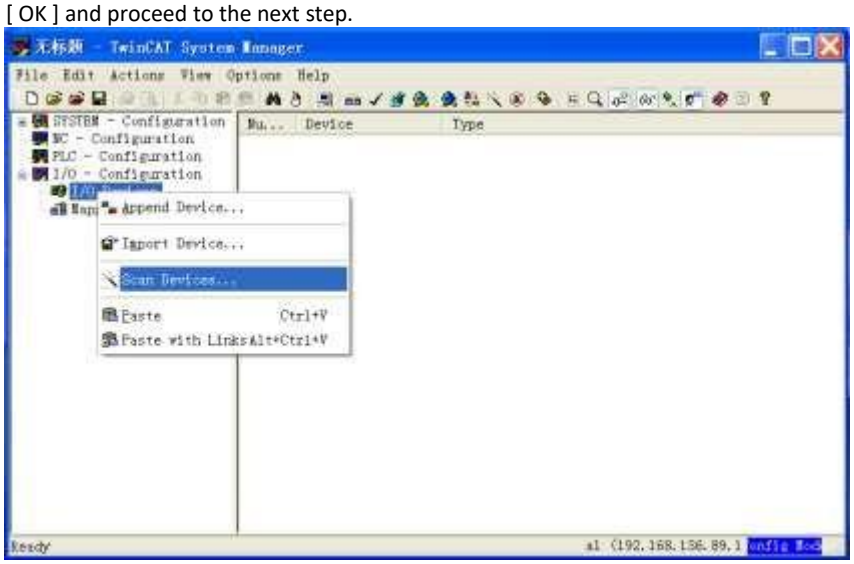
4. Installing a Network Adapter (NIC) to run EtherCAT communication.
Select [Options] , then click [Show Real Time Ethernet Compatible Devices] .



5. From the list of installed network adapters, select the one that is appropriate for EtherCAT Select the network adapter for communication and click [Install] .

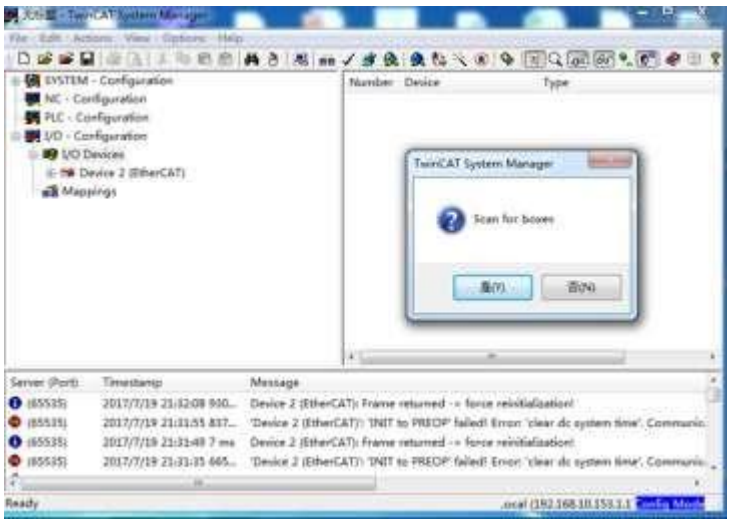


6. Open the drop-down menu from [File] and click [New] to create a new project.
7. In [I / O Right-click on [Device] and select [Scan Devices] or press the [F5] key to start scanning for devices. In the pop-up dialog box, press [OK] and proceed to the next step.



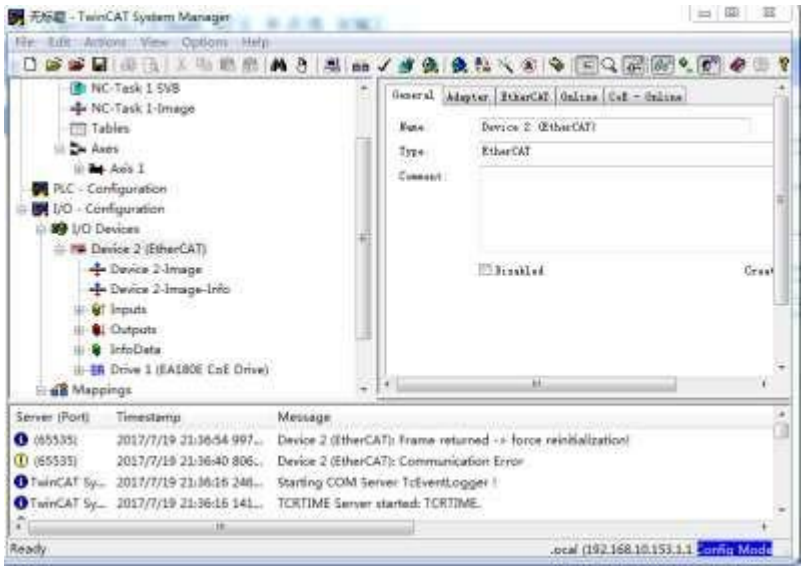
8. Select [Device [n] (EtherCAT)] and click [OK] .

9. Click [Yes] to enable EtherCAT Device detection.

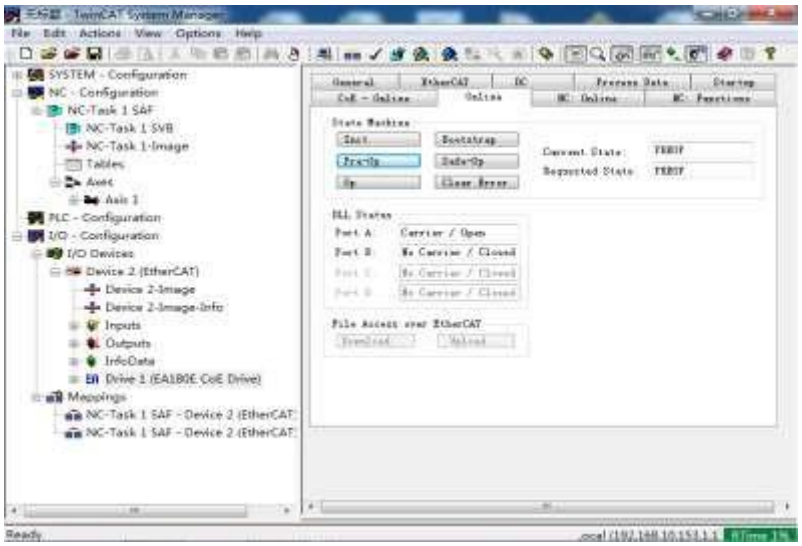


10. Click [Yes] to add the driver to NC-Configuration .

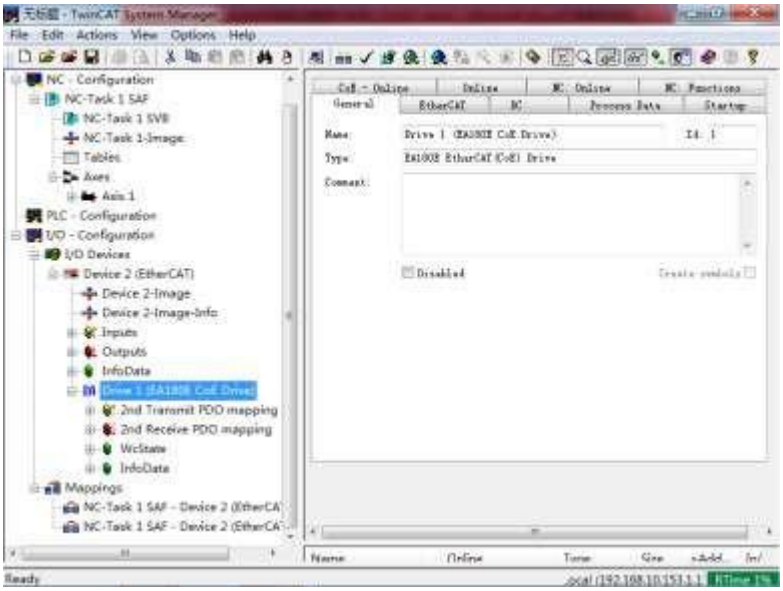
11. In the dialog box below, click [No] , TwinCAT Will switch to Config Mode



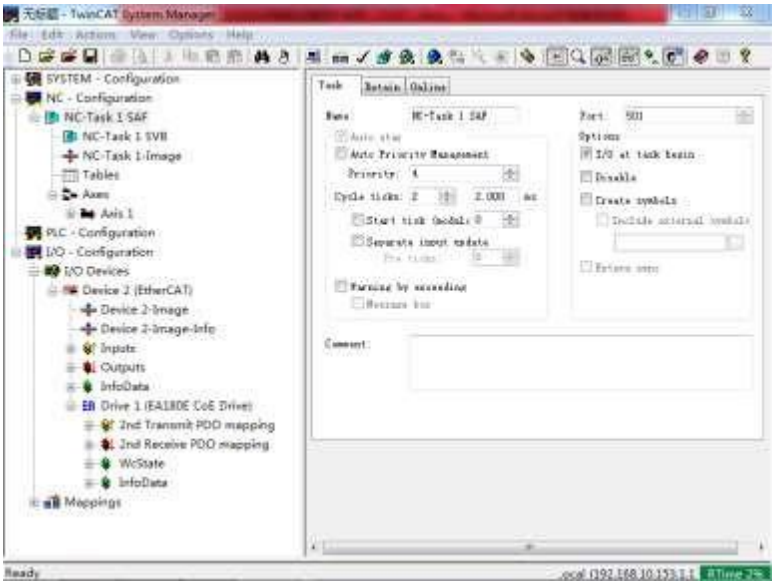
12. Select [Drive 1 (EA300E CoE Drive)] , youcancheck the EtherCAT Isthe state machine (ESM) in PREOP? Status



13. Double-click [Drive 1 (EA300E CoE Drive)] , the screen will display:
2nd TxPDO – CoETx PDO mapping
3rd RxPDO – CoE Rx PDO mapping
WcState
InfoData



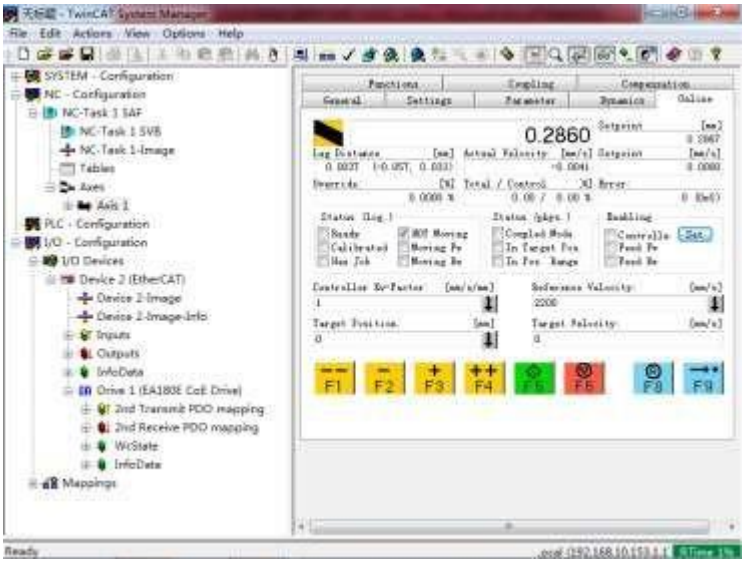
14. Set the communication cycle *(the default value is 2 ms)
In the left window, select [NC-Task 1 SAF] , and in the Cycle ticks The field sets the communication cycle (the minimum setting value is 1 ms) * Communication cycle, SYNC0 Cycle and PDO The setting value of the cycle must be consistent.



15. Following Error Calculation Set to " Extern ."
In the left window, select [Axis 1_Drive] → In the Parameter T h e FollowingError field Calculation Set to " Extern " → click [Download] b u t t o n , a n d t h e n c l i c k [OK] in the pop-up dialog box .

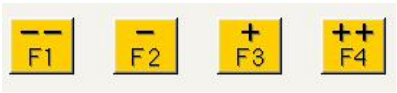
16. TwinCAT Switch to Run Mode .
Press to generate mappings → Press to confirm the configuration → Press to enable the configuration, TwinCAT Will switch to Run Mode , please click [OK] in the pop-up dialog box .

17. The motor Servo On .
In the left window, under [NC-Configuration] , select [Axis 1] → Select Online in the right window tab→click [Set] .



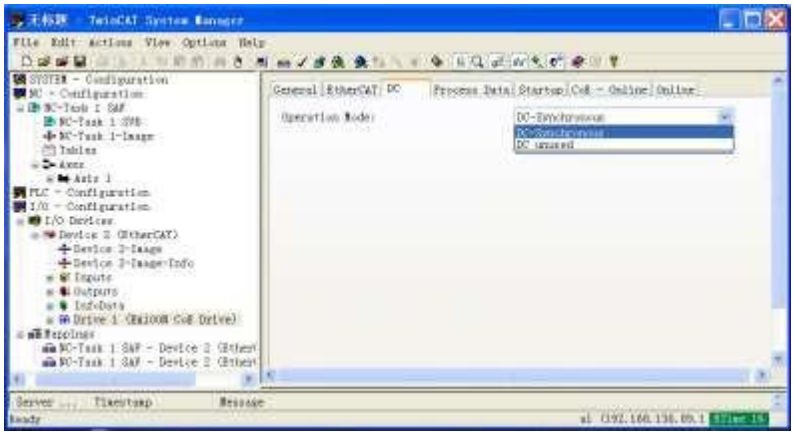
18. In the pop-up dialog box, click [All] to start the motor.

19. Online In the tab, the jog button provides two different speed levels when the motor is running forward or reverse. Users can use this button to test the system. When operating , please make sure that the operation of the servo system will not damage the system or endanger personnel safety.



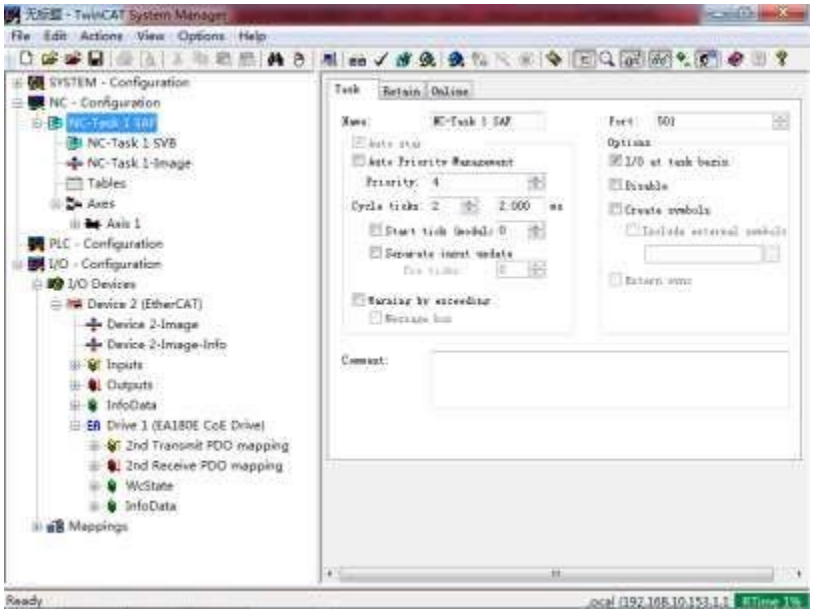
6.9 Synchronous mode selection

1. In the left window, select [Drive 1 (EA300E CoE Drive)] .
2. Users can select DC Select [DC-Synchronous] or [Free Run] (asynchronous) as the operation mode.



6.10 Synchronous clock setting

1. In the left window, select [NC-Task 1 SAF] .
2. Click Task in the right window Tab.
3. Task Cycle under the tab ticks The field can set the data exchange period.



SYNC0 The unit of period is 2 ms .

Chapter 7 Control Mode

7.1 Servo Setting Process

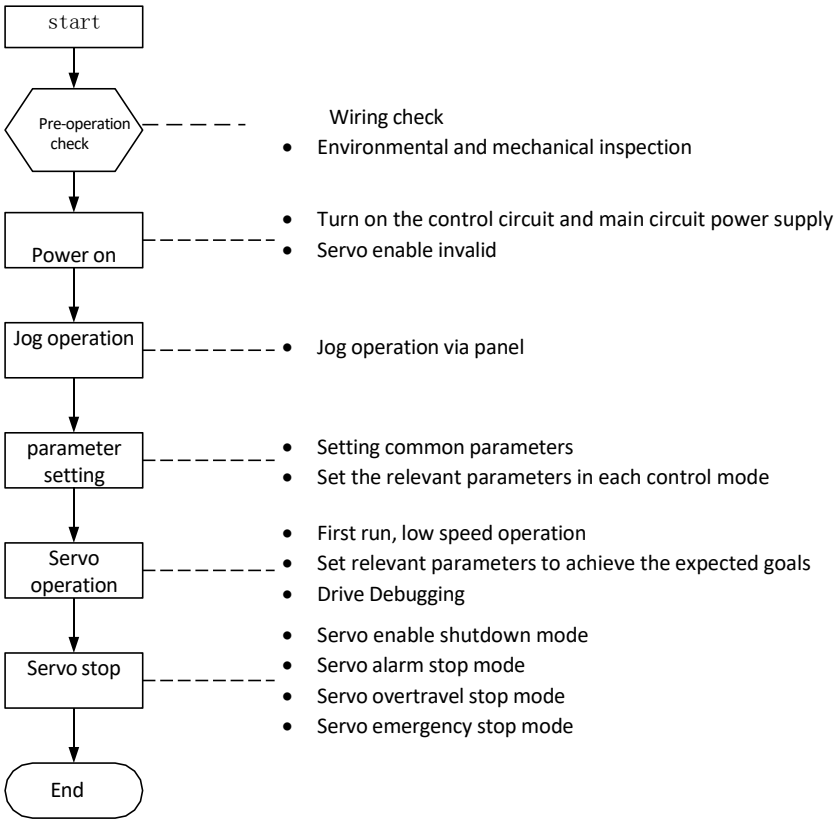


Figure7-1 Servo Setting Process

7.1.1 Jog operation

Please use the jog operation to confirm whether the servo motor can rotate normally and there is no abnormal vibration or abnormal sound when rotating. The jog operation function can be used through the panel.

The machine uses the current function code P8-00 Stores the value as the jog speed.

Panel inching AF-02 Enter the jog mode and press SET key, the panel displays SJOG, andthe UP/DOWN Press the MODE key to exit the jog operation state.

Key index code

index	JOG speed Setting value	Initial value	unit	Can it be mapped?	Data Structure
2800		100	-	-	UINT

Control Mode : -

Data Type : UINT
Data range : 0~3000
Display mode : -
Accessibility: RW

Setting takes effect: The setting takes effect immediately after running

Parameter function : When using the jog function, set the jog running speed command value.

The jog function can be triggered when the servo drive is in normal operation, regardless of the current control board mode.

7.1.2 Rotation direction selection

By setting 0x607E , the rotation direction of the motor can be changed without changing the polarity of the input command.

index	Polarity	Initial value	unit	Can it be mapped?	Data Structure
0x607E		0	-	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~255 **Display mode** : -
Accessibility: RW

Setting takes effect: Setting takes effect when the machine is running and stopped

Parameter function: bit7 and bit6 represent the position and speed polarity respectively , 0 represents1, 1 represents-1;

7.1.3 Conversion factor settings

6093h : Position (INC) conversion factor; 6094h : Speed (INC/s) conversion factor; 6097h : Acceleration/deceleration (INC/s²) conversion factor; their definitions are basically the same, as follows

Only6093h For simpler and more intuitive operation, please refer to P1-02 explain.

- The conversion factor actually means: the load axis given value (user unit) is1 The actual value of the motor shaft (encoder unit) when Position conversion factor from molecule 6093-01h and denominator 6093-02h The proportional relationship between the load shaft displacement (command unit) and the motor displacement (encoder unit) can be established through the conversion factor:
- Motor displacement = load shaft displacement × gear ratio

The motor and the load are connected through a reducer and other mechanical transmission mechanisms. Therefore, the gear ratio is related to the mechanical reduction ratio and mechanical size. The calculation method is as follows:

- Gear ratio = motor resolution / load axis resolution

index	Position Factor Position Factor	Initial value	unit	Can it be mapped?	Data Structure
6093		OD default value	-	YES	ARR

Control mode : ALL
Data type : Uint32
Data range : OD Data
range display mode :decimal
Accessibility:-Settings
effective: -

Parameter function : The gear ratio is used to establish the proportional relationship between the load shaft displacement and the motor shaft displacement specified by the user.

the motor position feedback (encoder unit) and the load shaft position feedback (command unit) :

- Motor position feedback = load shaft position feedback × gear ratio Relationship between motor speed (rpm) and load shaft speed (command unit /s) :

- $\text{Motor speed (rpm)} = \frac{\text{load shaft speed} \times \text{gear ratio 6094h}}{\text{Encoder resolution}} \times 60$

Motor acceleration (rpm/ms) and load shaft speed (command unit /s2) Relationship:

- $\text{Motor acceleration} = \frac{\text{load shaft acceleration} \times \text{gear ratio 6097h}}{\text{Encoder resolution}} \times \frac{60}{1000}$

Sub-index	Gear ratio numerator numerator	Initial value	unit	Can it be mapped?	Data Structure	Accessibility	Display Mode
01h		1	-	RPDO	-	R W	Decimal

Control Mode : -
Data type : Uint32
Data range : 1 to (2^{32} - 1)
Setting takes effect: Shutdown setting takes effect

Sub-index	Gear ratio denominator Divisor	Initial value	unit	Can it be mapped?	Data Structure	Accessibility	Display Mode
02h		1	-	RPDO	-	R W	Decimal

Control Mode : -
Data type : Uint32
Data range : 1 to (2^{32} - 1)
Setting takes effect: Shutdown setting takes effect

Parameter function : The gear ratio range is: 1.0～64000.0 . Outside this range, a gear ratio setting over-limit alarm will occur.

- Take the ball screw as an example:

The minimum unit of instruction fc=0.001mm

Screw lead Pb=10mm/r

Reduction ratio n=5:1

23bit encoder motor resolution P=8388608(P/r)

The position factor is calculated as follows:

$$\text{Position factor} = \frac{\text{motor resolution} \times}{/} = \frac{8388608 \times 5}{10/0.001} = 4194.304 = \frac{524288}{125}$$

Therefore: 6093-1h=524288, 6093-2h=125 . Its essential meaning is: when the load displacement is 0.125mm , the motor displacement is 524288 encoder pulses.

7.2 Servo status setting

UsingEA300E The drive must comply with the CiA standard 402 The servo drive can only run and reach the specified state if the process specified by the protocol guides the servo drive.

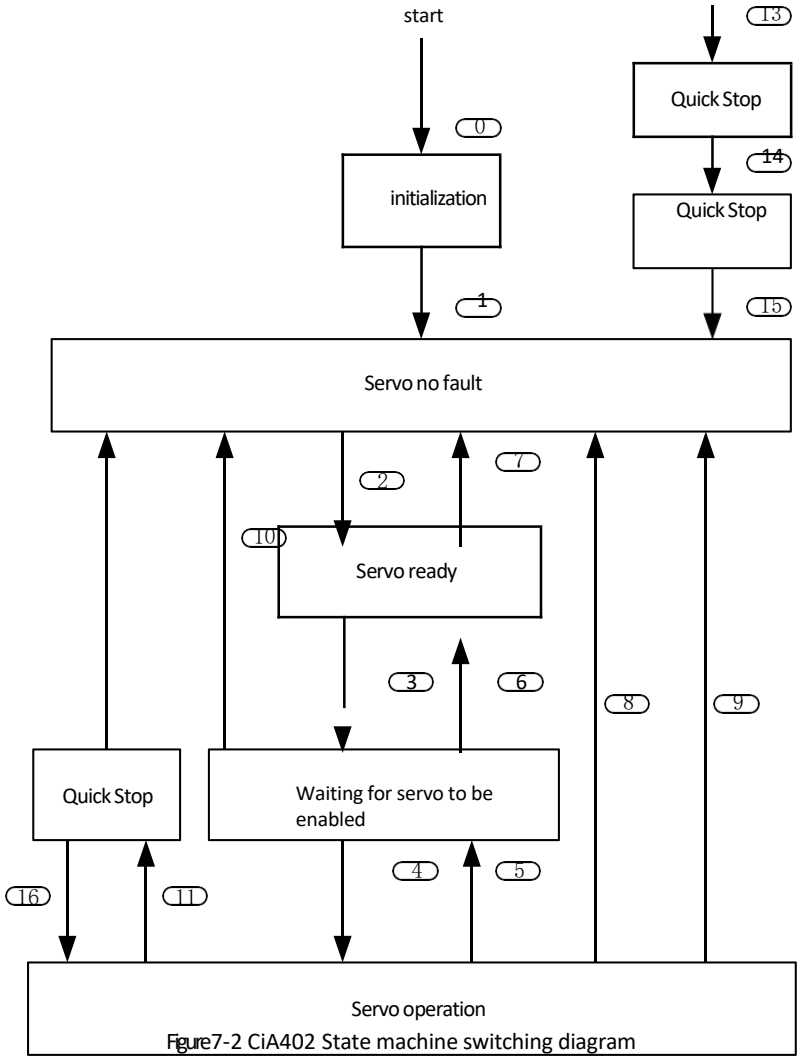


Figure7-2 CiA402 State machine switching diagram

The description of each status is as follows:

initialization	The drive initialization and internal self-test have been completed. The drive parameters cannot be set and the drive function cannot be executed.
Servo no alarm	Servo drive has no alarm or error has been eliminated. Drive parameters can be set.
Servo ready	The servo drive is ready. The drive parameters can be set.
Waiting for servo to be enabled	The servo drive is waiting for the servo to be enabled. The drive parameters can be set
Servo operation	The drive is operating normally, a servo operation mode has been enabled, the motor is powered on, and the command is not 0 When the motor The drive parameter attribute of "operation change" can be set, and others cannot be set.
Quick Stop	The fast stop function is activated and the drive is executing the fast stop function. The drive parameter attribute of "Run Change" can be set, and others cannot be set.
Alarm shutdown	The drive has an alarm and is in the process of executing an alarm shutdown. The drive parameter attribute of "Run Change" can be set, but others cannot.

7.2.1 Control commands and state switching:

CIA402 State Switching		Control Word 6040h	Status word 6041h bit0～bit9
0	Power on → Initialize	Natural transition, no control instructions required	0x0000
1	Initialization → Servo no alarm	Natural transition, no control instructions required If an error occurs during initialization, go directly to 13	0x250
2	Servo no alarm → Servo ready	0x0006	0x0231
3	Servo ready → Waiting for servo to be enabled	0x0007	0x233
4	Waiting for the servo to be enabled → Servo to run	0x000F	0x237
5	Servo running → Waiting for servo to be enabled	0x0007	0x233
6	Waiting for the servo to be enabled → Servo is ready	0x0006	0x0231
7	Servo ready → Servo no alarm	0x0000	0x250
8	Servo running → Servo ready	0x0006	0x0231
9	Servo running → Servo no alarm	0x0000	0x250
10	Waiting for servo to be enabled → Servo has no alarm	0x0000	x250
11	Servo operation → quick stop	0x0002	0x217
12	Quick stop → Servo no alarm	Quick stop mode 605A Select 0~3, after the stop is completed, the transition is natural, and no control command is required	0x250
13	→ Alarm shutdown	In any state except "alarm", once the servo drive generates an alarm, it will automatically switch to the alarm stop state without the need for control instructions.	0x21F
14	Alarm Shutdown → Alarm	After the alarm shutdown is completed, the transition is natural and no control instructions are required	0x218
15	Alarm → No Alarm	0x80 The rising edge of bit7 is valid; when bit7 remains at 1, other control instructions are invalid.	0x250
16	Quick stop → servo operation	The fast shutdown mode 605A is selected from 5 to 7. After the shutdown is completed, send 0x0F	0x0237

☞ **Due to status word 6041h bit10 ~bit15(bit14 It is related to the operating status of each servo mode and is represented by " 0 " in the above table . For the specific status of each bit, please check the operating mode of each servo**

7.2.2 Control word 6040h

index	Control word	Initial value	unit	Can it be mapped?	Data	Accessibility	Display Mode
6040h		0	-	RPDO	VAR	RW	Decimal

Control mode : ALL

Data type : Uint16

Data range : 00～FF

Setting effective: Run setting shutdown effective

parameter function : Set control command

Bit	name	describe
0	Servo ready	1- Valid, 0- invalid
1	Main circuit energized	1- Valid, 0- invalid
2	Fast shutdown	1- Invalid, 0- efficient
3	Servo operation	1- Valid, 0- invalid
4~6		Related to each servo operation mode.
7	Alarm reset	For resettable alarms and warnings, execute the alarm reset function bit7 The rising edge is valid; bit7 Keep it as 1 , other control instructions are invalid.
8	pause	605Dh for the pause method in each mode .
9~10		NA Reserve
11~15		Factory-defined reserved, undefined

Each bit of the control word It is meaningless to assign a value to a bit alone, and it must be combined with other bits to form a control instruction.

bit0~bit3 and bit7 The meaning is the same in each servo mode. The commands must be sent in sequence to operate the servo drive according to CiA402. The state machine switching process leads to the expected state, and each command corresponds to a certain state.

bit4~bit6 Related to each servo mode (please refer to the control instructions in different modes) status word 6041h

index	status word	Initial value	unit	Can it be mapped?	Data Structure	Accessibility	Display Mode
6041h		0	-	TPDO	VAR	RO	Decimal

Control mode : ALL
Data Type : Uint16
Data range : 00～FFFF
Setting effective: -

Parameter function : reflect the servo status

Setting value (binary)	describe
xxxx xxxx x0xx 0000	Not ready to switch on
xxxx xxxx x1xx 0000	Switch on disabled
xxxx xxxx x01x 0001	Ready to switch on
xxxx xxxx x01x 0011	Switched on
xxxx xxxx x01x 0111	Operation enabled
xxxx xxxx x00x 0111	Quick stop active
xxxx xxxx x0xx 1111	Fault reaction active
xxxx xxxx x0xx 1000	Fault

☞

1) **Each bit of the status word The bit is meaningless when read alone, and must be combined with other bits to feedback the current status of the servo**
2) **bit0~bit9 The meaning is the same in each servo mode, control word 6040h After sending commands in sequence, the servo feedback a certain status.**
3) **bit12~bit13 Related to each servo mode (please check the control instructions in different modes)**
4) **bit10 bit11 bit15 The meaning is the same in each servo mode, and it is the status of the servo after it executes a certain servo mode.**

7.3 Servo Mode Settings

7.3.1 Servo Mode Introduction

EA300E Support8 Servo mode, object dictionary 6502h Used to display the servo modes supported by the servo drive.

index	Supported servo operation modes	Initial value	unit	Can it be mapped?	Data Structure	Accessibility	Display Mode
6502h	Supported drive modes	0x3ED	-	NO	VAR	RO	Decimal

7.4 Profile position control mode (1- PP)

This mode is mainly used for point-to-point positioning applications. In this mode, the host computer gives the target position (absolute or relative) , the speed of the position curve, acceleration and deceleration, and the trajectory generator inside the servo will generate the target position curve command according to the settings, and the driver will complete the position control, speed control, and torque control.

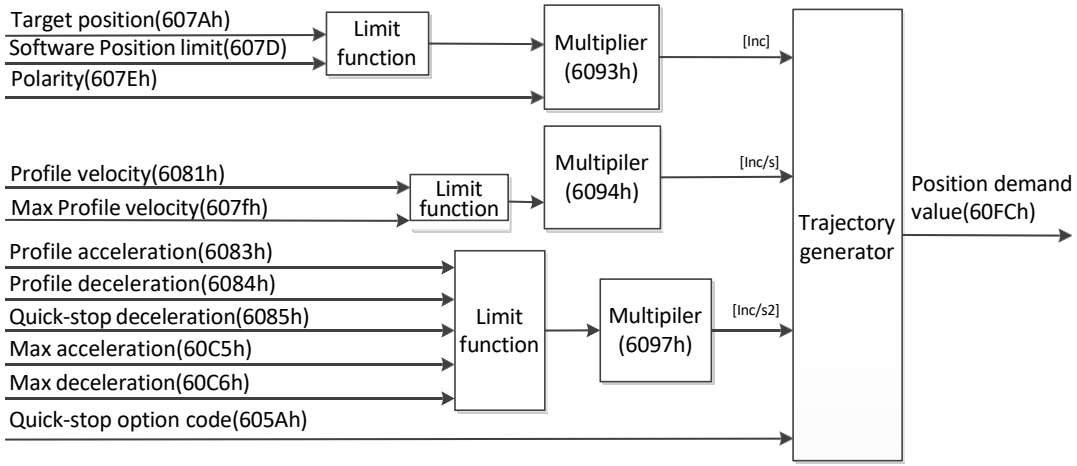


Figure7-3 Contour position mode given module control block diagram

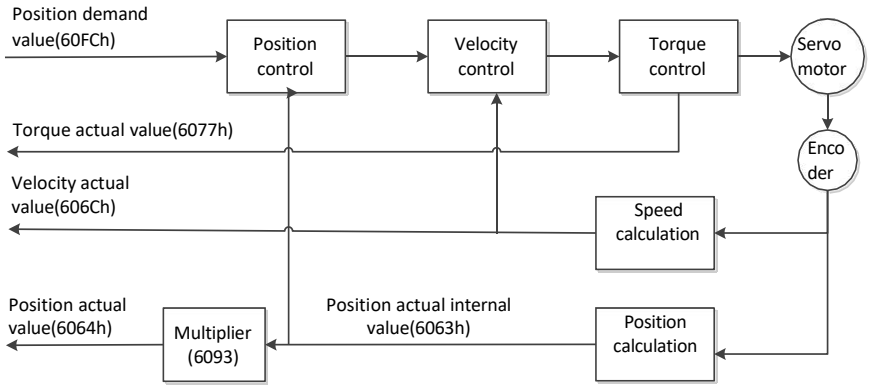


Figure7-4 Contour Position Mode Feedback Module Control Block Diagram

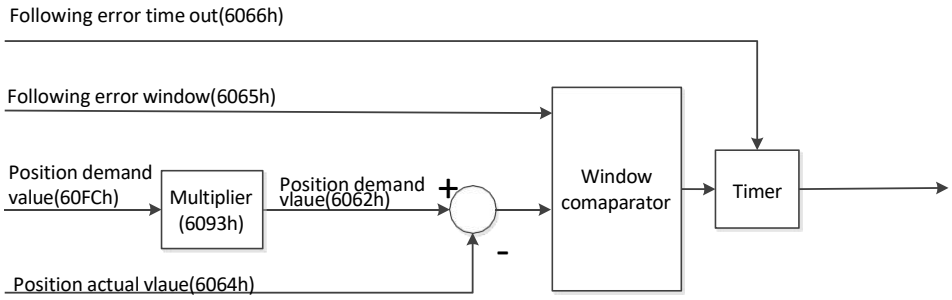


Figure7-5 Contour position mode following error judgment module control block diagram

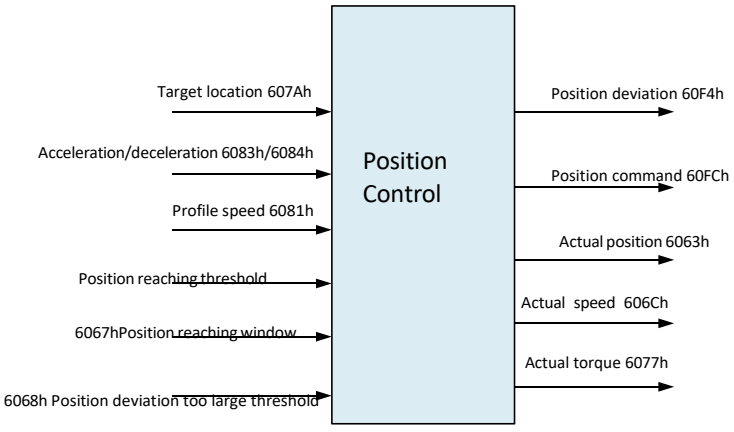


Figure 7-6 Profile position mode (pp) Input and Output Block Diagram

7.4.1 Related Objects

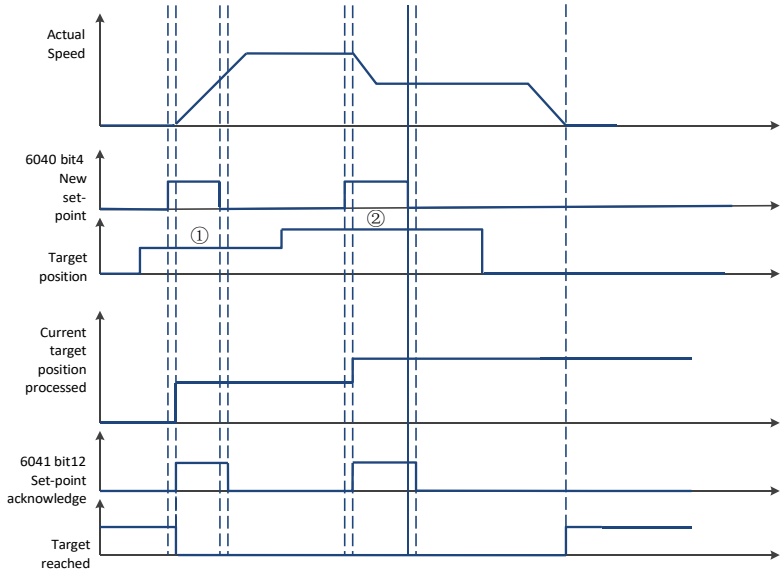
Control Word 6040h		
Bit	name	describe
0	Switch on	Bit0~bit3 Both are 1, indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	New set-point	A rising edge of this bit from 0 to 1 indicates a pre-trigger of a new target position given by 607Ah, profile velocity 6081h, acceleration 6083h and deceleration 6084h
5	Change set immediately	0: Not updated immediately 1: Update immediately
6	abs/rel	0: The target position is an absolute position command 1: The target position is a relative position command

Status word 6041h		
Bit	name	describe
10	Target reached	0: Target position not reached 1: Target position reached
12	Set-point acknowledge	0: The target position can be updated 1: The target position cannot be updated
13	Following error	0: No position deviation alarm 1: Position deviation alarm
15	Home Find	0: Origin return not completed 1: Origin return completed

index	name	access	Data Types	Can it be mapped?	unit	Setting range	default value
6040	Control Word	R W	UINT16	RPDO	-	0 ~ 65535	0
6041	Status word	RO	UINT16	TPDO	-	0 to xFFFF	0
6060	Mode Selection	R W	INT8	RPDO	-	0 ～ 10	1
6061	Mode Display	RO	INT8	TPDO	-	0 ～ 10	1
607A	Target location	R W	INT32	RPDO	Command unit	-2^{31} ～(2^{31} - 1)	0
6081	Profile speed	R W	INT32	RPDO	Instruction unit /s	0 ~ (2^{31} - 1)	218453
6083	Contour acceleration	R W	INT32	RPDO	Command unit /s^2	0 ~ (2^{31} - 1)	1310720
6084	Contour deceleration	R W	INT32	RPDO	Command unit /s^2	0 ~ (2^{31} - 1)	1310720
6064	Position feedback	R W	INT32	TPDO	Instruction unit /s	-2^{31} ～(2^{31} - 1)	0

7.4.2 Position curve completion diagram

1. **Control instruction timing is updated immediately :**
   a) The host computer first updates and modifies other attributes of the displacement instruction as needed (acceleration time 6083h Deceleration time 6084h , profile speed 6081h , target displacement 607Ah) .
   b) The host computer will 6040h bit4 From 0 Set to 1 , prompting the slave station to have a new displacement instruction that needs to be enabled. The slave station receives 6040h bit4 After the rising edge of , it is determined whether the new displacement instruction can be received:
   c) If 6040 bit5 The initial state is 1 , and at this time 6041h bit12 is 0 , indicating that the slave station can receive new displacement instructions①; after the slave station receives the new displacement instruction, it will Bit 12 is set to 0 Set to 1 , indicating that the new displacement instruction ① has been received, and the current slave is in a state where it cannot continue to receive new displacement instructions. In the immediate update mode, once a new displacement instruction is received (6041 bit12 From 0 becomes 1) , the servo immediately executes the displacement command.
   d) The host computer receives the status word 6041h from the slave station bit12 becomes 1 After that, the displacement instruction data can be released and the control word 6040h bit 4 From 1
   Set to 0 , indicating that there is no new position command. bit4 It is effective for edge change, so this operation will not interrupt the displacement instruction being executed.
   e) The slave detects the control word 6040h bit4 From 1 becomes 0 When the status word 6041h bit12 From 1 Set to 0 , indicating that the slave is ready to receive new displacement instructions. In the immediate update mode, when the slave detects the control word 6040h bit4 From 1 becomes 0 When 6041h is always bit12 Clear. In the immediate update mode, during the execution of the current displacement instruction, a new displacement instruction ② is received, and the displacement instruction executed by ① is not discarded. For the relative position instruction, after the second displacement instruction is positioned, the total displacement increment = ①'s target position 607A + ②'s target position 607A.



7-7 Update control command timing immediately

2. **Control instruction timing is not updated immediately :**

a） The host computer first updates and modifies other properties of the displacement instruction as needed (acceleration time 6083 , deceleration time 6084 , maximum operating speed 6081 , target displacement 607A)

b） The host computer will 6040 bit4 From 0 Set to 1 to prompt the slave that there is a new displacement instruction that needs to be enabled

c） The slave receives 6040 bit4 After the rising edge of , it is determined whether the new displacement instruction can be received: if 6040 bit5 The initial state is 0 , and at this time 6041 bit12 is 0 , indicating that the slave station can receive new displacement instructions①; after the slave station receives the new displacement instruction, it will bit12 From 0 Set to 1 , indicating that the new displacement instruction ① has been received and the current slave station is in a state where it cannot continue to receive new displacement instructions.

d） The host computer receives status word 6041 bit12 becomes 1 After that, the displacement instruction data can be released and the control word 6040 bit4 From 1 Set to 0 , indicating that there is no new position instruction at present .
Due to 6040 bit4 It is effective for edge change, so this operation will not interrupt the displacement instruction being executed.

e） The slave detects control word 6040 bit4 From 1 becomes 0 , and after the current segment positioning is completed, 6041 is released bit12 The servo is ready to receive new displacement instructions. In non-immediate update mode, the servo cannot receive new displacement instructions while the current segment is running. After the current segment positioning is completed, the servo can receive new displacement instructions. Once received (6041 bit12 From 0 becomes 1) , the servo immediately executes the displacement command.

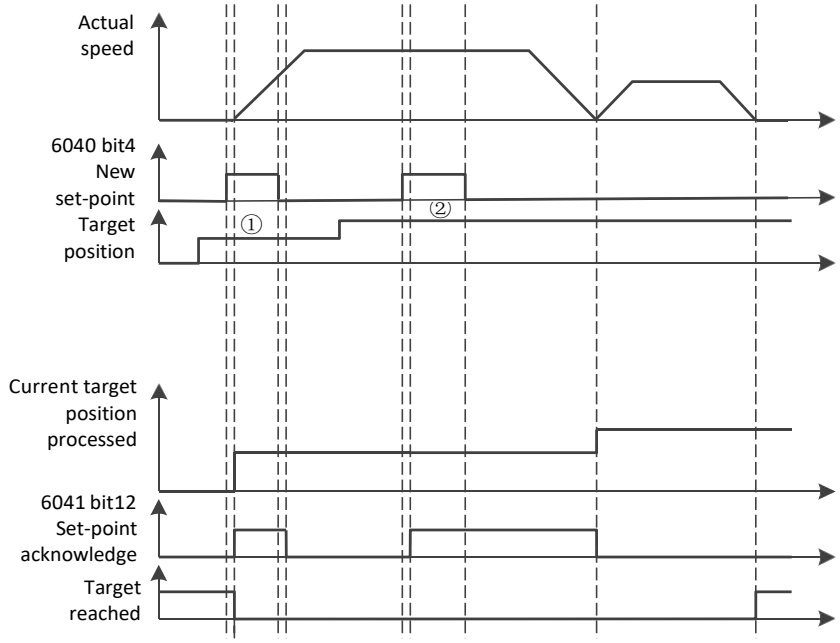
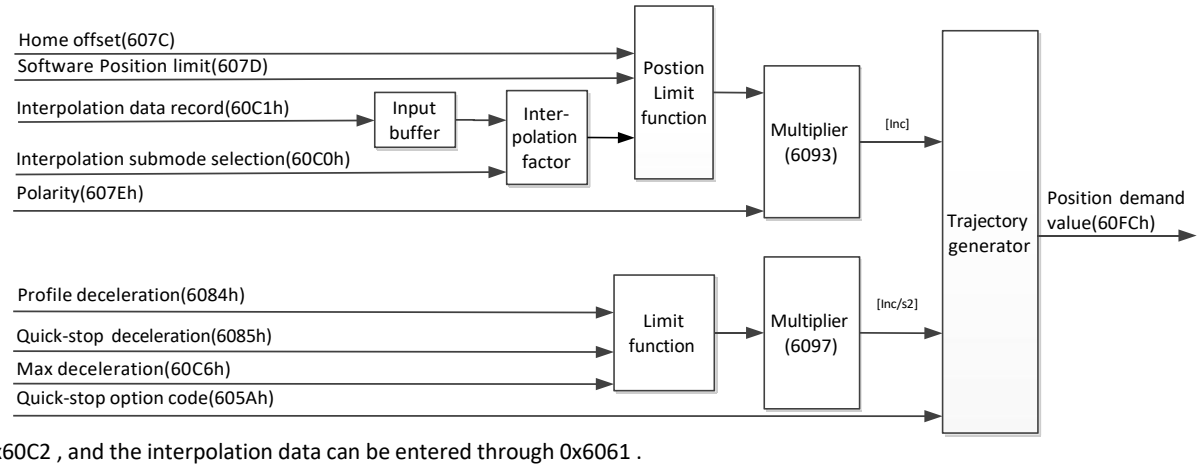


Figure7-8 Non-immediate update control instruction timing

7.5 Interpolation position control mode (7- IP)

Interpolation position control mode is used to control the need for Set point Time compensation of multiple axes or one axis. Generally used to adjust the time of drive units related to time synchronization technology. The interpolation cycle is defined by



0x60C2 , and the interpolation data can be entered through 0x6061 .

Figure7-9 Position interpolation mode configuration diagram

7.5.1 Mode Switching

Notes on mode switching:

1. **When the servo drive is in any state, after switching from contour position mode or periodic synchronous position mode to other modes, the unexecuted position instructions will be discarded.**
2. **When the servo drive is in any state, after switching from profile speed mode, profile torque mode, periodic synchronous speed mode, or periodic synchronous torque mode to other modes, it will first perform a ramp stop. After the stop is completed, it can switch to other modes.**
3. **When the servo is in zero return mode and is running, it cannot be switched to other modes; when the zero return is completed or interrupted (alarm or enable is invalid), it can be switched to other modes.**
4. **In the servo running state, when switching from other modes to the cycle synchronization mode, please send instructions at least 1ms later, otherwise the instruction will be lost or an error will occur.**

7.5.2 Related Objects

Control Word 6040h		
bit	name	describe
0	Switch on	Bit0~bit3 Both are 1, indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	Disable interpolation	0: interpolation is not allowed; 1: interpolation is enabled;
8	Halt demand	0: Execute the instruction of bit4,1: The axis should stop according to the stop method of 605Dh, and the status word bit12 should be set to 0

Control Word 6041h		
bit	name	describe
10	Target reached	0: Target position not reached 1: Target position reached
12	IP mode active	0: IP mode enable is effective 1: IP mode enable is not effective

index	Sub-index	name	access	Data Types	Can it be mapped?	unit	Setting range	default value
6040		Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041		Status word	RO	UINT	TPDO	-	0 to xFFFF	0
6060		Operation Mode	R W	SINT	RPDO	-	0 ～ 10	7
6061		Mode Display	RO	SINT	TPDO	-	0 ~ 10	7
60C1		Interpolation data records	RO	DINT	NO	-	ARR	-
60C1	01	Interpolation data records	R W	DINT	NO	-	-2^{31} ～ $(2^{31}-1)$	0
607D	00	Support software absolute position limit sub-index maximum number	RO	USINT	NO		2	2
607D	01	Minimum software absolute position limit	R W	DINT	NO	-	-2^{31} ～ $(2^{31}-1)$	-2^{31}
607D	02	Maximum software absolute position limit	R W	DINT	NO	-	-2^{31} ～ $(2^{31}-1)$	$2^{31}-1$
60C2	00	Maximum supported interpolation time Sub-index of the period	RO	USINT	NO	-	2	2
60C2	01	Interpolation time period unit	R W	USINT	NO	-	0~65535	1
60C2	02	Interpolation time index	R W	SINT	NO	-	- 128 to 63	- 3

7.6 Cyclic Synchronous Position Control Mode (8- CSP)

7.6.1 Control block diagram

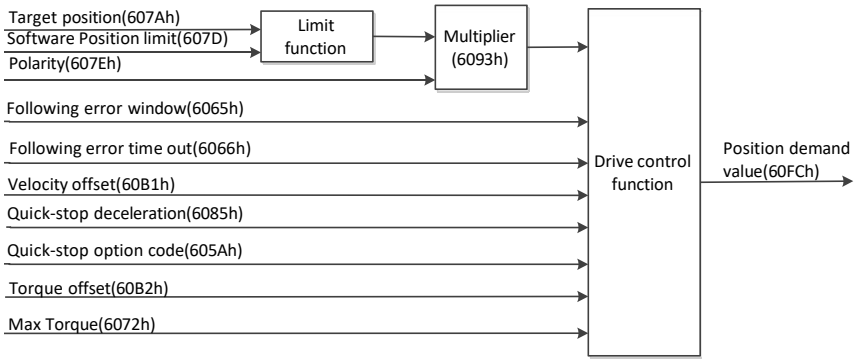


Figure 7-10 Synchronous cycle position configuration block diagram

7.6.2 Related Objects

Control word 6040h		
Bit	name	describe
0	Switch on	Bit0~bit3 are all 1 , indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	Disable interpolation	0 : interpolation is not allowed; 1 : interpolation enabled;
8	Halt demand	0 : Execute bit4 Instructions 1 : The axis should be based on 605Dh The parking mode is set to stop, and the status word bit12 should be set to 0

Status word 6041h		
Bit	name	describe
0	Target reached	0 : The target position has not been reached; 1 : Target position reached;
1	internal limit active	0 : Position command and position feedback are within the limit 1 : Position command or position feedback exceeds the limit
2	Slave follows the command drive follow the command value	0 : The slave does not follow the command 1 : Slave follows the instruction
3	following error	0 : No position deviation alarm 1 : Excessive position deviation alarm occurs
5	Home find	0 : Home return is not completed 1 : Return to zero completed

index	Sub-index	name	access	Data Types	Mapp ?	unit	Setting range	default value
6040		Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041		Status word	RO	UINT	TPDO	-	0 to xFFFF	0
6060		Operation Mode	R W	SINT	RPDO	-	0 ～ 10	8
6061		Mode Display	RO	SINT	TPDO	-	0 ～ 10	8
6062		Position feedback	RO	DINT	NO	Command	-	-
6063		Position feedback	RO	DINT	NO	Encoder unit	-	-
6064		Position feedback	RO	DINT	NO	Command	-	-
6065		Position deviation too large threshold	R W	UDINT	NO	Command unit	0~ (2^{31} - 1)	0
6066		Position deviation timeout	R W	UINT	NO	ms	0~ (2^{31} - 1)	200000
6067		Position reaches threshold	R W	UDINT	RPDO	Encoder unit	0~ (2^{31} - 1)	30
6068		Position reaches window	R W	UINT	NO	ms	0~65535	0
6072		Maximum torque	R W	UINT	RPDO	0.1%	0~65535	3000
607D	01	Minimum position limit	R W	DINT	NO	Command unit	-2^{31}~2^{31}	2^{31}
	02	Maximum position limit	R W	DINT	NO	Command unit	-2^{31}~2^{31}	2^{31}
6085		Rapid stop deceleration	R W	UDINT	RPDO	Command unit /s^2	0~ (2^{31} - 1)	1000

7.7 Home Return Mode (6- HM)

7.7.1 illustrate

The origin return mode is used to find the mechanical origin and locate the position relationship between the mechanical origin and the mechanical zero point.

- Mechanical origin: A fixed position on the machine, which can correspond to a certain origin switch or the motor encoder Z Signal.
- Mechanical zero point: Mechanically absolute 0 Location.

  After the origin return is completed, the motor stop position is the mechanical origin. By setting 607Ch , the relationship between the mechanical origin and the mechanical zero point can be set:
- Mechanical origin = mechanical zero + 607C (origin offset)

  When607C=0 , the mechanical origin coincides with the mechanical zero point.

7.7.2 Procedure

1. Set Mode of Operations: 6060h 】Set to homing mode mode) (0x06) .
2. Settings【 Home offset:607Ch 】.
3. Set [Homing method:6098h], the setting range is 1 To 36 .
4. Setting Homing speeds:6099h Sub-1], defines the speed when searching for the origin switch (unit: pulse/s) .
5. Setting Homing speeds:6099h Sub-2], define the speed of finding the zero point (unit: pulse/s) .
6. Setting Homing acceleration:609Ah], defines the acceleration of regression (unit: pulse/s2) .
7. [Controlword:6040h] to (0x06 > 0x07 > 0x0F) in sequence , and set the driver Servo On And start the motor running.
8. [Controlword:6040h] to (0x0F > 0x1F) in sequence , and find the origin switch (Home Switch) and make a comeback.
9. Read [Statusword:6041h] to obtain the drive status.

7.7.3 Related Object List

Control word 6040h		
Bit	name	describe
0	Switch on	Bit0~bit3 Both are 1 , indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	Homing start	0 → 1: Start zero return; 1 : Zero return in progress; 1 → 0 : End and return to zero;
8	Stop Instructions Halt	0 : Servo press bit 4 The setting determines whether to start returning to zero or not;1 : Servo press 605D Set a pause;

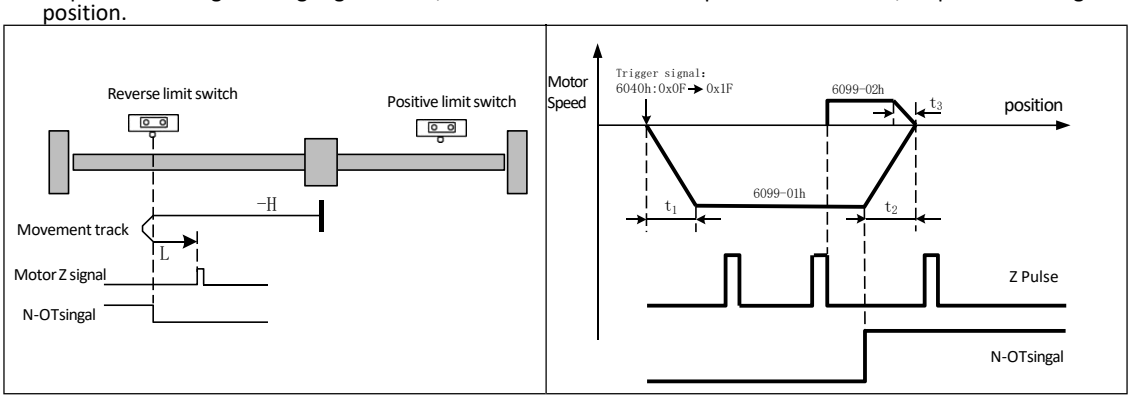
Status word 6041h		
Bit	name	describe
10	Target reached	0 : The target position has not been reached; 1 : Target position reached;
12	homing	0 : Return to zero failed 1 : Zero return successful. This flag is set when the servo is in the zero return mode.
13	Homing error	0 : No error occurred during zero return; 1 : Zero return timeout or excessive deviation error occurs;
15	Home find	0 : Home return is not completed; 1 : Origin return is completed. This flag is set when the origin signal is encountered.is set when

index	Sub-index	name	access	Data Types	mapped?	unit	Setting range	default value
6040		Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041		Status word	RO	UINT1	TPDO	-	0 to xFFFF	0
6060		Operation Mode	R W	SINT	RPDO	-	0 ~ 10	6
6061		Mode Display	RO	SINT	TPDO	-	0 ~ 10	6
607C		Origin offset	RO	USINT	RPDO	Command	-2^{31} ～ $(2^{31}-1)$	0
6098		Origin regression method	R W	DINT	RPDO	-	1 to 35	34
6099		Zero return speed	-	ARR	RPDO	-	OD Data Range	OD default value
6099	01	Search for the signal speed at the deceleration point	R W	UDINT	RPDO	Instruction unit /s	0 ~ $(2^{31}-1)$	69905067
6099	02	Search origin signal speed	R W	UDINT	RPDO	Instruction unit /s	0 ~ $(2^{31}-1)$	69905067
609A		Origin return acceleration	R W	UDINT	RPDO	Command unit /s^2	0 ~ $(2^{31}-1)$	419430400

7.7.4 Introduction to zero return method

1) 6098h=1 :
   a) Target zero position: The first motor Z signal after the falling edge of the reverse limit switch N-OT .
   b) Deceleration point: Reverse limit switch (N- OT)

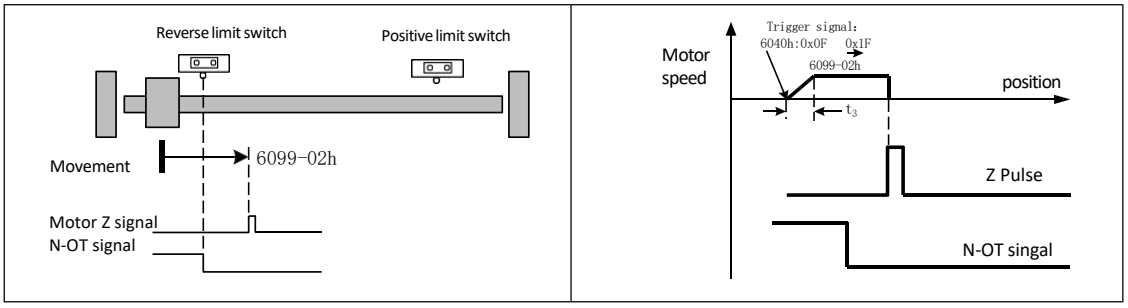
- N-OT signal is invalid when starting the return to zero , the reverse direction is 6099h sub1 It runs at a speed of 10000, decelerates and stops after receiving the rising edge of N-OT , and then runs forward at a speed of 6099h sub2 , stops after finding the target zero position.



Note1 : H : forward 6099h sub1 Speed; -H : reverse 6099h sub1 speed;
L : Forward 6099h sub2 speed; -L : reverse 6099h sub1 speed. Same as below

Note2 : $t_1 = t_2 \frac{6099\text{-}01h}{609Ah} ms$ $t_3 = \frac{6099\text{-}02h}{609Ah} ms$

- N-OT signal is valid when returning to zero , it will be directly set to 6099h sub2 The machine moves forward at a speed of 100 km/h

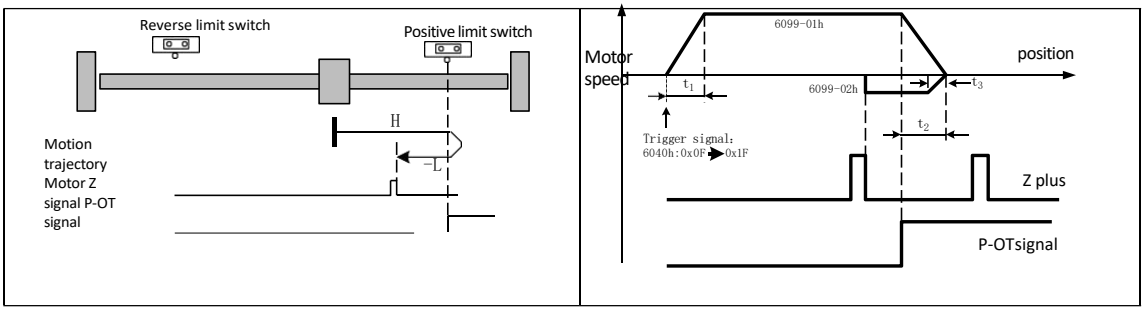


and stops after finding the target zero position.

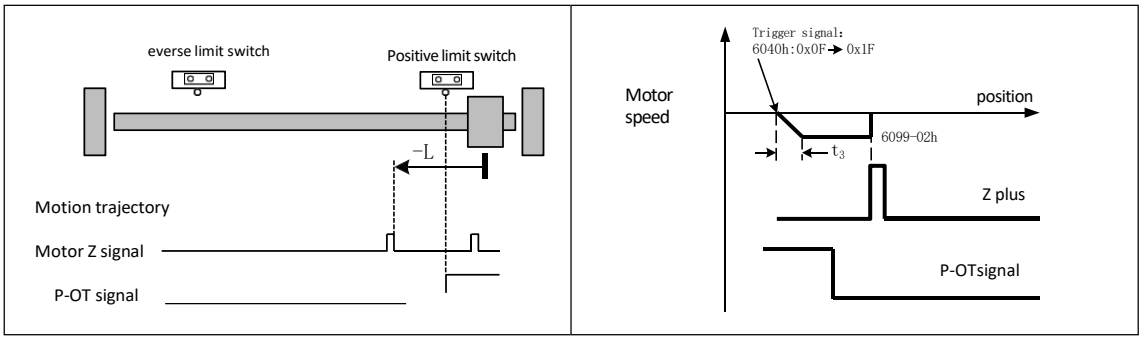
2) 6098h=2 :
   a) The first motor encoder Z signal after the falling edge of the positive limit switch P-OT .
   b) Deceleration point: Positive limit switch (P- OT)

- P-OT signal is invalid when returning to zero , the forward direction will be 6099h. sub1 It runs at a speed of 6099h , decelerates and stops after receiving the rising edge of P-OT , and then reverses at sub2

  The vehicle stops after finding the target zero position at a certain speed.



- P-OT signal is valid when returning to zero , it will be directly set to 6099h sub2 The vehicle moves in reverse at a speed to find the target



zero position and then stops.

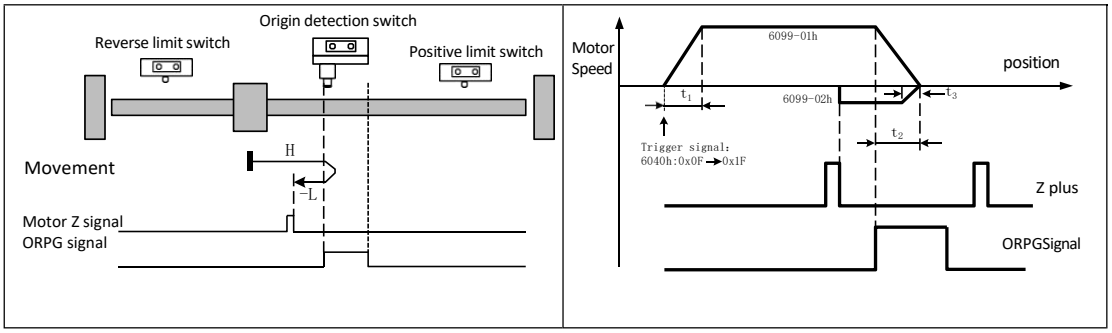
3) 6098h=3

a) Target Zero: ORPG The first motor Z after the falling edge pulse

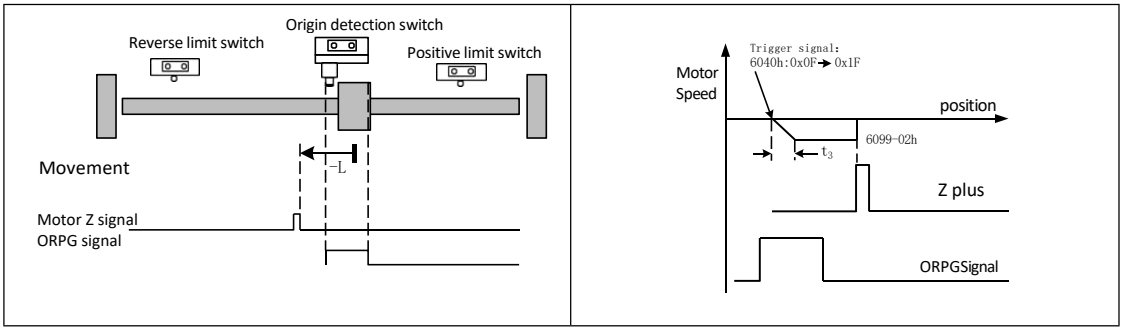
b) Deceleration point: origin switch (ORPG)

- ORPG signal is invalid when returning to zero , the forward direction is 6099h. sub1 It runs at a speed of 6099h , decelerates and stops when it encounters the rising edge of ORPG , and then reverses to sub2

  The vehicle stops after finding the target zero position at a certain speed.



- ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 Search for the target zero position in reverse direction at a speed of

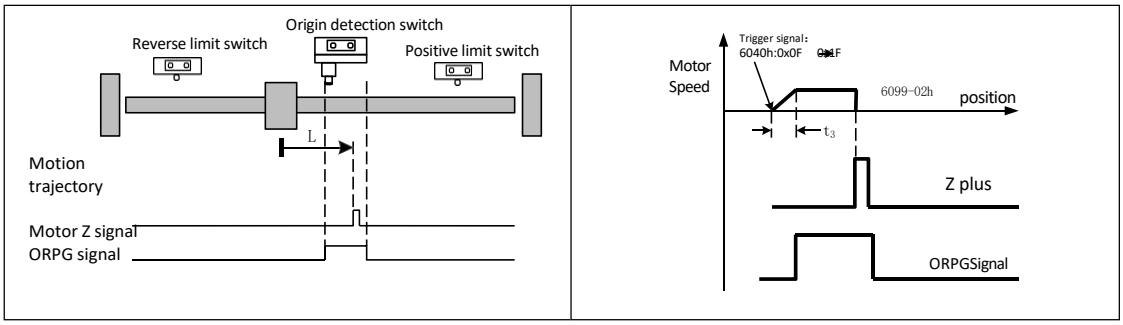


4) 6098h=4

a) Target Zero: ORPG The first Z after the rising edge pulse

b) Deceleration point: origin switch (ORPG)

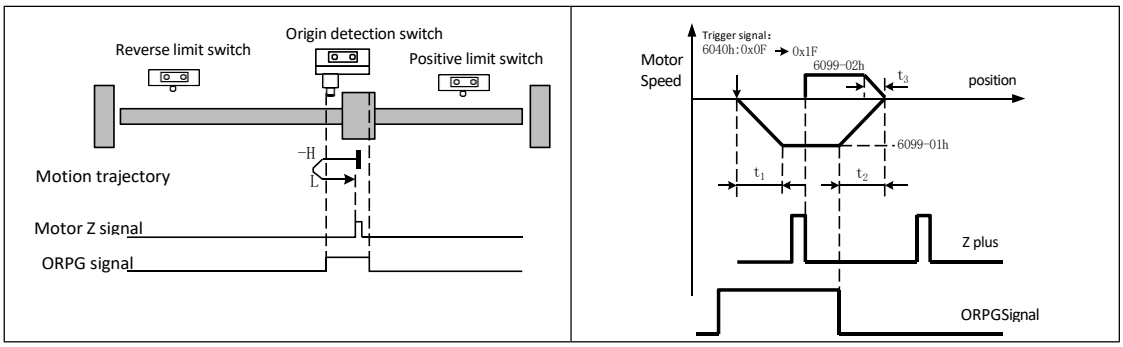
- ORPG signal is invalid when starting the return to zero , it will be directly used as 6099h sub2 The speed is forward to find the target zero



position.

- ORPG signal is valid when returning to zero , the reverse direction is 6099h sub1 It runs at a speed of 6099h, decelerates and stops when it encounters the falling edge of ORPG , and then runs forward at 6099h sub2

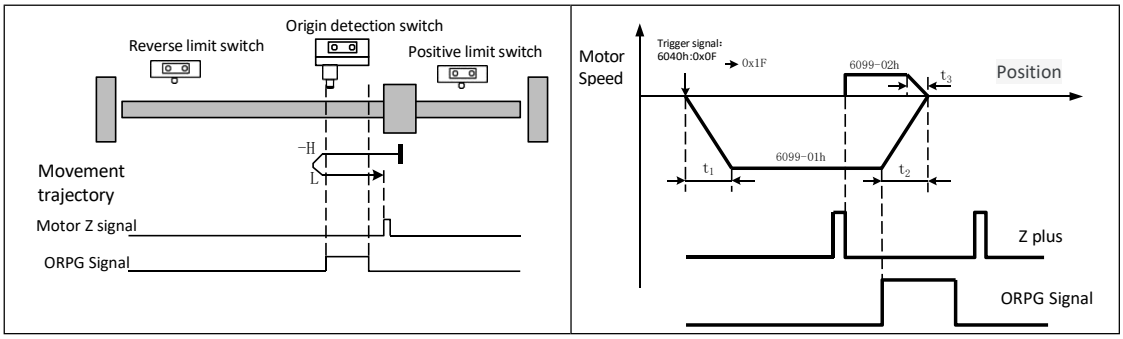
  Find the target zero position at a speed of



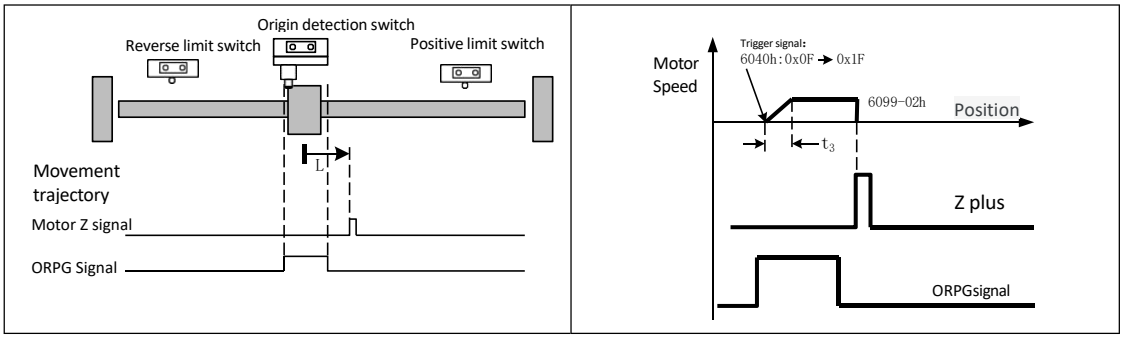
- 6098h=5
  - Target Zero: ORPG The first Z after the falling edge pulse
  - Deceleration point: origin switch (ORPG)

5) ORPG signal is invalid when starting the return to zero , the reverse direction is 6099h sub1 It runs at a speed of 6099h, decelerates and stops when it encounters the rising edge of ORPG , and then runs forward at 6099h sub2

Find the target zero position at a speed of



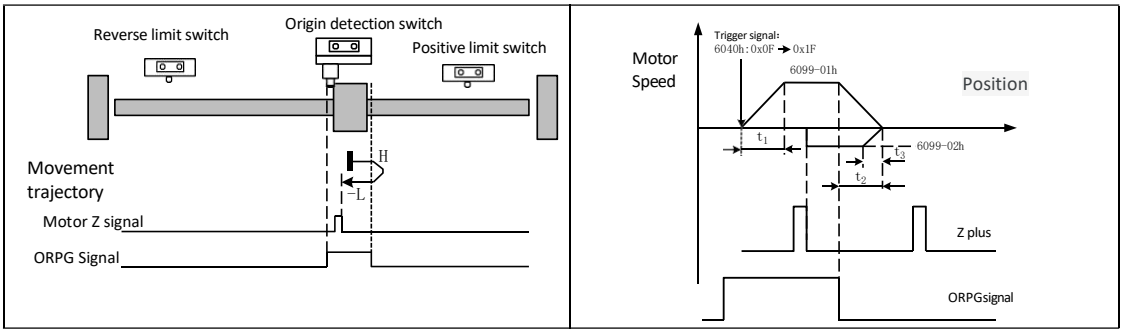
6) ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 The speed is forward to find the target zero position.



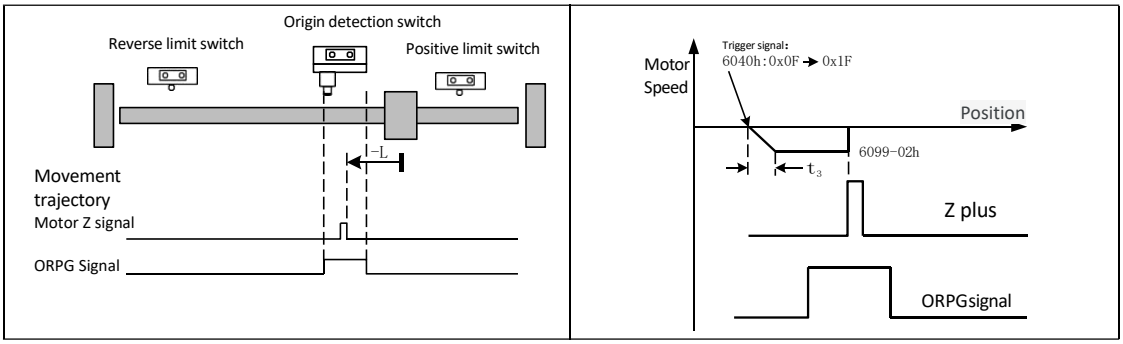
- 6098h=6
  - Target Zero: ORPG The first Z after the rising edge pulse
  - Deceleration point: origin switch (ORPG)

7) ORPG signal is valid when returning to zero , the forward direction is 6099h. sub1 It runs at a speed of 6099h , decelerates and stops when it encounters the falling edge of ORPG , and then reverses to sub2

Find the target zero position at a speed of

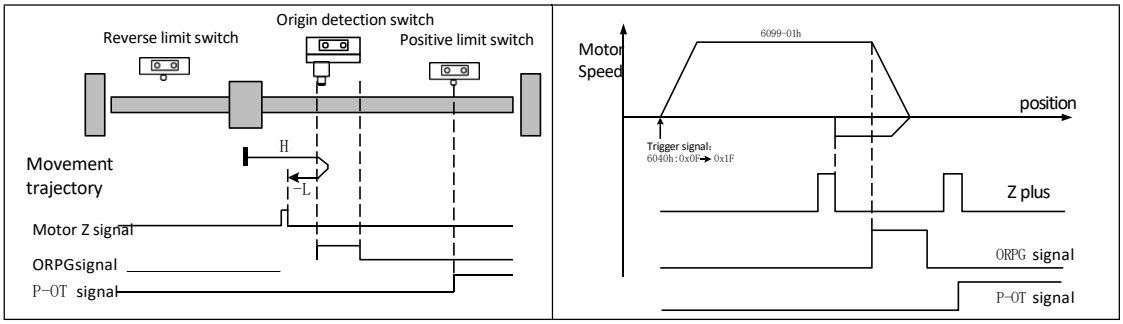


8) ORPG signal is invalid when starting the return to zero , it will be directly used as 6099h sub2 Search for the target zero position in reverse direction at a speed of

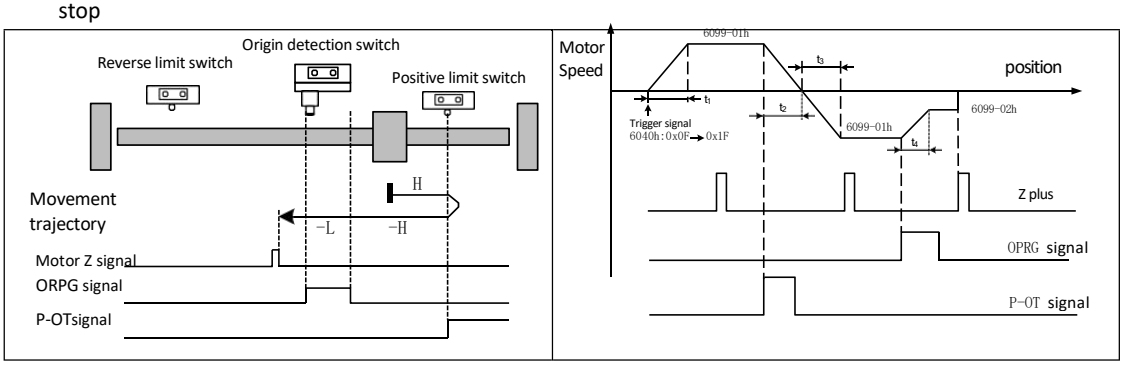


- 6098 h = 7
  - Target Zero: ORPG The first Z after the falling edge pulse
  - Deceleration point: origin switch (ORPG)

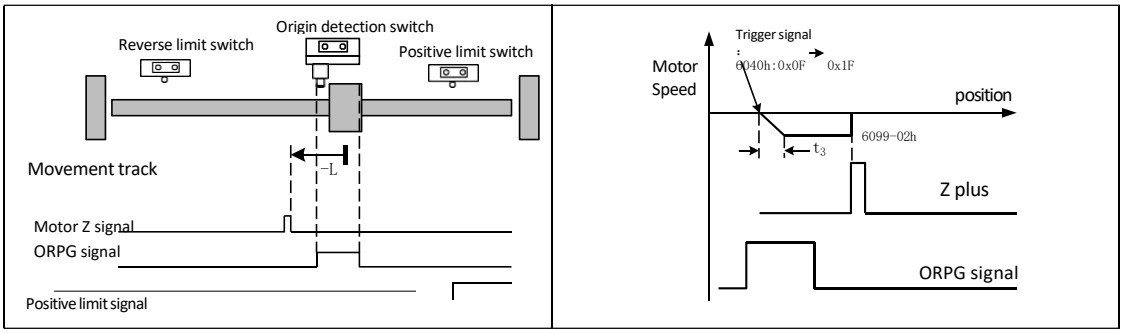
9) When the return to zero start is started, the ORPG signal is invalid, and the forward direction is 6099h. sub1 Running at speed:
   - If the positive limit switch P-OT signal is not encountered, the system will decelerate and stop when it encounters the rising edge of ORPG , and then reverse at 6099h. sub2 Find the target zero position at a speed of



   - If the forward limit switch P-OT signal is encountered, it will automatically reverse and run at a speed of 6099h sub1 . When it encounters the rising edge of OPRG , it will decelerate to 6099h sub2 speed, and continue running to the target zero position to stop



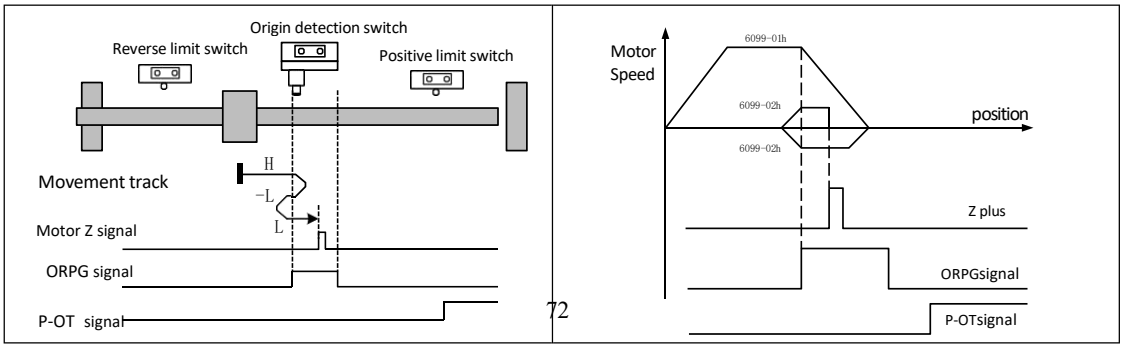
10) ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 Search for the target zero position in



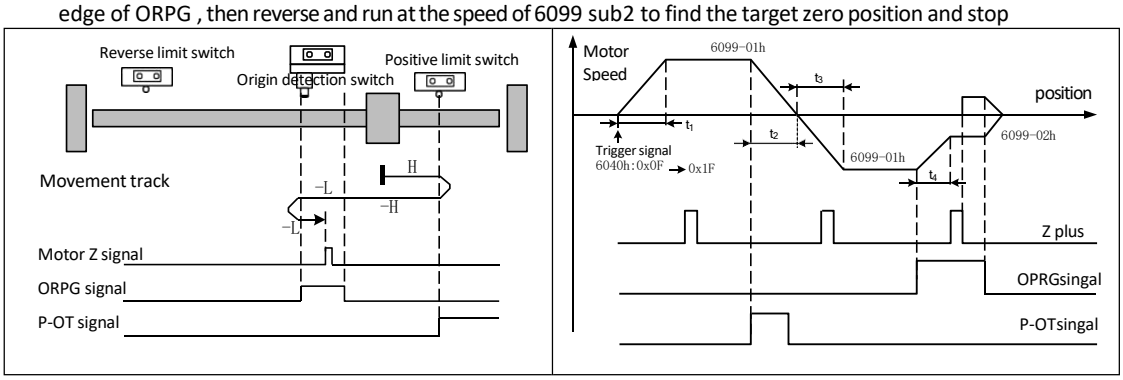
reverse direction at a speed of

- 6098 h = 8
  - Target Zero: ORPG The first Z after the rising edge pulse
  - Deceleration point: origin switch (ORPG)

11) When the return to zero start is started, the ORPG signal is invalid, and the forward direction is 6099h. sub1 Running at speed:
   - If the positive limit switch P-OT signal is not encountered, the system will decelerate and stop when it encounters the rising edge of ORPG , and then reverse at 6099h. sub2 Running at a speed of
     ORPG After the falling edge, it continues to run in the forward direction to find the target zero position.

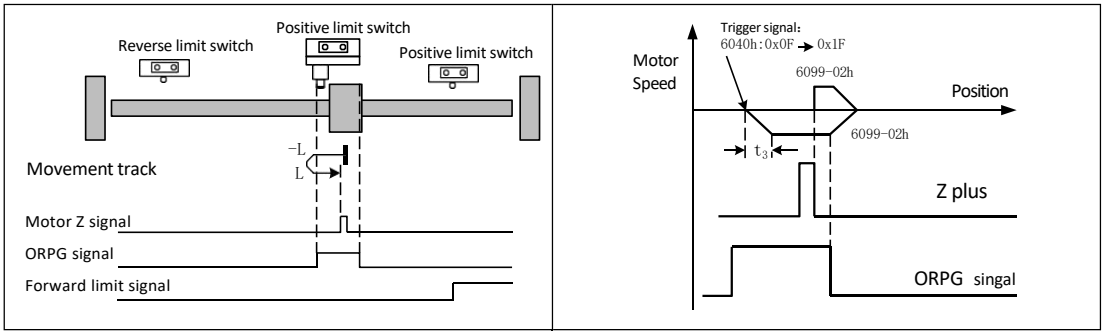


- If the forward limit switch P-OT signal is encountered, it will automatically reverse and run at a speed of 6099h sub1 . When it encounters the rising edge of OPRG , it will decelerate to 6099h sub2 speed, and continue to run until it encounters the falling edge of ORPG , then reverse and run at the speed of 6099 sub2 to find the target zero position and stop



12) ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 The speed starts to return to zero in the reverse direction . After the falling edge, it decelerates to stop and then moves forward.

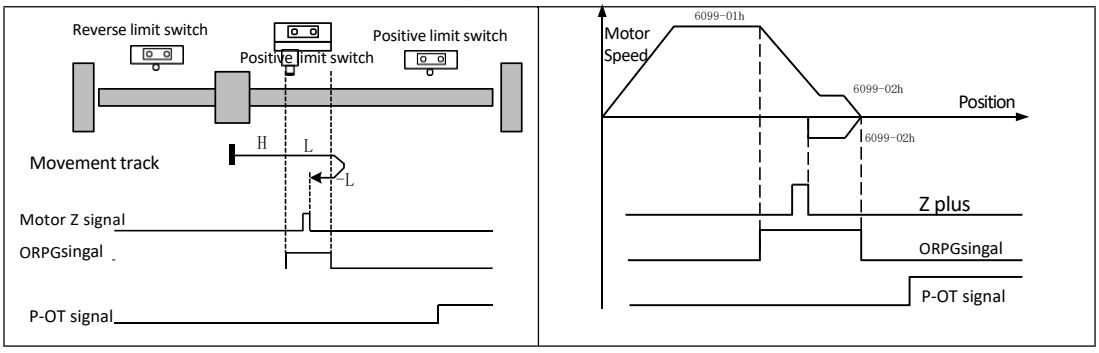
6099h sub2 Find the target zero position at a speed of



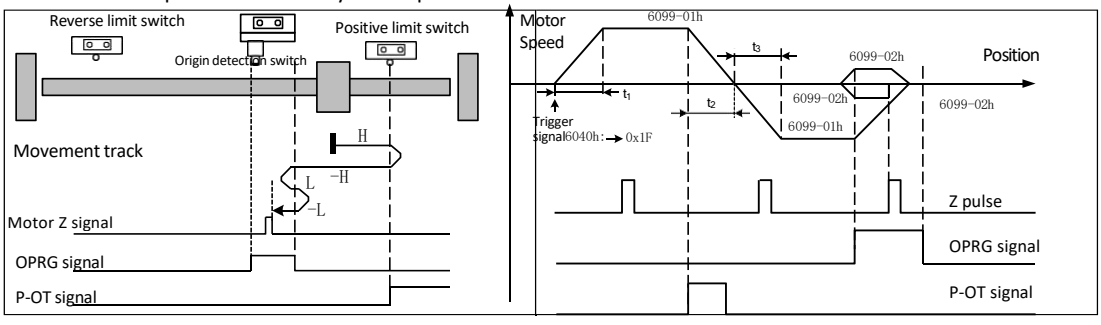
- 6098 h = 9
  - Target Zero: ORPG The first Z after the rising edge pulse
  - Deceleration point: origin switch (ORPG)

13) When the return to zero start is started, the ORPG signal is invalid, and the forward direction is 6099h. sub1 Running at speed:

- If the positive limit switch P-OT signal is not encountered, the speed will be decelerated to 6099h after the ORPG rising edge is encountered. sub2 The speed continues to run forward, and after encountering the falling edge of ORPG , it decelerates and stops, and then runs in the reverse direction at a speed of 6099h sub2 to find the target zero position.

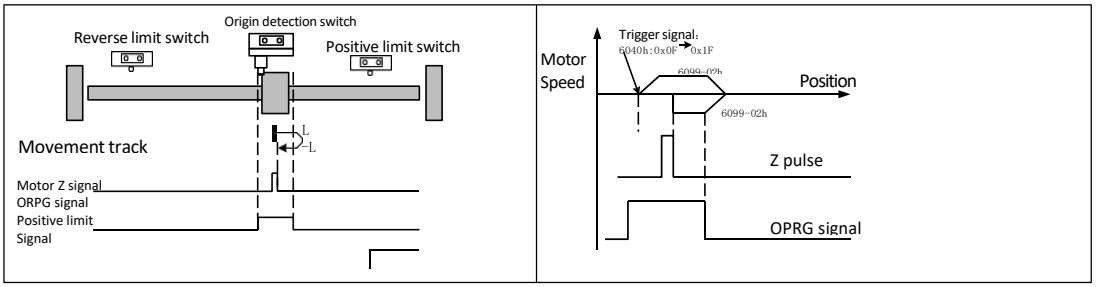


- If you encounter a positive limit switch P-OT signal, it will automatically reverse to 6099h sub1 When it encounters the rising edge of OPRG , it decelerates to stop and runs forward at the speed of 6099h sub2. When it encounters the falling edge of ORPG, it decelerates to stop and runs reversely at the speed of



- 6099 sub2 until it finds the target zero position and stops.

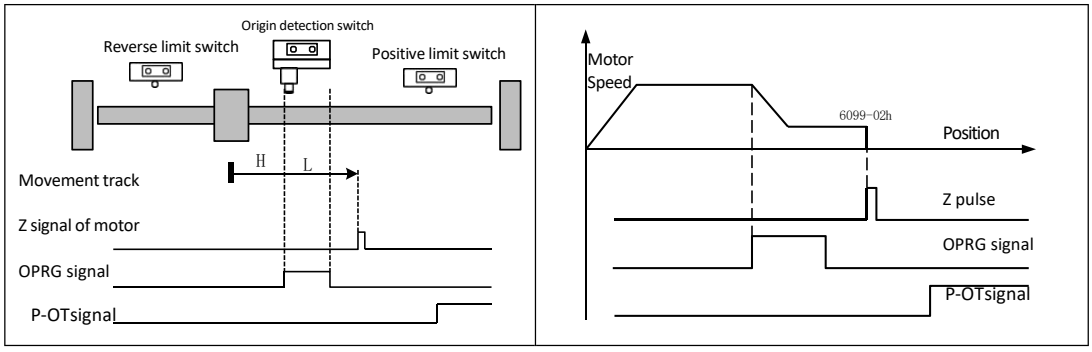
14) ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 The speed starts to return to zero in the positive direction . After the falling edge, it decelerates to stop and then reverses to 6099h sub2 Find the target zero position at a speed of



- 6098h=10
  - Target Zero: ORPG The first Z after the falling edge pulse
  - Deceleration point: origin switch (ORPG)

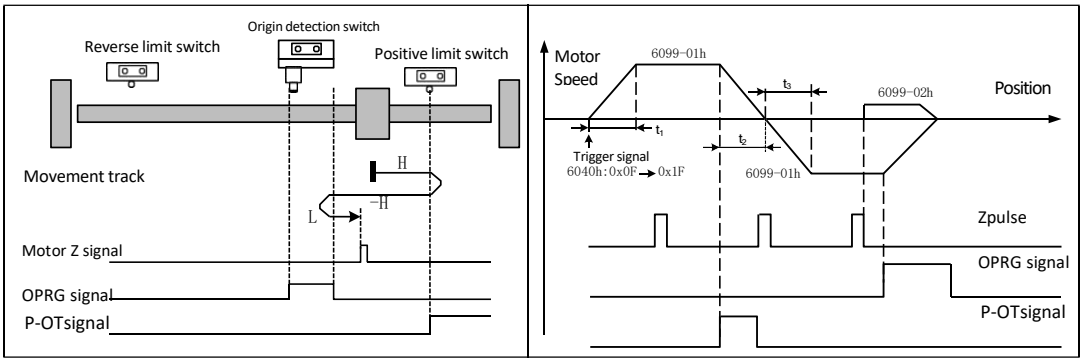
15) When the return to zero start is started, the ORPG signal is invalid, and the forward direction is 6099h. sub1 Running at speed:

- If the positive limit switch P-OT signal is not encountered, the speed will be decelerated to 6099h after the ORPG rising edge is

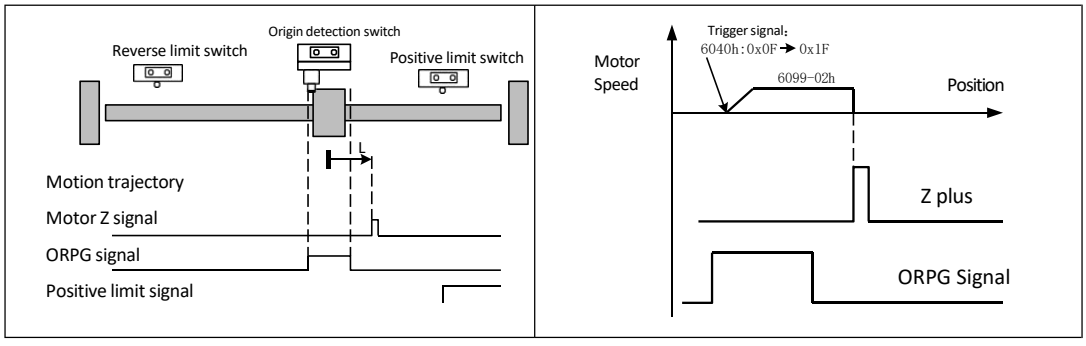


encountered. sub2 Speed, run forward to find the target zero position.

- If you encounter a positive limit switch P-OT signal, it will automatically reverse to 6099h sub1 When it encounters the rising edge of OPRG , it decelerates and stops, and runs forward at the speed of 6099h sub2 until it finds the target zero position and stops.



16) ORPG signal is valid when starting the return to zero , it will be directly converted to 6099h sub2 The speed is forward to find the target



zero position.

- 6098h=11 , 12 , 13 , 14
  - to6098h=7~10 , all running directions are opposite, and all limit switches correspond to reverse limit switches N-OT .

- 6098h=17 to30 , and6098h=1~14 The motion curve is the same, only the last step is to find Z The step of signal is omitted. Stop immediately when encountering the following origin signal.

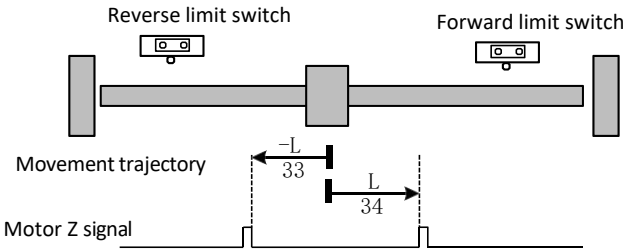
6098h=	Origin signal		6098h=	Origin signal
17	N-OT Falling edge		twenty four	ORPG Rising edge
18	P-OT Falling edge		25	ORPG Rising edge
19	ORPG Falling edge		26	ORPG Falling edge
20	ORPG Rising edge		27	ORPG Falling edge
twenty one	ORPG Falling edge		28	ORPG Rising edge
twenty two	ORPG Rising edge		29	ORPG Rising edge
twenty three	ORPG Falling edge		30	ORPG Falling edge

- 6098h=31 , 32 reserve

- 6098h=33 , 34
  - Origin signal: Z pulse
  - Slowdown point: None

17) Zero return method 33 : Reverse direction with 6099h sub2 The machine runs at the speed of 0.1000 and stops when it encounters the first Z pulse.

18) Zero return mode 34 : forward direction at 6099h sub2 The machine runs at the speed of 0.1000 and stops when it encounters the first Z pulse.



- 6098h=35

  The current position is the mechanical origin. After the origin is triggered, the user's current position is 6064h = 607C

- 6098h=36

  Trigger electrical zero point return. The motor runs at 6099h The speed of sub1 runs to electrical zero.

- **Profile speed control mode (3- PV)**

- **Control block diagram**

In profile speed control mode, the acceleration is accelerated to the target speed (0x606B) according to the configured acceleration (0x6083), and the deceleration is decelerated at the configured deceleration (0x6084) during deceleration.
to the target speed (0x60FF). The maximum speed is limited by the maximum configured speed (0x607F) .

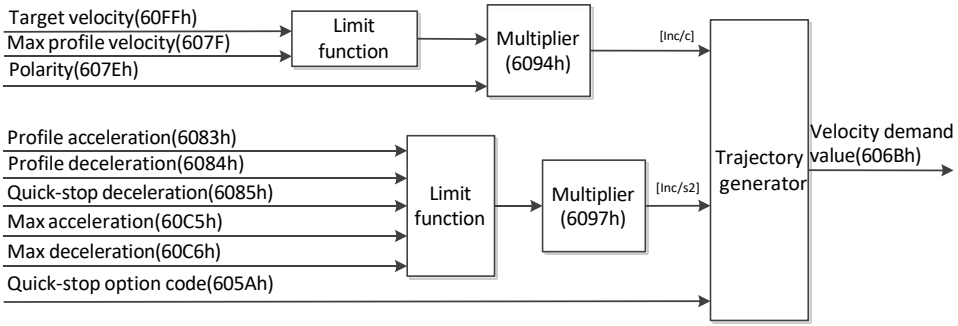


Figure 7-11 Speed setting module control block diagram

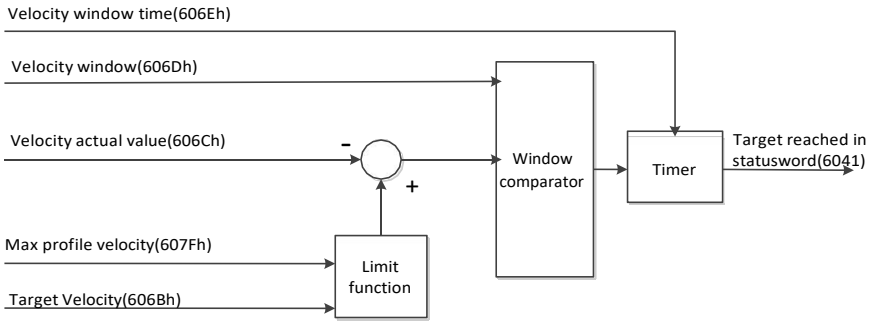


Figure7-12 Speed arrival module given block diagram

- **Related Object List**

Control Word 6040h		
BIT	Name	describe
0	Switch on	Bit0~bit3 are all 1, indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
8	Halt	0: Servo is set according to bit0~bit3; 1: Servo is paused according to 605D setting;

Status word 6041h		
Bit	name	describe
10	Target reached	0 : The target position has not been reached; 1 : Target position reached;
11	Internal limit active	0 : Both the position command and position feedback are within the limit; 1 : Position command or position feedback exceeds the limit;
15	Home find	0 : Home return is not completed;1 : Home return completed;

index	name	access	Data Types	mapp ?	unit	Setting range	default value
6040	Control Word	RW	UINT	RPDO	-	0～65535	0
6041	Status word	RO	UINT	TPDO	-	0～xFFFF	0
6060	Operation Mode	RW	SINT8	RPDO	-	0～10	3
6061	Mode Display	RO	SINT8	TPDO	-	0～10	3
607F	Maximum contour speed	RW	UDINT	RPDO	Command unit	0～(2^{31}-1)	0
6063	Position feedback	RO	DINT	NO	-	-	-
6064	Position feedback	RO	DINT	NO	-	-	-
606B	Target speed	RW	DINT	RPDO	Command unit/s	-2^{31}～(2^{31}-1)	0
606C	Actual speed	RO	DINT	TPDO	Command unit/s	-	-
606D	Speed reaches threshold	RW	UINT	NO	Command unit/s	0～65535	20
606E	Speed arrival	RW	UINT	NO	ms	0～65535	0
6083	Contour acceleration	RW	UDINT	RPDO	Command unit/s^2	0～(2^{31}-1)	1310720
6084	Contour deceleration	RW	UDINT	RPDO	Command unit/s^2	0～(2^{31}-1)	1310720

- **Cyclic Synchronous Speed Mode (9- CSV)**

- **Control block diagram**

In periodic synchronous speed mode, the master specifies the target speed (0x60FF) to the drive to limit the speed. In this mode, the master can append
Torque deviation (0x60B2) .

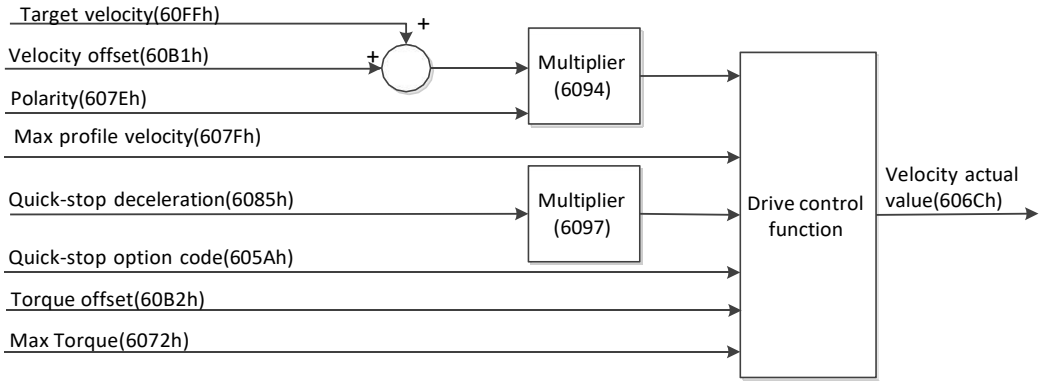


Figure7-13 Synchronous speed mode control block diagram

- **Related Object List**

Control Word 6040h		
Bit	name	describe
0	Switch on	Bit0~bit3 are all 1, indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
8	Halt	0: Servo is set according to bit0~bit3; 1: Servo is paused according to 605D setting;

Status word 6041h		
Bit	name	describe
10	Target reached	0 : The target position has not been reached; 1 : Target position reached;
12	Drive follow the command Value	0 : The slave does not follow the command; 1 : The slave follows the instruction;
15	Home find	0 : Home return is not completed; 1 : Home return completed;

index	name	access	Data Types	mapp ?	unit	Setting range	default value
6040	Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041	Status word	RO	UINT	TPDO	-	0 to xFFFF	0
6060	Operation Mode	R W	SINT	RPDO	-	0 ～ 10	9
6061	Mode Display	RO	SINT	TPDO	-	0 ～ 10	9
607F	Maximum contour speed	R W	UDINT	RPDO	Command unit	^{0} ~ (2^{31} - 1)	0
6063	Position feedback	RO	DINT	NO	-	-	-
6064	Position feedback	RO	DINT	NO	-	-	-
60B1	Speed bias	R W	DINT	NO	Instruction unit /s	- 2^{31} ～(2^{31} - 1)	0
60B2	Torque bias	R W	DINT	NO	0.1%	- 5000~5000	0
60E0	Forward torque limit	R W	UINT	NO	0.1%	0~5000	3000
60E1	Reverse torque limit	R W	UINT	NO	0.1%	0~5000	3000
60FF	Target speed	R W	DINT	RPDO	commandunit /s	- 2^{31} ～(2^{31} - 1)	0
606C	Actual speed	RO	DINT	TPDO	command unit /s	-	-
606D	Speed reaches threshold	R W	UINT	NO	command unit /s	0 ~ 65535	20
606E	Speed arrival	R W	UINT	NO	ms	0 to 65535	0
6083	Contour acceleration	R W	UDINT	RPDO	Command unit /s ^{2}	0 ~ (2^{31} - 1)	1310720
6084	Contour deceleration	R W	UDINT	RPDO	Command unit /s ^{2}	0 ~ (2^{31} - 1)	1310720

- **Contour torque control mode (4- TQ)**

- **Control block diagram**

In profile torque mode, the torque increases or decreases according to the torque gradient (0x6087) until the target torque (0x6071) is reached. The torque is limited by the forward / reverse torque .
The values (0x60E0 , 0x60E1) are limited. The maximum torque (0x6072) is independent of the forward / reverse direction and shows the maximum torque that can be applied to the motor.

:

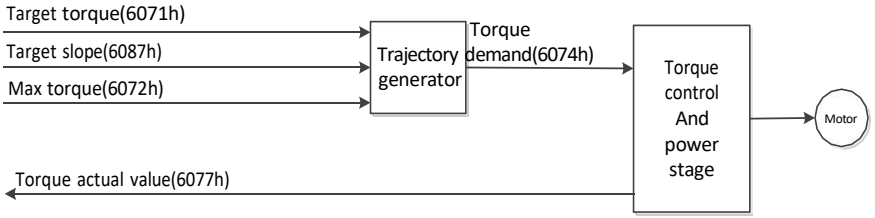


Figure7-14 Torque setting module control block diagram

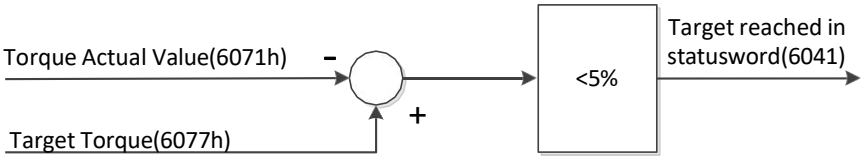


Figure7-15 Torque arrival judgment module control block diagram

- **Related Object**

List

Control Word 6040h		
Bit	name	describe
0	Switch on	Bit0~bit3 are all 1, indicating that the operation is started
1	Enable voltage	
2	Quick stop	
3	Enable operation	
8	Halt	0: Servo is set according to bit0~bit3; 1: Servo is paused according to 605D setting;

Status word 6041h		
Bit	name	describe
10	Target reached Target reached	0 : The target position has not been reached; 1 : Target position reached;
12	Software internal position limits internal limit active	0 : Position feedback is within the limit; 1 : Position feedback exceeds limit;
15	Return to zero completed Home find	0 : Home return is not completed; 1 : Home return completed;

index	name	access	Data Types	Can it be mapped?	unit	Setting range	default value
6040	Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041	Status word	RO	UINT	TPDO	-	0 to xFFFF	0
6060	Operation Mode	R W	SINT	RPDO	-	0 ～ 10	4
6061	Mode Display	RO	SINT	TPDO	-	0 ～ 10	4
6071	Target torque	R W	INT	RPDO	0.1%	- 32768~32768	0
6087	Torque gradient	R W	UDINT	RPDO	0.1%/ms	$0\sim2^{31}$	1
6077	Current torque	RO	INT	TPDO	0.1%	- 32768~32768	-
6072	Maximum Torque	R W	INT	RPDO	0.1%	- 32768~32768	3000
60E0	Forward torque limit	R W	UINT	NO	0.1%	0~5000	3000
60E1	Reverse torque limit	R W	UINT	NO	0.1%	0~5000	3000

- **Periodic Synchronous Torque Mode (A- CST)**
- **Control block diagram**

In periodic synchronous torque mode, the master specifies the target torque (0x6071) to the drive , thereby limiting the torque.

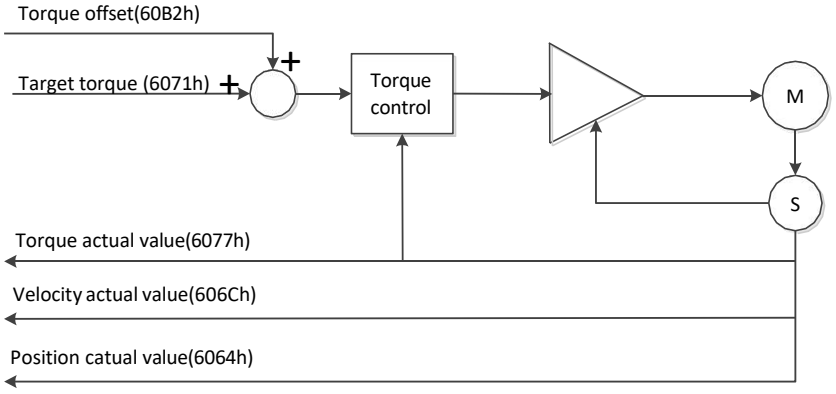


Figure7-16 Synchronous torque mode control block diagram

- **Related Object List**

Control word 6040h		
Bit	name	describe
0	Servo ready Switch on	Bit0~bit3 Both are 1 , indicating that the operation is started
1	Connect the main circuit Enable voltage	
2	Fast shutdown Quick stop	
3	Servo operation Enable operation	
8	Stop Instructions Halt	0 : Servo presses bit0~bit3 set up; 1 : Servo press 605D Set a pause;

Status word 6041h		
Bit	name	describe
10	Target reached Target reached	0 : The target position has not been reached; 1 : Target position reached;
12	Slave follows the command Drive follow the command value	0 : The slave does not follow the command; 1 : The slave follows the instruction;
15	Return to zero completed Home find	0 : Home return is not completed; 1 : Home return completed;

index	name	access	Data Types	Can it be mapped?	unit	Setting range	default value
6040	Control Word	R W	UINT	RPDO	-	0 ~ 65535	0
6041	Status word	RO	UINT	TPDO	-	0 to xFFFF	0
6060	Operation Mode	R W	SINT	RPDO	-	0 ~ 10	10
6061	Mode Display	RO	SINT	TPDO	-	0 ~ 10	10
6071	Target torque	R W	INT	RPDO	0.1%	-32768~32768	0
6074	Torque command	RO	INT	TPDO	0.1%	-32768~32768	-
6077	Current torque	RO	INT	TPDO	0.1%	-32768~32768	-
6072	Maximum Torque	R W	INT	RPDO	0.1%	-32768~32768	3000
60B2	Torque bias	R W	INT	RPDO	0.1%	-32768~32768	0
60E0	Forward torque limit	R W	UINT	NO	0.1%	0~5000	3000
60E1	Reverse torque limit	R W	UINT	NO	0.1%	0~5000	3000

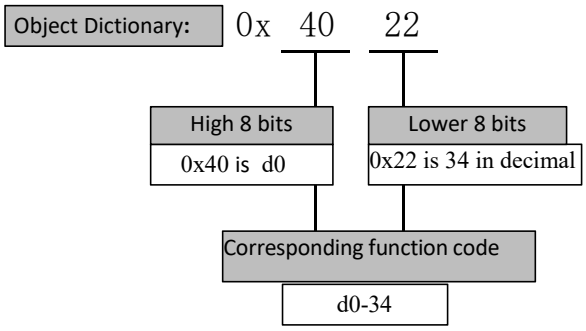
Chapter 8 Object Dictionary Detailed Description

- **Object dictionary category description**

The object dictionary supported by this driver is classified as follows:

index	illustrate
0x1000 to 0x1FFF	Cia301 Object Dictionary
0x2000 to 0x2F63 (Note1)	Corresponding general function codes P0-00 ~ PF- 99
0x3000 ~ 0x3F63 (Note1)	Corresponding special function codes F0-00 ~ FF- 99
0x4000 ~ 0x4F63 (Note1)	Corresponding monitoring function code d0-00 ~ dF- 99
0x5E00 (Note1)	Corresponding status function code St- 00
0x5F00 to 0x5F63 (Note1)	Corresponding auxiliary function codes AF-00 ~ AF- 99
0x6000 to 0x67FF	Cia402 Object Dictionary

☞ **The factory-defined object dictionary index consists of high 8 bits and low 8 bits: the high 8 bits correspond to the group number, and the low 8 bits correspond to the number within the group. For example, object dictionary 0x4022 corresponds to function code d0-34 .**



Function parameter setting property description:

PP:	Contour position control mode	PV:	Profile Speed Mode
IP:	Interpolation position control mode	CSV:	Periodic synchronous speed control mode
CSP:	Cyclic synchronous position control mode	TQ:	Contour torque mode
HM:	Origin return control mode	CST:	Periodic torque control mode

○: Set at any time, effective immediately	▲: Read-only parameter, cannot be set
●: Set at any time and take effect after power-on again	☆: Set at any time, effective when the motor is stationary

Control mode description:

- **Data Types**

Data used in this manual Type The content and scope are shown in the following table.

Name	Description	Range
SINT	Signed 8bit	-128 ~127
USINT	Unsigned 8bit	0~ 255
INT	Signed 16bit	-32768 ~ 32767
UINT	Unsigned 16bit	0 ~ 65535
DINT	Signed 32bit	-2147483648 ~ 2147483647
UDINT	Unsigned 32bit	0 ~ 4294967295
STRING	String Value	

- **Communication parameter details (1000H)**

This area describes the basic functions of the device to communicate and exchange data in the network. Typical entries are as follows:

index	Device Type Device Type	Initial value	unit	Can it be mapped?	Data Structure
0x1000		0x00020192	-	NO	VAR

Data Type : UDINT

Accessibility: RO

Parameter function : Display and describe the CoE device protocol type

bit	name	describe
0~15	Device profile	402（192h:Device sub-protocol)
16~23	type	02：Servo Drives
25~31	Mode	Factory customized

index	Error Register Error recorder	Initial value	unit	Can it be mapped?	Data Structure
0x1001		0x00	-	NO	VAR

Data Type : USINT
Accessibility: RO

Parameter function : Display the error logger value of the device. Store the value in a section of the emergency information.

Function	value	content
Warning status	0	Servo normal
	1	With warning

index	Manufacture Device Number	Initial value	unit	Can it be mapped?	Data Structure
0x1008		0x00	-	NO	

Data type : STRING
Accessibility: RO

Parameter function : describe the manufacturer's equipment name EA300E .

index	Software Version Software Version	Initial value	unit	be mapped?	Data Structure
0x100A		0x00	-	NO	

Data type : STRING
Accessibility: RO

Parameter function : describes the software version of the manufacturer's equipment, such as F000V100B00D00 .

index	Storage parameters	Initial value	unit	be mapped?	Data Structure
0x1010		OD default value	-	NO	OD Data Types

Data Type : REC
Accessibility: RO

Parameter function : Description Storage parameter Classification: Sub-index write **0x65766173** Trigger the corresponding storage operation.

Sub-index	Store all parameters	Initial value	unit	be mapped?	Data Structure
01		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW

Parameter function : store all parameters (02/03/04 Sub-index all) , and automatically cleared to 0 after execution .

Sub-index	Store communication parameters	Initial value	unit	be mapped?	Data Structure
02		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW

Parameter function : store CIA301 Communication parameters (1000H) are automatically cleared to 0 after execution .

Sub-index	Store CiA402 parameters	Initial value	unit	be mapped?	Data Structure
03		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000~ 0xFFFFFFFF
Accessibility: RW

Parameter function : storage CIA402 Parameter (6000H) is automatically cleared to 0 after execution .

Sub-index	Store EA300E Servo specific parameters	Initial value	unit	be mapped?	Data Structure
04		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW
Parameter function : Storage EA300E Servo drive P0~Pb Group parameters.

index	Restore default parameters	Initial value	unit	be mapped?	Data Structure
0x1011		0D	-	NO	OD

Data Type : REC
Accessibility: RO
Parameter function : Description Storage parameter classification: Sub-index write **0x64616F6C** Trigger the corresponding factory reset operation.

Sub-index	Restore default parameters	Initial value	unit	be mapped?	Data Structure
01		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW
Parameter function : Restore all default parameters (02/03/04 Sub-index all) , automatically cleared to 0 after execution

Sub-index	Restore communication parameters	Initial value	unit	be mapped?	Data Structure
02		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW
Parameter function : Restore CIA301 Communication parameters (1000H) , automatically cleared to 0 after execution

Sub-index	Restore CiA402 parameters	Initial value	unit	be mapped?	Data Structure
03		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000~ 0xFFFFFFFF
Accessibility: RW
Parameter function : restore CIA402 Parameter (6000H) , automatically cleared to 0 after execution

Sub-index	Restore Servo Specific parameters	Initial value	unit	be mapped?	Data Structure
04		0	-	NO	UDINT

Data Type : UDINT
Data range : 0x00000000 ~ 0xFFFFFFFF
Accessibility: RW
Parameter function : restore servo drive P0~Pb Set parameters, automatically cleared to 0 after execution . Function is the same as AF-09 operation.

index	ID 1018h	Initial value	unit	be mapped?	Data Structure
0x1018		0D	-	NO	

Data Type : USINT
Data range : OD Data Range
Accessibility: RO
Parameter function : describe device information.

Sub-index	Supplier ID	Initial value	unit	be mapped?	Data Structure
01h		0x6DA	-	NO	

Data Type : UDINT
Data Range : 0x6DA
Accessibility: RO
Parameter function : Manufacturer ID number, assigned by ETG organization. SINEE company is 0x6DA .

Sub-index	Product No. code	Initial value	unit	be mapped?	Data Structure
02h		0x10000	-	NO	

ta Type : UDINT
Data Range : 0x10000
Accessibility: RO
Parameter function : Servo drive model code. EA100N: 0x00000000, EA300E: 0x00010000 .

Sub-index	Revision Number	Initial value	unit	be mapped?	Data Structure
03h		0x0005000B	-	NO	

Data Type : UDINT
Data Range : 0x0005000B
Accessibility: RO
Parameter function : EtherCAT communication underlying software version.

Sub-index	Serial number	Initial value	unit	be mapped?	Data Structure
04h		0x0	-	NO	

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reserved

index	1st Receive PDO Mapping	Initial value	unit	be mapped?	Data Structure
0x1600		OD default value	-	NO	REC

Data Type : UDINT
Data range : OD Data Range
Accessibility: RW
Parameter function : Set the mapping object of RPDO1

Sub-index	RPDO1 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		4	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RO
Parameter function : number of sub-indexes

Sub-index	1st Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60400010	-	NO	-
Sub-index	2nd Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60710010	-	NO	-
Sub-index	3rd Input Object to be Mappe	Initial value	unit	be mapped?	Data Structure
03		0x607A0020	-	NO	-
Sub-index	4th Input Object to be Mappe	Initial value	unit	be mapped?	Data Structure
04		0x60600008	-	NO	-
Sub-index	5rd~10th Input Object to be Mapped				
05~0A					

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW
Parameter function : Set the mapping object of RPDO1

index	2nd Receive PDO Mapping	Initial value	unit	be mapped?	Data Structure
0x1601		OD default value	-	NO	REC

Data Type : UDINT
Data range : OD Data Range
Accessibility: RW
Parameter function : Set the mapping object of RPDO2

Sub-index	RPDO2 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		2	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RO
Parameter function : number of sub-indexes

Sub-index	1st Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60400010	-	NO	-
Sub-index	2nd Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x607A0020	-	NO	-
Sub-index	3rd~10th Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		0	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of RPDO2

index	3rd Receive PDO Mapping	Initial value	unit	be mapped?	Data Structure
0x1602		OD default value	-	NO	REC

Data Type : UDINT
Data range : OD Data Range
Accessibility: RW

Parameter function : Set the mapping object of RPDO3

Sub-index	RPDO3 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		2	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RO

Parameter function : number of sub-indexes

Sub-index	1st Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60400010	-	NO	-
Sub-index	2nd Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60FF0020	-	NO	-
Sub-index	3rd~10th Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		0	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of RPDO3

index	The fourth group of mapping objects	Initial value	unit	be mapped?	Data Structure
0x1603		OD default value	-	NO	REC

Data Type : UDINT
Data range : OD Data Range
Accessibility: RW

Parameter function : Set the mapping object of RPDO4

Sub-index	RPDO4 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		2	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RO

Parameter function : number of sub-indexes

Sub-index	1st Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60400010	-	NO	-
Sub-index	2nd Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60710010	-	NO	-

Sub-index	3rd~10th Input Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		0	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of RPDO4

index	The first set of mapping objects	Initial value	unit	be mapped?	Data Structure
0x1A00		OD default value	-	NO	REC

Data Type : UDINT
Data range : OD Data Range
Accessibility: RO

Parameter function : Set the mapping object of TPDO1

Sub-index	TPDO1 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		8	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RW

Parameter function : number of sub-indexes

Sub-index	1st Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60410010	-	NO	-
Sub-index	2nd Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60770010	-	NO	-
Sub-index	3rd Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03h		0x60640020	-	NO	-
Sub-index	4t h Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
04h		0x60F40020	-	NO	-
Sub-index	5th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
05h		0x60FD0020	-	NO	-
Sub-index	7th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
06h		0x60610008	-	NO	-
Sub-index	7th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
07h		0x40000010	-	NO	-
Sub-index	8th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
08h		0x40010010	-	NO	-
Sub-index	9th~10th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
09h~0Ah		0x40000010	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of TPDO1

index	2nd Transmint PDO Mapping	Initial value	unit	be mapped?	Data Structure
0x1A01		OD default value	-	NO	Record

Data Type : UDINT
Data range : OD Data Range
Accessibility: RO

Parameter function : Set the mapping object of TPDO2

Sub-index	TPDO2 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		2	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RW

Parameter function : Set the mapping object of TPDO2

Sub-index	1st Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60410010	-	NO	-
Sub-index	2nd Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60640020	-	NO	-
Sub-index	3rd~10th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		-	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of TPDO1

index	3rd Transmint PDO Mapping	Initial value	unit	be mapped?	Data Structure
0x1A02		OD default value	-	NO	Record

Data Type : UDINT
Data range : OD Data Range
Accessibility: RO

Parameter function : Set the mapping object of TPDO3

Sub-index	TPDO3 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		2	-	NO	REC

Data type : USINT
Data range : 0 to 10
Accessibility: RW

Parameter function : Set the mapping object of TPDO3

Sub-index	1st Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60410010	-	NO	-
Sub-index	2nd Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60640020	-	NO	-
Sub-index	3rd~10th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		-	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of TPDO3

index	The fourth group of mapping objects	Initial value	unit	be mapped?	Data Structure
0x1A03		OD default value	-	NO	Record

Data Type : UDINT
Data range : OD Data Range
Accessibility: RO

Parameter function : Set the mapping object of TPDO4

Sub-index	TPDO4 Number of supported mapping objects	Initial value	unit	be mapped?	Data Structure
00h		8	-	NO	REC

Data type : USINT
Data range : 0 to 8
Accessibility: RW

Parameter function : Set the mapping object of TPDO4

Sub-index	1st Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
01h		0x60410010	-	NO	-
Sub-index	2nd Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
02h		0x60640020	-	NO	-

Sub-index	3rd~10th Output Object to be Mapped	Initial value	unit	be mapped?	Data Structure
03~0Ah		-	-	NO	-

Data Type : UDINT
Data range : 0 to 0xFFFFFFFF
Accessibility: RW

Parameter function : Set the mapping object of TPDO4

index	Sync Manager Communication Type	Initial value	unit	be mapped?	Data Structure
0x1C00		OD default value	-	NO	ARR

Data Type : USINT
Data Range : OD Data Range
Accessibility: RO

Parameter function : Set the object index of the RPDO allocation

Sub-index	Maximum index number of synchronous management communication type	Initial value	unit	be mapped?	Data Structure
01h		4	-	NO	-
Sub-index	Communication Type SM0	Initial value	unit	be mapped?	Data Structure
01h		-	-	NO	-
Sub-index	Communication Type SM1	Initial value	unit	be mapped?	Data Structure
02h		-	-	NO	-
Sub-index	Communication Type SM2	Initial value	unit	be mapped?	Data Structure
03h		-	-	NO	-
Sub-index	Communication Type SM3	Initial value	unit	be mapped?	Data Structure
04h		-	-	NO	-

Data Type : UINT
Accessibility: RO

Parameter function : Set the communication type

index	Synchronous Management 0 RPDO (SM0) Assignment	Initial value	unit	be mapped?	Data Structure
0x1C10		OD default value	-	NO	ARR

Control Mode : -
Data Type : USINT
Data range : OD Data range
display mode : -
Accessibility: RW

Parameter function : Set the object index of the RPDO allocation

index	Synchronous Management 1 RPDO(SM0) Assignment	Initial value	unit	be mapped?	Data Structure
0x1C11		OD default value	-	NO	ARR

Control Mode : -
Data Type : USINT
Data range : OD Data range
display mode : -
Accessibility: RW

Parameter function : Set the object index of the RPDO allocation

index	Synchronous Management 2 RPDO (SM2) Assignment	Initial value	unit	be mapped?	Data Structure
0x1C12		OD default value	-	NO	ARR

Data Type : USINT
Data Range : OD Data Range
Accessibility: RW

Parameter function : Set the object index of the RPDO allocation

Sub-index	SM2 RPDO The maximum sub-index number allocated	Initial value	unit	be mapped?	Data Structure
00H		1	-	NO	-

Data type : USINT
Data range : 0 to
1Accessibility **:** RO

Parameter function : Set the object index of the RPDO allocation

Sub-index	Index of RPDO Assignment	Initial value	unit	be mapped?	Data Structure
01H		0x1601	-	NO	-

Data Type : USINT
Data range : 0x1600 to 0x1603
Accessibility: RW

Parameter function : Set the object index of the RPDO allocation

index	RPDO (SM3) Assignment	Initial value	unit	be mapped?	Data Structure
0x1C13		OD default value	-	NO	-

Data Type : USINT
Data Range : OD Data Range
Accessibility: RW

Parameter function : Set the object index of the TPDO assignment

Sub-index	SM3 TPDO The maximum sub-index number allocated	Initial value	unit	be mapped?	Data Structure
00H		1	-	NO	-

Data Type : USINT
Data Range : OD Data Range
Accessibility: RW

Parameter function : Set the object index of the TPDO assignment

Sub-index	Index of TPDO Assignment	Initial value	unit	be mapped?	Data Structure
01H		0x1A01	-	NO	-

Data Type : USINT
Data range : 0x1A00 to 0x1A03
Accessibility: RW

Parameter function : SetTPDO Assigned index number

index	SM2 output synchronization management parameters	Initial value	unit	be mapped?	Data Structure
0x1C32		32	-	NO	-

Data Type : USINT
Data Range : OD Default Range
Accessibility: RW

Parameter function : Output synchronization management parameters

Sub-index	Output synchronization management parameter maximum index number	Initial value	unit	be mapped?	Data Structure
00h		32	-	NO	-

Data Type : USINT
Data range : OD default range
display mode : -
Accessibility: RO

Sub-index	Synchronization modes	Initial value	unit	be mapped?	Data Structure
01h		0X0002	-	NO	-

Data type : UINT
Data range : -
Accessibility: RO

Parameter function : 0x0002 IndicatesSM2 The synchronization type is distributed clock synchronization 0 Mode (DC SYNC 0 Mode) .

Sub-index	Cycle time	Initial value	unit	be mapped?	Data Structure
02h		0x001E8480	ns	NO	REG

Data Type : UDIN

Data Range : -
Accessibility: RO
Parameter function : reflect DC SYNC 0 cycle.

Sub-index	Shift time	Initial value	unit	be mapped?	Data Structure
03h		0	ns	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reserved

Sub-index	Supported synchronization modes	Initial value	unit	be mapped?	Data Structure
04h	modes supported	5	-	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO

Parameter function : describe the supported modes, 5 Show support for FreeRun a n d Sync0.

Sub-index	Minimum cycle time cycle time	Initial value	unit	be mapped?	Data Structure
05h		0x000F4240	ns	NO	REG

Data type : UDINT
Display mode : -
Accessibility: RO

Parameter function : reflects the minimum synchronization period supported by the slave station , unit: ns .
◆Note: EA300E The minimum synchronization cycle supported by the series servo drives is 1000000ns . If the synchronization cycle is lower than this value, the network cannot be switched to OP. state

Sub-index	Calc and copy time	Initial value	unit	be mapped?	Data Structure
06h		0x0003D090	ns	NO	-

Data type : UDINT
Data range : -
Accessibility: RO

Parameter function : reflects the time when data is copied from synchronization management to local.

index	SM event misses counter	Initial value	unit	be mapped?	Data Structure
09h		0	ns	NO	-

index	Sync0 time	Initial value	unit	be mapped?	Data Structure
0Ah		0x001E8480	ns	NO	-

Data type : UDINT
Data range : -
Accessibility: RO

Parameter function : effective sync0 time

index	Sync0 ERROR	Initial value	unit	be mapped?	Data Structure
20h		0	-	NO	REG

Data type : BOOL
Data range : -
Accessibility: RO

Parameter function : 0 : Normal synchronization; 1 : Abnormal synchronization.

index	Input synchronization management parameters Sync Parameter	Initial value	unit	be mapped?	Data Structure
0x1C33		32	-	NO	-

Data Type : USINT
Data Range : OD Default Range
Accessibility: RW

Parameter function : input synchronization management parameters

Sub-index	Enter the maximum number of indexes for synchronization management parameters	Initial value	unit	be mapped?	Data Structure
00h		32	-	NO	-

Data Type : USINT
Data Range : OD Default Range
Accessibility: RO
Parameter function : Maximum index

Sub-index	Synchronization modes	Initial value	unit	be mapped?	Data Structure
01h		0X0002	-	NO	-

Data type : UINT
Data range : -
Accessibility: RO
Parameter function : 0x0002 IndicatesSM2 The synchronization type is distributed clock synchronization 0 Mode (DC SYNC 0 Mode) .

Sub-index	Cycle time	Initial value	unit	be mapped?	Data Structure
02h		0x001E8480	ns	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reflectDC SYNC 0 cycle.

Sub-index	Shift time	Initial value	unit	be mapped?	Data Structure
03h		0	ns	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reserved

Sub-index	Supported synchronization modes	Initial value	unit	be mapped?	Data Structure
04h		5	-	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : describe the supported modes, 5 Show support for FreeRun a n d Sync0.

Sub-index	Minimum cycle time cycle time	Initial value	unit	be mapped?	Data Structure
05h		0x000F4240	ns	NO	REG

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reflects the minimum synchronization period supported by the slave station , unit: ns .
◆Note: EA300E The minimum synchronization cycle supported by the series servo drives is 1000000ns . If the synchronization cycle is lower than this value, the network cannot be switched to OP. state

Sub-index	Calc and copy time	Initial value	unit	be mapped?	Data Structure
06h		0x0003D090	ns	NO	-

Data type : UDINT
Data range : -
Accessibility: RO
Parameter function : reflects the time when data is copied from synchronization management to local

index	Delay time SM event misses counter	Initial value	unit	be mapped?	Data Structure
09h		0	ns	NO	-

index	Synchronize time Sync0 time	Initial value	unit	be mapped?	Data Structure
0Ah		0x001E8480	ns	NO	-

Data type : UDINT
Data range : -
Accessibility: RO

Parameter function : effectivesync0 time

index	Sync0 ERROR	Initial value	unit	be mapped?	Data Structure
20h		0	ns	NO	REG

Data type : BOOL
Data range : -
Accessibility: RO

Parameter function : 0 : Normal synchronization; 1 : Abnormal synchronization

- **Communication parameter details (6000H)**

CiA402 Servo and motion control profile object dictionary, for details refer to 402 protocol.

index	Error Code	Initial value	unit	be mapped?	Data Structure
0x603F		OD default value	-	TPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~65535
Accessibility: RO

Parameter function : Displays the user-defined alarm that occurs in the drive (0 meansno alarm, non-zero value represents the alarm number).

For detailed explanation, see the Alarm Warning and Processing section.

index	Controlword	Initial value	unit	be mapped?	Data Structure
0x6040		0	-	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~65535
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately.
Parameter function : Set control instructions:

bit	name	describe
0	Servo ready	1 isvalid, 0 is invalid
1	Connect the main circuit	1 isvalid, 0 is invalid
2	Fast shutdown	1 isinvalid, 0 efficient
3	Servo operation	1 Valid, 0 invalid
4~6		Related to each servo operation mode.
7	Alarm reset	For resettable alarms and warnings, execute the alarm reset function bit7 The rising edge is valid; bit7 Keepitas1 , other control instructions are invalid
8	pause	605Dh for the pause method in each mode .
9~10	NA	Reserve
11~15	Factory customized	Reserved, undefined

☞
1 **each bit of the control word alone, and it must be combined with other bits to form a certain control instruction.**
2 **Bit0~bit3 and bit7 have the same meaning in each servo mode. Commands must be sent in sequence to guide the servo drive into the expected state according to the CiA402 state machine switching process. Each command corresponds to a certain state.**
3 **Bit4~bit6 are related to each servo mode (please check the control instructions in different modes)**

index	Statusword	Initial value	unit	be mapped?	Data Structure
0x6041		0	-	TPDO	VAR

Control mode : ALL

Data type : UDINT
Data range : 0 to 0xFFFF
Accessibility: RO

Parameter function : reflects the servo status:

Setting value (binary)	describe
xxxx xxxx x0xx 0000	Not ready to switch on
xxxx xxxx x1xx 0000	Switch on disabled
xxxx xxxx x01x 0001	Ready to switch on
xxxx xxxx x01x 0011	Switched on
xxxx xxxx x01x 0111	Operation enabled
xxxx xxxx x00x 0111	Quick stop active
xxxx xxxx x0xx 1111	Fault reaction active
xxxx xxxx x0xx 1000	Fault

☞

2 **Each bit of the status word is meaningless when read alone. It must be combined with other bits to feedback the current status of the servo.**

3 **Bit0~bit9 have the same meaning in each servo mode. After the control word 6040h sends the command in sequence, the servo feedback a certain status.**

4 **Bit12~bit13 are related to each servo mode (please check the control instructions in different modes)**

5 **bit10, bit11, bit15 The meaning is the same in each servo mode, and it is the status of the servo after it executes a certain servo mode.**

index	quick stop mode.	Initial value	unit	be mapped?	Data Structure
0x605A		2	-	NO	VAR

Control mode : ALL
Data type : INT
Data range : 0 to 8
Accessibility : RW

Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the quick stop mode and the shutdown will take effect.

Settings	Shutdown mode
0	Free stop, keep free running state
1	With0x 6084 The ramp decelerates to a standstill and remains in free-running state (Switch On Disabled)
2	With0x 6085 The ramp decelerates to a standstill and remains in free-running state (Switch On Disabled)
3	NA
4	NA
5	With0x 6084 Ramp deceleration to a standstill, keeping the position locked (Quick stop Active
6	With0x 6085 Ramp deceleration to a standstill, keeping the position locked (Quick stop Active
7	NA
8	NA

index	Shutdown Option Code	Initial value	unit	be mapped?	Data Structure
0x605B		1	-	NO	VAR

Control mode : ALL
Data type : INT
Data range : 0 to 2 **Accessibility :** RW
Setting effective: Run setting, effective immediately
Parameter function : Set to disable parking mode

Settings	Shutdown mode
0	Free parking (transit into Switch On Disabled)
1	0x6084 Ramp deceleration to a standstill, maintain free running state (state machine moves down)
2	With0x6085 Ramp deceleration to a standstill, maintain free running state (state machine moves down)

index	Select Halt as the pause mode. Option Code	Initial value	unit	be mapped?	Data Structure
0x605D		1	-	NO	VAR

Control mode : ALL
Data type : INT
Data range : 1 to 2
Accessibility : RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the operation pause processing method

Settings	Shutdown mode
1	0x6084 Ramp deceleration to a standstill, maintaining position lock status (Operation enabled)
2	With 0x6085 Ramp deceleration to a standstill, maintaining position lock status (Operation enabled)

index	Alert handling options	Initial value	unit	be mapped?	Data Structure
0x605E	Fault reaction option code	2	-	NO	VAR

Control mode : ALL
Data type : INT
Data range : 0~2
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the processing method for the second level alarm

Settings	Shutdown mode
0	Free parking (Fault)
1	0x6084 Ramp deceleration to a standstill, maintain free running state (Fault)
2	With 0x6085 Ramp deceleration to a standstill, maintain free running state (Fault)

index	Modes of Operation	Initial value	unit	be mapped?	Data Structure
0x6060		0	-	RPDO	VAR

Control mode : ALL
Data type : S INT
Data range : 0 to 10
Accessibility: RW
Setting takes effect: Run the setting, and it takes effect immediately.
Parameter function : Select the servo operation mode:

Settings	Servo Mode	
0	NA	Reserve
1	Profile position mode (pp)	Refer to " 7.4 Profile Position Mode (pp)"
	NA	Reserve
3	Profile velocity mode (pv)	Refer to " 7.8 Profile Velocity Mode (pv)"
4	Contour torque mode (tq)	Refer to " 7.10 Profile torque mode (tq)"
5	NA	Reserve
6	Zero return mode (hm)	Refer to " 7.7 Origin return mode (hm)
7	Interpolation mode (ip)	Refer to " 7.5 Interpolation Mode (IP)
8	Cyclic Synchronous Position Mode (CSP)	Refer to " 7.6 Cyclic Synchronous Position Mode (CSP)
9	Cycle Synchronous Speed Mode (csv)	Refer to " 7.9 Cycle Synchronous Speed Mode (csv)"
10 (A)	Cycle Synchronous Torque Mode (cst)	Refer to " 7.11 Cyclic Synchronous Torque Mode (cst)"

Via PDO An unsupported servo mode is set, and the servo mode change is invalid;

index	Display operating mode	Initial value	unit	be mapped?	Data Structure
0x6061	Modes of Operation Display	0	-	TPDO	VAR

Control mode : ALL
Data type : S INT
Data range : 0 to 10
Accessibility: RO

Parameter function : Display the current operating mode of the servo:

Settings	Servo Mode	
0	NA	Reserve
1	Contour Position Mode（PP）	Refer to "7.4 Profile Position Mode（1-PP）"
	N	Reserve
3	Profile Speed Mode（PV）	Refer to "7.8 Profile Speed Mode（3-PV）"
4	Contour torque mode（TQ）	Refer to "7.10 Contour Torque Mode（4-TQ）"
5	NA	Reserve
6	Zero return mode（HM）	Refer to "7.7 Origin Return Mode(6-HM)"
7	Interpolation mode （IP）	Refer to "7.5 Interpolation Position Control Mode（7-IP）"
8	Periodic Synchronous Position Mode（CSP）	Refer to "7.4 Periodic Synchronous Position Mode（8-CSP）"
9	Cyclic synchronous speed mode（CSV）	Refer to "7.5 Cycle Synchronous Speed Mode（9-CSV）"
10	Periodic synchronous torque mode（CST）	Refer to "7.6 Cycle Synchronous Torque Mode（A-CST）"

index	Position command Position Demand Value	Initial value	unit	be mapped?	Data Structure
0x6062		0	Command unit	TPDO	VAR

Control mode : PP/HM/CSP
Data type : D INT
Data range : -2^31~(2^31-1)
Accessibility: RO

Parameter function : reflects the current actual effective (after position planning) position command (command unit) in the servo enabled state .

index	The lower 32 bits of the internal value of the position feedback Position Actual Internal Value	Initial value	unit	be mapped?	Data Structure
0x6063		0	Encoder unit	TPDO	VAR

Control mode : ALL
Data type : D INT
Data range : - 2^31~(2^31-1)
Accessibility: RO

Parameter function : reflects the current position of the motor, encoder unit (this value will overflow due to the electronic gear, for reference only)

index	Position feedbackPosition Actual Value	Initial value	unit	be mapped?	Data Structure
0x6064		0	Command unit	TPDO	VAR

Control mode : ALL
Data type : D INT
Data range : - 2^31~(2^31-1)
Accessibility: RO

Parameter function : reflects the current position of the motor, command unit
Position feedback 6064h ×gear ratio (6093h) = position feedback 6063h

index	Position deviation too large thresholdFollowing Error Window	Initial value	unit	be mapped?	Data Structure
0x6065		2000000	Command unit	RPDO	VAR

Control mode : PP/IP/CSP
Data type : D INT
Data range : 0~(2 ^{32} - 1)
Accessibility: RW

Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the position deviation excessive threshold (command unit) .
Position deviation 6065h = Position command 6062h - current position 6064h , when its absolute value exceeds 6065h When the duration exceeds the setting value of 6066h
AL.013(Position deviation too large alarm) .

index	Tracking Error Timeout Error Time Out	Initial value	unit	be mapped?	Data Structure
0x6066		0	Synchronization cycle	NO	VAR

Control mode : PP/HM/CSP
Data type : U INT
Data range : 0 to 65535
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the time for judging the excessive position deviation alarm.

index	Position reaches the threshold Position Window	Initial value	unit	be mapped?	Data Structure
0x6067		100	Command unit	RPDO	VAR

Control mode : PP/IP
Data type : UDINT
Data range: 0~(2^{31}-1)
Accessibility: RW
Setting takes effect: Run the setting and it takes effect immediately.
Parameter function : Set the threshold for position arrival.
6067h is the command unit. Position deviation is ± 6067h Within, and the time reaches 6068h When the position is reached, the status word 6041 bit10 =1
PP/IP position mode, this flag is meaningful when the servo enable is valid; otherwise it is meaningless.

index	Position arrival time Window Time	Initial value	unit	be mapped?	Data Structure
0x6068		0	ms	NO	VAR

Control mode : PP/IP
Data type : UINT
Data range : 0 to 65535
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the time window for determining the effective position arrival.
User Location Command 6062 Feedback with user's actual position 6064 The difference is ± 6067 Within, and the time reaches 6068 When the position is reached, in the contour position mode,
Status word 6041 bit10=1
PP/IP position mode, this flag is meaningful when the servo enable is valid; otherwise it is meaningless.

index	Target velocity value Velocity Demand Value	Initial value	unit	be mapped?	Data Structure
0x606B		0	Instruction unit /s	RPDO	VAR

Control mode : PV/CSV
Data type : DINT
Data range : -2^31~(2^31-1)
Accessibility: RO
Parameter function : reflects the actual given value of the current speed in speed mode (after speed planning)

index	Current speed Volocity Actual Value	Initial value	unit	be mapped?	Data Structure
0x606C		0	Instruction unit /s	TPDO	VAR

Control mode : ALL
Data type : D INT
Data range : -2^31~(2^31-1)
Accessibility: RO
Parameter function : Indicates the current real-time speed of the motor

index	Velocity Window	Initial value	unit	be mapped?	Data Structure
0x606D		20	rpm	RPDO	VAR

Control mode : PV
data type : UINT
Data range : 0 to 65535
Accessibility: RW
Setting takes effect: Run the setting and it takes effect immediately.
Parameter function : Set the threshold value for speed reaching.
The difference between the target speed 606B (converted to motor speed rpm) and the actual motor speed is ± 606D Within, and the time reaches 606E When the speed is reached, the status word is 6041
Bit10 = 1 , and the speed reaches DO The function works.
In profile speed mode, this flag is meaningful when the servo enable is valid; otherwise it is meaningless.

index	Velocity Arrival Time Window Time	Initial value	unit	be mapped?	Data Structure
0x606E		0	Synchronization cycle	RPDO	VAR

Control mode : PV
data type : UINT
Data range : 0 to 65535
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the time period for speed arrival judgment.

index	Zero speed judgment speed threshold Velocity Threshod	Initial value	unit	be mapped?	Data Structure
0x606F		10	rpm	RPDO	VAR

Control mode : PV
data type : UINT
Data range : 0 to 8000
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the speed threshold for zero speed judgment.
When the actual speed is less than ±606FH and the time reaches 6070H , the motor is considered to have stopped (at zero speed). Only the profile speed mode is valid, and the ZERO output in the DO function has nothing to do with this judgment.

index	Zero speed judgment time Volocity Threshod Time	Initial value	unit	be mapped?	Data Structure
0x6070		0	Synchronizatio n cycle	RPDO	VAR

Control mode : PV
Data Type : U INT
Data range : 0 to 65535
Accessibility: RW
Setting effective: Run setting, effective immediately
Parameter function : Set zero speed judgment time

index	Final target torque Target Torque	Initial value	unit	be mapped?	Data Structure
0x6071		0	0.1%	RPDO	VAR

Control mode : PQ/TQ
Data type : INT
Data range : -5000 to +5000
Accessibility : RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the servo target torque in contour torque mode and cycle synchronous torque mode.
A setting of 1000 (100.0%) corresponds to 1 times the rated torque of the motor.

index	Max.Torque	Initial value	unit	be mapped?	Data Structure
0x6072		3500	0.1%	RPDO	VAR

Control mode : TQ/CST
Data type : UINT
Data range : 0 to 5000
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the maximum allowable torque value of the servo.
According to 2006h The settings of 2007h , etc. determine the final torque limit value.

index	Real-time target torque Torque Demand Value	Initial value	unit	be mapped?	Data Structure
0x6074		0	0.1%	RPDO	VAR

Control mode : TQ
Data type : UINT
Data range : 0 to 5000
Accessibility: RO

Parameter function : Display the real-time value of the internal torque command (after planning) in the torque mode operation state of the servo trajectory planning .
1000 (100.0%) corresponds to 1 times the rated torque of the motor.

index	Motor rated current Rated Current	Initial value	unit	be mapped?	Data Structure
0x6075		240	0.01A	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0 to 65535
Accessibility: RO

Parameter function : Display the rated current of the servo motor

index	Motor rated torque Rated Torque	Initial value	unit	be mapped?	Data Structure
0x6076		127	0.01Nm	NO	VAR

Control mode : ALL
Data type : UINT
Data range : 0 to 65535
Accessibility: RO

Parameter function : Display the rated torque of the motor.

index	Real-time torque value Torque Actual Value	Initial value	unit	be mapped?	Data Structure
0x6077		0	0.01%	TPDO	VAR

Control mode : ALL
Data type : INT
Data range : -5000 to 5000
Accessibility: RO

Parameter function : Display servo internal torque feedback.
100.0 % corresponds to 1 times the motor rated torque

index	Final target location Target Position	Initial value	unit	be mapped?	Data Structure
0x607A		0	Command unit	RPDO	VAR

Control mode : PP/CSP
Data type : D INT
Data range : -2^{31}~$(2^{31}-1)$
Accessibility: RW

Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the servo target position in the contour position mode and cycle synchronization position mode.

index	Home Offset	Initial value	unit	be mapped?	Data Structure
0x607C		0	Command unit	RPDO	VAR

Control mode : HM
Data type : D INT
Data range: -2^{31}~$(2^{31}-1)$ (Note: Please set607Dh Range)
Accessibility: RW

Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the physical position of the mechanical zero point deviating from the motor origin during origin return.
Origin offset effective condition: After the power-on operation is completed (status word 6041 bit15= 1)
Function of origin offset: After the origin return is completed, the user's current position is 607Ch .

index	Software limit Position Limit	Initial value	unit	be mapped?	Data Structure
0x607D		2	-	NO	VAR

Control mode : CSP/IP/PP
Data type : DINT
Data range : -2^{31}~$(2^{31}-1)$
Accessibility: RW

Parameter function : Set the minimum and maximum values of the software absolute position limit
Forward software absolute position limit = (607D-1h) , 0x7FFFFFFF
disables the forward limit Reverse software absolute position limit =
(607D-2h) , 0x80000000 disables the reverse limit
Set the software position limit in the contour position control mode, that is, the maximum position that can be reached in this mode. If the set target position is greater than the set value, the servo is controlled by the host.
After the function is enabled , the AL.030 and AL.031 alarms will be reported.

index	Polarity	Initial value	unit	Can it be mapped?	Data Structure
0x607E		0	–	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~255 **Display mode** : -
Accessibility: RW
Setting effective: Setting in operation, effective when stopped
Parameter function : bit 7 and bit 6 represent the position and speed polarity respectively, 0 represents 1, 1 represents - 1;

index	Maximum contour speed Max Profile Velocity	Initial value	unit	be mapped?	Data Structure
0x607F		6553600	Instruction unit /s	RPDO	VAR

Control mode : PP/PV/CSV
Data type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the user's maximum operating speed. When the speed command changes, the set value takes effect.

index	Profile Velocity	Initial value	unit	be mapped?	Data Structure
0x6081		218453	Instruction unit /s	RPDO	VAR

Control mode : PP
Data Type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the uniform running speed of this segment of displacement instruction in contour position mode.

$$\text{Profile speed (rpm)} = \frac{\text{6081h} * \frac{\text{speed factor}}{\text{6094h}}}{\text{Encoder resolution}} * 60$$

index	Profile Acceleration	Initial value	unit	be mapped?	Data Structure
0x6083		1310720	Command unit /s²	RPDO	VAR

Control mode: PP/PV
Data type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the acceleration of the speed in position planning mode and speed planning mode.

$$\text{Motor speed acceleration (rpm/s)} = \frac{\text{6083h} * \frac{\text{Acceleration/deceleration factor 6097h}}{\text{Encoder resolution}}}{} * 60$$

In position planning mode, the set value takes effect after the position command of this section is triggered; in speed planning mode, the operation takes effect.

index	Profile Deceleration	Initial value	unit	be mapped?	Data Structure
0x6084		1310720	Command unit /s²	RPDO	VAR

Control mode : PP/PV
Data type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting effective: Setting in operation, effective when stopped
Parameter function : Set the speed deceleration in position planning mode and speed planning mode.

$$\text{Motor speed deceleration (rpm/s)} = \frac{84h * \text{Acceleration/deceleration factor 6097h}}{\text{Encoder resolution}} * 60$$

In position planning mode, the set value takes effect after the position command of this section is triggered. In speed planning mode, the operation takes effect.

index	Quick Stop Deceleration	Initial value	unit	be mapped?	Data Structure
0x6085		0x7FFFFFFF	Command unit /s²	RPDO	VAR

Control mode : PP/PV/CSP/CSV/HM
Data type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting effective: Setting in operation, effective when stopped

Parameter function : PP CSV PV In HM mode, when the parking mode is fast parking
PP CSV In PV mode, the fast stop mode selection (605A) is equal to 1 or 5, and the deceleration rate of ramp stop when the fast stop command is valid. In PP CSV PV mode, the pause mode selection (605D) is equal to 1, and the deceleration rate of ramp stop when the pause command is valid.
Parameter value set to 0 will be coerced to 1

index	Torque Slope	Initial value	unit	be mapped?	Data Structure
0x6087		1	0.1%/ms	RPDO	VAR

Control mode : TQ
Data Type : UDINT
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the torque command acceleration in profile torque mode.
the default value of 6087h is 1 , the time for the driver output to increase from 0.0% to 100.0% is 1000ms .

index	Zero return method Homing Method	Initial value	unit	be mapped?	Data Structure
0x6098		34	-	RPDO	VAR

Control mode : HM
Data type : SINT
Data range : 0 to 35
Accessibility: RW
Setting effective: Run setting stop effective
parameter function : Select origin return mode:

1	Reverse return to zero, the deceleration point is the reverse limit switch, the origin is the motor Z signal, and the reverse must be encountered before the Z signal Limit falling edge
2	Return to zero in the positive direction. The deceleration point is the positive limit switch. The origin is the motor Z signal. Before encountering the Z signal, the positive direction must be encountered first. Limit falling edge
3	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered. Falling edge on the same side
4	Reverse return to zero, the deceleration point is the origin switch, the origin is the motor Z signal, and the origin switch must be encountered before the Z signal is encountered ， Rising edge on the same side
5	Reverse return to zero, the deceleration point is the origin switch, the origin is the motor Z signal, and the origin switch must be encountered before the Z signal is encountered， Falling edge on the same side
6	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered.Rising edge on the same side
7	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered.Falling edge on the same side
8	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered.Rising edge on the same side
9	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered.The other side rising edge
10	Return to zero in the positive direction. The deceleration point is the origin switch. The origin is the motor Z signal. The origin switch must be encountered before the Z signal is encountered.The other side falling edge
11	Reverse return to zero, the deceleration point is the origin switch, the origin is the motor Z signal, and the origin switch must be encountered before the Z signal is encountered， Falling edge on the same side
12	Reverse return to zero, the deceleration point is the origin switch, the origin is the motor Z signal, and the origin switch must be encountered before the Z signal is encountered Rising edge on the same side
13	Z signal of the motor on the other side of the origin switch , and it must be First encounter the rising edge of the other side of the origin switch
14	Z signal of the motor on the other side of the origin switch , and it must be First encounter the falling edge on the other side of the origin switch

15	NA
16	NA
17~32	to1-14 , but the deceleration point coincides with the origin
33	Reverse return to zero, the origin is the motor Z signal
34	Return to zero in the positive direction, the origin is the motor Z signal
35	Take the current position as the origin

index	Zero return speed Homing Speeds	Initial value	unit	be mapped?	Data Structure
0x6099		2	-	RPDO	VAR

Control Mode : HM **Data Type** : U D I N T
Accessibility: RO

Parameter function : Set 2 speed values in zero return mode :
01h : Search high speed
02h : Search low speed.

Sub-index	speed during search for switch	Initial value	unit	be mapped?	Data Structure
01H		1092267	Command unit /S	RPDO	VAR

Control mode : HM
Data type : U D I N T
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting effective: Running setting , effective when returning to zero next time

Parameter function : Set the search speed of the deceleration point signal. This speed can be **set to** a higher value to prevent the zero return time from being too long and causing a zero return timeout alarm AlOIC.
Note: After the slave finds the deceleration point, it will decelerate. During the deceleration process, the slave shields the change of the origin signal. To avoid hitting the origin signal during the deceleration process, the switch position of the deceleration point signal should be set reasonably, leaving enough deceleration distance, or increasing the return to zero acceleration to shorten the deceleration time.

Sub-index	speed during search for zero	Initial value	unit	be mapped?	Data Structure
02H		109227	Command unit /S	RPDO	VAR

Control mode : HM
Data type : U D I N T
Data range : 0~(2^{32}-1)
Accessibility: RW
Setting effective: Run setting , the next return to zero takes effect
Parameter function : Set the search origin signal speed
This speed should be set to a lower speed to prevent overshoot when the servo stops at high speed, resulting in a large deviation between the stop position and the set mechanical origin.

index	Homing acceleration	Initial value	unit	be mapped?	Data Structure
0x609A		6553600	Command unit /s^2	RPDO	VAR

Control mode : HM
Data type : U D I N T
Data range : 1 0~(2^{32}-1)
Accessibility: RW
Setting effective: Running setting , effective when returning to zero next time

Parameter function : Set the acceleration in origin return mode.
After the origin return is started, the set value takes effect.
HM In mode, the pause mode 605Dh=2 When the Set deceleration to stop. The meaning of this object dictionary is the increment of position command (command unit) per second.
Set the parameter value to 0 will be coerced to 1

index	Position Offset	Initial value	unit	be mapped?	Data Structure
0x60B0		0	Command unit	RPDO	VAR

Control mode: CSP
Data type : DINT
Data range : -2^{31}~ (2^{31}-1)
Accessibility: RW

Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the servo position command offset in the periodic synchronous position mode. After offset: servo target position = 607Ah+60B0h

index	Speed bias Velocity Offset	Initial value	unit	be mapped?	Data Structure
0x60B1		0	Instruction unit /s	RPDO	VAR

Control mode:
CSP/CSV Data type :
DINT
Data range : -2^{31} ~ (2^{31}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : 1. Set EtherCAT in periodic synchronous position mode External speed feedforward signal; 2. Set the servo speed command offset in the periodic synchronous speed mode.
After offset: Servo target speed = 60FFh+60B1h

index	Torque bias Offset	Initial value	unit	be mapped?	Data Structure
0x60B2		0	0.1%	RPDO	VAR

Control mode : CSP/CSV/CST
Data type : INT
Data range : -32768 to + 32767Accessibility **:** RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : 1. Set EtherCAT in periodic synchronous position mode and periodic synchronous speed External torque feedforward signal; 2. Set the servo torque in periodic synchronous torque mode.
Torque command offset, after offset: target torque = 6071h+60B2h

index	Probe settings Touch probe Function	Initial value	unit	be mapped?	Data Structure
0x60B8		0	-	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~65535
Accessibility: RW

Parameter function: Set the function of probe 1 and probe 2

Bit	describe		Remark
0	Probe1 Enable	0 : Disable 1 : Enable	After enabling, 0X60B9 The relevant enable status flag will be set to 1 ; When invalid, 0X60B9 will be b i t s 0 to 7 Clear to 0 ;
1	Probe1 Trigger Options	0 : Single trigger 1 : Continuous trigger	Single trigger: trigger only when the trigger signal is valid for the first time. Continuous trigger: continuously capture DI The terminal specifies the position of the edge transition moment and is stored in the corresponding object dictionary.
2	Probe1 Trigger signal selection	0 : DI7 Signal 1 : Z pulse	DI7 Signal: DI7 terminal input signal, divided into rising edge and falling edge trigger; Z Pulse: that is, the zero crossing point of a single-turn position, which is divided into increasing zero crossing and decreasing zero crossing;
3	reserve		
4	Probe1 Rising edge trigger is valid	0 : Invalid 1 : Valid	bit0 After the bit is enabled, bit4&bit5 Can be switched at will, effective in real time, independent of bit0 ; If the rising edge is invalid, the corresponding 0X60B9 Corresponding status flag bit1 Clear to 0 ;
5	Probe1 Falling edge trigger is valid	0 : Invalid 1 : Valid	bit0 After the bit is enabled, bit4&bit5 Can be switched at will, effective in real time, independent of bit0 ; If the falling edge is invalid, the corresponding 0X60B9 The corresponding status bit2 is cleared to 0 ;
6~7	reserve		
8	Probe2 Enable	0 : Disable 1 : Enable	Same as above
9	Probe2 Trigger Options	0 : First trigger 1 : Continuous trigger	
10	Probe2 Trigger signal selection	0 : DI8 Signal 1 : Z pulse	DI8 Signal: DI8 terminal input signal, divided into rising edge and falling edge trigger; Z Pulse: that is, the zero crossing point of a single-turn position, which is divided into increasing zero crossing and decreasing zero crossing;
11	reserve		
12	Probe2 Rising edge trigger valid bit	0 : Invalid 1 : Valid	Same as above
13	Probe2 Falling edge trigger valid bit	0 : Invalid 1 : Valid	
14~15	reserve		

☞

3 Probe 1 fixed using DI7 Corresponding digital input terminal, if you want to enable, please confirm P6-08 Set to 45 ;

4 Probe 2 fixed using DI8 Corresponding digital input terminal, if you want to enable, please confirm P6-09 Set to 46 ;

index	Probe Status Touch probe status	Initial value	unit	be mapped?	Data Structure
0x60B9		-	-	RPDO	VAR

Control mode : ALL
Data type : UINT
Data range : 0~65535
Accessibility: RO

Parameter function: probe status

Bit	describe		Remark
0	Probe1 Enable status bit	0 : Probe 1 Not enabled 1 : Probe 1 Enable	0x60B8 When bit 0 ofthe MCU is enabled, this bit is set to 1 , otherwise it is cleared to 0.
1	Probe1 Rising edge capture state	0 : Not captured 1 : Captured	0x60B8 When bit0 ofis0 , this bit is cleared to 0 ; 0x60B8 bit4 Bitis 0 At this moment, this bit is cleared to 0 ; when the probe completes the falling edge capture, this bit is cleared to 0 ; The probe completes the rising edge capture, and this position is 1 ;
2	Probe1 Falling edge capture state	0 : Not captured 1 : Captured	0x60B8 When bit0 ofis0 , this bit is cleared to 0 ; 0x60B8 bit5 Bitis 0 At this moment, this bit is cleared to 0 ; when the probe completes the rising edge capture, this bit is cleared to 0 ; The probe completes the falling edge capture, and this position is 1 ;
3~5	reserve		

6	Characterization probe 1 model	0 : DI7 Signal 1 : Z pulse	0 : Probe 1 Is triggered by DI terminal 0 : Probe 1 The encoder Z pulse is used to trigger
7	Characterization probe 1 Signal level status after latching	0 : DI7 Low level 1 : DI7 High level	Bit7 The current level will be displayed only after the edge latch triggers
8	Probe 2 Enable status 5 Not enabled 6 Enabled	0 : Probe 2 Not enabled 1 : Probe 2 Enable	Same as probe 1 Description
9	Probe 2 Rising edge capture state:	0 : Not captured 1 : Captured	
10	Probe 2 Falling edge capture state	0 : Not captured 1 : Captured	
11~13	reserve		
14	Characterization probe 2 model	0 : DI8 Signal 1 : Z pulse	Same as probe 1 Description
15	Characterization probe 2 Signal level status after latching	0 : DI8 Low level 1 : DI8 High level	

index	Probe 1 Rising edge latch position Touch probe Pos1 Pos Value	Initial value	unit	be mapped?	Data Structure
0x60BA		0	Command pulse	TPDO	VAR
index	Probe 1 Falling edge latch position Touch probe Pos1 Neg Value	Initial value	unit	be mapped?	Data Structure
0x60BB		0	Command pulse	TPDO	VAR
index	Probe 2 Rising edge latch position Touch probe Pos2 Pos Value	Initial value	unit	be mapped?	Data Structure
0x60BC		0	Command pulse	TPDO	VAR
index	Probe 2 Falling edge latch position Touch probe Pos2 Neg Value	Initial value	unit	be mapped?	Data Structure
0x60BD		0	Command pulse	TPDO	VAR

Control mode : ALL
Data type : DINT
Data range : -2^{31}~(2^{31}-1)
Accessibility: RO

Parameter function: Latched probe position.

☞ **The latched probe position is in command pulse units.**

index	Interpolation data record Data Record	Initial value	unit	be mapped?	Data Structure
0x60C1		-	-	NO	VAR

Control Mode: IP
Data Type : US INT
Accessibility: RO

Parameter function : interpolation data given

Sub-index	Interpolation data record	Initial value	unit	be mapped?	Data Structure
01H		0	Command unit	RPDO	VAR

Control Mode : IP
Data Type : D INT
Data range : -2147483648 to +2147483647
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately
Parameter function : Set the target position value of the interpolation mode

index	Interpolation Time Period	Initial value	unit	be mapped?	Data Structure
0x60C2		2	0.1%	NO	VAR

Control Mode : CSP/IP
Data Type : US INT
Accessibility: RO

Parameter function : Set the update period of the interpolation position, similar to the position smoothing filter function.
DC Sync0 mode The lower interpolation period is automatically set to the Sync0 cycle time.
DC Free-run mode The interpolation period is set to the application cycle time of the master server. The interpolation period can be changed in the Switch on Disabled state.

Sub-index	Interpolation time period	Initial value	unit	be mapped?	Data Structure
01H		2	-	NO	VAR

Control mode: CSP/IP
Data type : US INT
Data range : 1 to 250
Accessibility : RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function: Set the interpolation time value. The unit is determined by 60C2h[02h] .

Sub-index	Interpolation time index	Initial value	unit	be mapped?	Data Structure
02H		- 3	-	NO	VAR

Control mode : CSP/IP
Data type : S INT
Data range : -6 to 0Accessibility **:** RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function: Set the unit of interpolation time - 0 : s ; -1: 100ms ; -2: 10ms ; -3 : ms ; -4: 100us ; -5: 10us ; -6: 1us

index	Maximum acceleration Acceleration	Initial value	unit	be mapped?	Data Structure
0x60C5		2^31- 1	Instruction unit/ s	NO	VAR

Control mode: PP/PV
Data type : UD INT
Data range : 0 ~ (2^31-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the maximum acceleration of speed planning in position planning mode and speed planning mode

index	Maximum deceleration Deceleration	Initial value	unit	be mapped?	Data Structure
0x60C6		2^31- 1	Instruction unit/ s	NO	VAR

Control mode:
PP/PV
Data type : UD INT
Data range : 0 ~ (2^31-1)
Accessibility: RW
Setting effective: Setting in operation , effective in shutdown

Parameter function : Set the maximum deceleration of speed planning in position planning mode and speed planning mode

index	Positive direction torque limit value Positive Torque Limit Value	Initial value	unit	be mapped?	Data Structure
0x60E0		3500	0.1%	RPDO	VAR

Control mode :
TQ/CST
Data type : U INT
Data range : 0 to 5000
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the maximum positive torque limit value in torque mode.

index	Negative torque limit value Torque Limit Value	Initial value	unit	be mapped?	Data Structure
0x60E1		3500	0.1%	RPDO	VAR

Control mode : ALL
Data type : U INT
Data range : 0 to 5000
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the negative maximum torque limit value in torque mode.

index	Position deviation Following Error Actual Value	Initial value	unit	be mapped?	Data Structure
0x60F4		-	Command unit	TPDO	VAR

Control mode :
PP/IP/CSP **Data type** :
D INT
Data range : -2^{31}~(2^{31}-1)
Accessibility: RO

Parameter function : Display current position deviation.

index	Position Demand Internal Value	Initial value	unit	be mapped?	Data Structure
0x60FC		-	Encoder unit	TPDO	VAR

Control mode : PP/HM/CSP
Data type : D INT
Data range : -2^{31}~(2^{31}-1)
Accessibility: RO

Parameter function : Display position command (encoder unit) . When using position factor, this monitoring will overflow, please use with caution.

In the servo-enabled state, when no warning occurs, the position command (encoder unit) and the position command (command unit) have the following relationship:

Position command 60FCh(Encoder unit) = Position command 6062h (Command unit) × electronic gear ratio (6091h)

index	Digital Input Input	Initial value	unit	be mapped?	Data Structure
0x60FD		0	-	TPDO	VAR

Control mode : ALL
Data Type : UD INT
Data range : 0~FFFFFFFF
Accessibility: RO

Parameter function : **reflect the current** DI of the drive Terminal function:

Bit	Function
bit0：N-OT	Reverse drive prohibited
bit1：P_OT	Forward drive disabled
bit2：ORGP	Origin detection signal
bit16：ALM_RST	Alarm reset signal
bit17：INHIBIT	Pulse disable signal
bit18：GAIN_SEL	Gain switching signal
bit19：J_SEL	Inertia ratio switching
bit20：GNUM0	Electronic gear ratio numerator selection 0
bit21：GNUM1	Electronic gear ratio numerator selection signal 1

index	Target speed Velocity	Initial value	unit	be mapped?	Data Structure
0x60FF		0	Instruction unit /s	RPDO	VAR

Control mode : PV / CSV
Data Type : D INT
Data range : -2^{31}~(2^{31}-1)
Accessibility: RW
Setting takes effect: Run the setting and it will take effect immediately

Parameter function : Set the speed command in the contour speed mode and cycle synchronous speed mode.

index	Supported drive operation modes Supported Drive Modes	Initial value	unit	be mapped?	Data Structure
0x6502		0x03FD	Encoder unit /s	NO	VAR

Control mode : ALL
Data Type : UD INT
Data range : 0~(2^{32}-1)
Accessibility: RO

Parameter function : reflects the servo operation mode supported by the drive:

bit	describe	0 - Not supported 1 - Supported
0	Profile position mode (pp)	1
1	Variable frequency speed regulation mode (vl)	0
2	Profile velocity mode (pv)	1
3	Contour torque mode (tq)	1
4	NA	0
5	Zero return mode (hm)	1
6	Interpolation position control mode (ip)	1
7	Cyclic Synchronous Position Mode (CSP)	1
8	Cyclic synchronous speed mode (csv)	1
9	Periodic synchronous torque mode (cst)	1
10~31	Factory-defined reserved, undefined	10~31

If the device supports object dictionary 6502h , it can be used to understand the servo modes supported by the drive.

- **Manufacturer-defined parameters detailed description**

The index range of the object dictionary is: 0x2000-0x5FFF . Corresponding to the servo function code, the corresponding relationship is:

- Object dictionary = function code + 0x2000 .

- **Group d0 - Monitoring parameters**

The monitoring group parameters are used to check the status of the servo drive and cannot be modified.

d0-00	0x4000	Motor speed	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	rpm	Read-only	ALL	十进制

Data size : INT

Parameter function : Display current motor speed

d0-01	0x 4001	Motor load factor	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Read-only	ALL	Decimal

Data size : -500.0~500.0Data size: **INT**

Parameter function : Display the actual output torque of the current motor and the percentage of the motor's rated torque

$$\text{Motor load factor} = \frac{\text{Actual output torque of t} \times 100\%}{\text{Motor rated tor}}$$

d0-02	0x 4002	Total number of external pulses collected	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	-	Read-only	PP/CSP/HM	Decimal

Data range : - (2^{31}-1) ~ (2^{31}-1)
Data size: DINT

Parameter function : Display the total number of pulses of the servo motor rotation based on the command pulse, which is only useful in position control mode.

1 : This value is the encoder feedback pulse, which is the number of position command pulses obtained after the electronic gear ratio is reversed.

2 : This value may be greater than five digits. Please use the shift keys to view the higher digits.

3 : The motor continues to rotate in the positive direction, and this value increases in the positive direction. When the motor rotates in the reverse direction, the value continues to decrease, and then increases in the negative direction after reaching zero.

4 : If the number of feedback pulses exceeds the above range, it will start counting again from the maximum value in the opposite direction.

5 : When the servo is turned OFF After that, this parameter is automatically cleared to zero.

d0-04	0x4004	Total feedback pulse number (command pulse unit)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ppr	Read-only	PP/CSP/HM	Decimal
d0-06	0x4006	Total feedback pulse number (encoder unit)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ppr	Read-only	PP/CSP/HM	Decimal

Data range: -2^{31}~ (2^{31}-1)
Data size : DINT

Parameter function : Display the total number of pulses of the servo motor rotation based on the command pulse, which is only useful in position control mode.

1 : This value is the actual pulse fed back by the encoder. Please pay attention to the motor resolution when using it.

2 : This value may be greater than five digits. Please use the shift keys to view the higher digits.

3 : Counting method and out-of-range processing are the same as d0-04 .

4 : When the servo is enabled After that, this parameter is automatically cleared to zero.

d0- 08	0x4008	Received external pulse frequency	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	kHz	Read-only	PP/CSP/HM	Decimal

Data range: -10000~10000
Data size : DINT

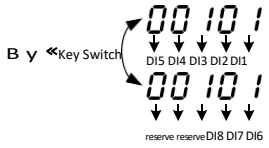
Parameter function : Display the current collected external pulse frequency, which is only useful in position control mode.

d0-12	0x400C	DI Input Status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00000000B	-	Read-only	ALL	Binary

Data range : 00000000B~11111111B

Data size : UINT

Parameter function : Display the status of the input terminal, a total of 8 bits of data are displayed, representing DI1~DI8 respectively

For example, the panel displays：		Description DI1, DI3, DI6, and DI8 are in a closed state (whether the DI terminal is high level or low level effective depends on the setting of parameter P6-01)

d0- 13	0x400D	DO Output Status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0000B	-	Read-only	ALL	Binary

Data range : 0000B~1111B
Data size : UINT

Parameter function : Display the status of the output terminal, a total of 6 bits of data are displayed, representing DO1~DO6 respectively .
For example, the panel displays:

Description of DO1 and DO3 There is currently an output (DO Whether the terminal is conducting or open circuit, the effective output is related to parameter P6-11 settings)

d0-16	0x 4010	Bus voltage	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	V	Read-only	ALL	Decimal

Data range : 0~1000
Data size : UINT

Parameter function : Display the actual value of the internal DC bus voltage (L1/L2/L3) of the drive

d0-17	0x 4011	Motor current effective value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.00	A	Read-only	ALL	Decimal

Data range : 0.00~655.35
Data size : UINT

Parameter function : Display the effective value of the current motor current.

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

d0-19	0x 4013	Speed command value	Initial value	unit	Parameter	Control Mode	Display Mode
			0	rpm	Read-only	ALL	Decimal

Data range : -6000~6000
Data size : INT

Parameter function : Display the current speed command value

d0- 20	0x 4014	Torque command value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Read-only	ALL	Decimal

Data range : -500.0~500.0
Data size : INT

Parameter function : Display the current torque command value, the benchmark is the motor rated torque

d0- 21	0x 4015	Motor instantaneous maximum load rate	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Read-only	ALL	Decimal

Data range : -500.0~500.0
Data size : INT

Parameter function : Display the current enable ON Until enable OFF The percentage of the motor's actual maximum output torque and the motor's rated torque during the entire process

d0- 22	0x 4016	IGBT Module temperature	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	℃	Read-only	ALL	Decimal

Data range : 0~150
Data size : UINT

Parameter function : This driver has a perfect over-temperature protection mechanism. Due to the temperature detection position, the displayed temperature may reach 100 ℃ or higher, which is normal.

d0- 23	0x 4017	Switching power supply bus voltage	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	V	Read-only	ALL	Decimal

Data range : 0~1000
Data size : UINT

Parameter function : Display control circuit (L1C/L2C) bus voltage (only SIZE D model support)

d0-24	0x 4018	Total system running time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	min	Read-only	ALL	Decimal

Data range : 0~(2^{31}-1)
Data size : UDINT

Parameter function : Display the cumulative running time of the servo drive since leaving the factory (enable ON (To prevent EEPROM damage, this parameter is saved every 10 minutes)

d0- 26	0x 401A	Braking load factor	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	%	Read-only	ALL	Decimal

Data range : 0~400
Data size : UINT

Parameter function : When the motor is in braking state, it displays the current load rate of the braking resistor. The load rate of the resistor is the actual power added to the braking resistor and the rated power of the braking resistor.
percentage.

d0- 27	0x 401B	Current motor electrical angle	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	°	Read-only	ALL	Decimal

Data range : 0~359.9
Data size : UINT

Parameter function: Display the current electrical angle of the motor rotor. The electrical angle is the product of the motor mechanical angle and the number of motor pole pairs.

d0- 29	0x 401D	Absolute encoder rotation number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	Rev	Read-only	ALL	Decimal

Data range : -32768~32768
Data size : INT

Parameter function : Display the multi-turn value of the absolute encoder feedback, the negative sign represents the reverse direction (the actual direction of the motor is determined by P0-01 definition)

d0-30	0x 401E	Encoder single-turn position value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	Pulse	Read-only	ALL	Decimal

Data range : 0~8388608
Data size : UDINT

Parameter function: Display the current single-turn position value fed back by the serial encoder.

d0- 34	0x 4022	Servo motor current position(Command pulse unit)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	Pulse	Read-only	PP CSP HM	Decimal

Data range : - (2^{31}-1) ~ (2^{31}-1)
Data size : DINT

Parameter function: Display the total number of pulses of the servo motor rotation based on the command pulse, which is valid in any mode.
1 : This value is the encoder feedback pulse, which is the number of corresponding command pulses obtained after the electronic gear ratio is reversed.

2 : This value may be greater than five digits. Please use the shift keys to view the higher digits.

3 : The motor continues to rotate in the positive direction, and this value increases in the positive direction. When the motor rotates in the reverse direction, the value continues to decrease, and then increases in the negative direction after reaching zero.

4 : If the number of feedback pulses exceeds the above range, it will start counting again from the maximum value in the opposite direction.

5 : The value of this parameter is calculated from the time the servo is powered on (the incremental system starts from **0** , the absolute system starts from the current encoder position, and after origin return, it starts from **Pb- 07** start) .

d0- 36	0x 4024	Servo motor current position(Encoder unit)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	Pulse	Read-only	PP CSP HM	Decimal

Data range : - (2^{31}-1) ~ (2^{31}-1)
Data size : DINT

Parameter function: Display the total number of pulses of the servo motor rotation based on the encoder resolution, which is valid in any mode.

1 : This value is the actual pulse number fed back by the encoder. Please pay attention to the resolution of the motor encoder when using it.

2 : This value may be greater than five digits. Please use the shift keys to view the higher digits.

3 : The value change method and out-of-range processing are the same as above.

4 : The value of this parameter is calculated from the time the servo is powered on (the incremental system starts from **0** , the absolute system starts from the current encoder position, and after origin return, it starts from **Pb- 07** start) .

d0-38	0x 4026	Positioning status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Read-only	ALL	Decimal

Data range : 0~1
Data size : INT

Parameter function: Display positioning status, 0 : in the process of positioning; 1 : positioning completed;

d0- 46	0x 402E	Average motor load rate	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Read-only	ALL	Decimal

Data range : 0.0~500.0
Data size : INT

Parameter function: Display the average motor load rate from the first time the drive is enabled;

d0- 47	0x 402F	Driver heat accumulation value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.000	-	Read-only	ALL	Decimal

Data range : 0.000~1.000
Data size : UINT

Parameter function Display the current drive heat accumulation value, and OVE alarm when it reaches 1.000 (If this value increases slowly during normal operation please consider whether the selection / control solution is correct);

d0- 48	0x 4030	Motor heat accumulation value (Steady state)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.000	-	Read-only	ALL	Decimal
d0-49	0x 4031	Motor heat accumulation value (Momentary)	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.000	-	Read-only	ALL	Decimal

Data range : 0.000~1.000
Data size : UINT

Parameter function: Display the current motor heat accumulation value, and OVd alarm when it reaches 1.000 (If this value increases slowly during normal operation, please consider whether the selection / control scheme is correct);

- **Group d1 - Alert query parameters**

  Alarm query can query the current alarm and the previous three alarm records. Here only describes the current alarm, the other alarms are the same **.**

d1-00	0x 4100	This alarm code	Initial value	unit	Parameter properties	Control Mode	Display Mode
			A000	-	Read-only	ALL	hexadecimal

Data range : 0~FF
Data size : UINT

Parameter function: Display the code of this alarm. Please refer to Chapter 9 for the meaning of the alarm code and its countermeasures.

d1-01	0x 4101	The speed at the time of this alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	rpm	Read-only	ALL	Decimal

Data range : -6000~6000
Data size : INT

Parameter function: Display the motor speed at the moment of this alarm. The negative sign indicates that the motor is rotating in the reverse direction (defined by P0-01).

d1- 02	0x 4102	Bus voltage at the time of this alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	V	Read-only	ALL	Decimal

Data range : 0~1000

Data size : UINT

Parameter function: Display the main circuit bus voltage value at the moment of this alarm;

d1- 03	0x 4103	The motor current during this alarm is validvalue	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	A	Read-only	ALL	Decimal

Data range : 0~655.35
Data size : UINT

Parameter function: Display the effective value of the motor current at the moment of this alarm;

d1- 04	0x 4104	The running time of this alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	min	Read-only	ALL	Decimal

Data range : 0~(2^{31}-1) **Data size** : UDINT

Parameter function : Display the cumulative running time of the driver at the time of this alarm

d1- 06	0x 4106	Previous Alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
			A000	-	Read-only	ALL	Decimal
d1- 07	0x 4107	Speed at last alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	rpm	Read-only	ALL	Decimal

d1-08	0x 4108	Previous alarm busbar Voltage	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	V	Read-only	ALL	Decimal
d1-09	0x 4109	effective value at the last alarm	Initial value	unit	Parameter properties	Control Mode	Display Mode
d1-10			0	A	Read-only	ALL	Decimal
d1-12	0x 410A	Run on last alarm time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	Min	Read-only	ALL	Decimal
d1-13	0x 410C	First two alarm codes	Initial value	unit	Parameter properties	Control Mode	Display Mode
			A1000	-	Read-only	ALL	Decimal
d1-14	0x 410D	Speed during the first two alarms	Initial value	unit	Parameter properties	Control Mode	Display Mode
d1-			0	rpm	Read-only	ALL	Decimal
15	0x 410E	First two alarm busbar power Pressure	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	V	Read-only	ALL	Decimal
d1-16	0x 410F	effective value during the first two alarms	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	A	Read-only	ALL	Decimal
d1-18	0x 4110	Run at the first two alarms time	Initial value	unit	Parameter properties	Control Mode	Display Mode
d1-19			0	Min	Read-only	ALL	Decimal
d1-20	0x 4112	The first three alarm codes	Initial value	unit	Parameter properties	Control Mode	Display Mode
			A1000	-	Read-only	ALL	Decimal
d1-21	0x 4113	Speed during the first three alarms	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	rpm	Read-only	ALL	Decimal
d1-	0x 4114	The first three alarm busbar Pressure	Initial value	unit	Parameter properties	Control Mode	Display Mode
22			0	V	Read-only	ALL	Decimal
d1- 24	0x 4115	effective value during the first three alarms	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	A	Read-only	ALL	Decimal
	0x 4116	Run on the first three alarms time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	min	Read-only	ALL	Decimal
	0x 4118	Current alarm status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Read-only	ALL	Decimal

Control mode : ALL
Data range : 0 ~ FF

Display mode : Hexadecimal

Parameter function : Displayed as 0 When it is displayed, it indicates that there is no alarm currently. 0 , it indicates that an alarm has occurred, and the value is the alarm code (not displayed A10), please go to
Chapter 9 Query the meaning of alarm codes and countermeasures

d1- 25	0x 4119	Current warning status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Read-only	ALL	Decimal

Control mode : ALL
Data range : 0 ~ FF

Display mode : Hexadecimal

Parameter function : Displayed as 0 When it is displayed, it indicates that no warning has occurred. 0 , it indicates that a warning has occurred, and the value is the warning code (not displayed A1E), please go to

- **d2 Group Product Information Query Group**

d2-00	0x4200	Drive Type	Example	unit	Parameter properties	Control Mode	Display Mode
			twenty one		Read-only	ALL	Decimal

Control mode : ALL
Data range : 0 ~ 3
Data size : UINT
Display mode : decimal

Parameter function : Display the type of servo drive.

d2-00 ten bits	d2-00 bit	Instruction Type	Encoder Type
2	0	EtherCAT EA300E	-

* : Bus-type drive products do not support 2500ppr Encoder.d2-00 The hundreds place is the manufacturer's parameter. Please provide it when you need technical support.

d2- 01	0x4201	Current motor code	Example	unit	Parameter properties	Control Mode	Display Mode
			101		Read-only	ALL	Decimal

Control mode : ALL
Data range : 0 ~ 999
Data size : UINT
Display mode : decimal

Parameter function : Display the current motor code;

d2- 02	0x4202	CPUA Software serial number 1	Example	unit	Parameter properties	Control Mode	Display Mode
			104.00		Read-only	ALL	Decimal
d2- 03	0x4203	CPUA Software serial number 2	Example	unit	Parameter properties	Control Mode	Display Mode
			0.000		Read-only	ALL	Decimal

Displays the control software version.

d2- 04	0x4204	CPUB software serial number 1	Example	unit	Parameter properties	Control Mode	Display Mode
			101.00		Read-only	ALL	Decimal
d2- 05	0x4205	CPUB software serial number 2	Example	unit	Parameter properties	Control Mode	Display Mode
			0.000		Read-only	ALL	Decimal

Displays the minimum version of the configuration file supported by the current driver.

- **d3 Group Information Feedback**

d3- 18	0x4312	Mechanical zero point corresponds to the encoder position Set low to 32 Bit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	PUL	Read-only	ALL	Decimal
d3- 20	0x4314	Mechanical zero point corresponds to the encoder position Set height 32 Bit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	PUL	Read-only	ALL	Decimal

Data range : - (2^{31}-1) ~ (2^{31}-1)
Data size : DINT

Parameter function: Display mechanical origin + 607C After offset, the corresponding absolute encoder position, encoder units.

- **It is only valid in absolute position mode. That is, the servo motor must use an absolute encoder, and the driver's P8-06 The parameter must be 1 .**
- **In absolute position mode, the absolute position command is based on the encoder position.**

d3- 22	0x4316	Mechanical position low 32 Bit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	PUL	Read-only	ALL	Decimal
d3- 24	0x4318	Mechanical position height 32 Bit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	PUL	Read-only	ALL	Decimal

Data range : - (2^{31}-1) ~ (2^{31}-1)
Data size : DINT

Parameter function: Display the offset of the current motor position relative to the mechanical zero point, encoder unit.

- **st The group displays the status of the servo drive.**

st- 04	0x5E00	Servo drive status	Initial value	unit	Parameter properties	Control Mode	Display Mode
			-		Read-only	ALL	Decimal

Data range : 0 ~ 65535
Data size : UINT

Parameter function : Display the status of the servo drive

0	Ndy Not ready	1	Rdy ready	2	Run	3	AL. alarm	4	ALE. warn
5	-poo- Return to origin	6	Jog	7	EydFt FFT	8	Jidt Inertia identification	9	tunE Self-learning

- **P0 Group - Basic**

control parameter setting

range : 0 ~ 8000

P0-02	0x2002	Maximum speed setting	Initial value	unit	Parameter properties	Control Mode	Display Mode
			3000	rpm	Effective immediately	ALL	Decimal

Parameter function : Set the maximum speed of the servo motor. The system setting shall not be higher than this setting value. If the motor running speed is higher than this setting value, an overspeed alarm will occur.

P0- 04	0x2004	Rotation signal output value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			20	rpm	Effective immediately	ALL	Decimal

Setting range : 10 ~ 1000
Data size : UINT

Parameter function : Set the standard for motor rotation status detection and the timing of TGON (motor rotation) signal output.

P0-06	0x2006	First torque limit - forward maximum	Initial value	unit	Parameter properties	Control Mode	Display Mode
			350.0	%	Effective immediately	ALL	Decimal
P0- 07	0x2007	First torque limit - reverse maximum	Initial value	unit	Parameter properties	Control Mode	Display Mode
			350.0	%	Effective immediately	ALL	Decimal

Setting range : 0.0 ~ 350.0
Data size : UINT

Parameter function : Set the torque limit value in the corresponding direction, based on the rated torque of the motor.

P0- 08	0x2008	Stop mode selection	Initial value	unit	Parameter properties	Control Mode	Display Mode
			200H	-	Effective immediately	ALL	hexadecimal

Setting range : 000H ~ 311H
Data size : UINT

Parameter function : Hundreds: Set the processing method when overtravel . The number ends with H Indicates that this parameter is 16 Please pay attention to the binary number when communicating.
P0-08=0H** : When overtravel occurs, the machine stops freely and the motor remains in a free state.
P0-08=1H** : When overtravel occurs, the motor decelerates to zero and then remains in a free state.
P0-08=2H** : When overtravel occurs, the motor will decelerate to zero and then maintain the position locked. **P0-08=3**H** : When overtravel occurs, the system will not process.

P0- 09	0x2009	Enable OFF Brake release indicator Delay time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			500	ms	Effective immediately	ALL	Decimal

Setting range : 1 ~ 30000
Data size : UINT

Parameter function : When the motor is rotating, if the servo is enabled OFF or an alarm occurs, the brake control terminal BK is closed after waiting for this time.

P0-10	0x200A	Brake release command speed value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			20	rpm	Effective immediately	ALL	Decimal

Setting range : 1 ~ 1000
Data size : UINT

Parameter function : When the motor is rotating, if the servo is turned off or an alarm occurs, when the motor speed drops to this set value or below, the holding brake control terminal BK is turned off.

P0-11	0x200B	Brake released - motor not powered Delay time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			200	ms	Effective immediately	ALL	Decimal

Setting range : 0 ~ 500
Data size : UINT

Parameter function : When the motor is in a stationary state, if the servo enable is turned off, the holding brake control terminal BK will be immediately turned off , and the motor will continue to be powered (only for zero off after the delay time set by this parameter.

P0-17	0x2011	Zero speed stop deceleration time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			200	ms	Motor standstill effective	ALL	Decimal

Setting range : 1 ~ 30000
Data size : UINT

Parameter function : When the parking mode is set to zero speed parking (P0-08 , this parameter specifies the deceleration time after receiving an enable close command or a level 2 alarm occurs.

P0-18	0x2012	Over travel protection deceleration time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			200	ms	Motor standstill effective	ALL	Decimal

Setting range : 1 ~ 30000
Data size : UINT

Parameter function : When an overtravel warning (P-OT , N-OT) occurs and P0-08 Set the time for the motor to decelerate and stop when it stops at zero speed due to overtravel.

P0-19	0x2013	Emergency stop deceleration time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	ms	Motor standstill effective	ALL	Decimal

Control mode : ALL
Setting range : 1 ~ 30000
Data size : UINT

Parameter function : When an overtravel warning (P-OT , N-OT) occurs and P0-08 Set the time for the motor to decelerate and stop when it stops at zero speed due to overtravel.

- **P1 Group - Basic control parameters**

P1-02	0x2102	Number of command pulses for the motor to rotate 1 circle	Initial value	unit	Parameter properties	Control Mode	Display Mode
			Encoder line number	-	Shutdown in effect	ALL	Decimal

8388608

Data size : UDINT

Parameter function : Set the motor to rotate 1 The number of command pulses required for a circle (360°). **Note:**

Please modify before enabling, and it cannot be modified during operation .

Change this parameter to something like 0x6093/0x6094/0x6097 The same effect, and P1-02 After the change, the internal position factor, speed factor and acceleration/deceleration factor are changed at the same time. The internal factor value is the relationship between the electronic gear and the setting factor value (0x6093/0x6094/0x6097) as follows:

$$\text{Internal factor effective value} = \text{electronic gear} * \text{setting factor value}$$

$$\text{Electronic gear} = \frac{\text{Encoder resolution}}{1-02} \text{ or } \frac{P1-04}{P1-06}$$

P1- 04 P1- 06	0x2104	Electronic gear ratio numerator 1	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Effective immediately	ALL	Decimal
	0x2106	Electronic gear ratio denominator	Initial value	unit	Parameter properties	Control Mode	Display Mode
			10000	-	Effective immediately	ALL	Decimal

Setting range : 0 to 2^{30}
Data size : UDINT

Parameter function: P1-04~P1-06 Used to set the electronic gear ratio, effective when P1-02=0 .

P1- 26 P1- 28	0x211A	Positive limit position	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2147483647	-	Effective immediately	ALL	Decimal
	0x211C	Negative limit position	Initial value	unit	Parameter properties	Control Mode	Display Mode
			- 2147483647	-	Effective immediately	ALL	Decimal

Setting range : $-(2^{31}-1)$ to $2^{31}-1$
Data size : DINT

Parameter function: set the positive and negative limit positions.

If the current position of the motor exceeds this range, the motor is prohibited from moving away from the range, and the LED Displaypot or not . This function is disabled by default and needs to be changed to enable

This parameter is a reasonable value.

- **P3 Group - Torque Control Parameter Group**

P3- 05	0x2305	Torque command method during torque control Speed limit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	rpm	Effective immediately	ALL	Decimal

Setting range : 0~6000
Data size : UINT

Parameter function: In torque control, set the speed limit value in the direction of torque command.

- **P4 Group - Gain parameter group**

P4-00	0x2400	Gain adjustment mode selection	Initial value	unit	Parameter properties	Control Mode	Display Mode
			1	-	Effective immediately	ALL	Decimal

Setting range : 0 ~4
Data size : U INT
Parameter function: Select the gain adjustment method.

P4-00=0 : Manual mode

- The position loop and speed loop gain related parameters and load inertia ratio are set by the user. In this mode, the control loop coefficient P4-14 is invalid.
- When switching from automatic mode to manual mode, the gain parameter will maintain the value calculated by the original

automatic mode.

- Gain switching is only effective in this mode.

P4-00=1 : Semi-automatic adjustment mode (rigidity table)

- It is suitable for the occasions where the load inertia ratio is basically constant. To use this mode, you should first pass AF-05 Perform offline inertia identification. After successful identification, the identification result will be automatically written to parameter P4-10 and saved (if it is not convenient to perform inertia identification, please assign a value that basically matches the mechanical situation to P4-10)
- The user needs to select the appropriate rigidity value (P4-01) according to the mechanical conditions , and the system will use this and P4-10 The value of P4-02 , P4-03 , P4-05 , P4-29 is automatically c a l c u l a t e d . Related gain parameters, these parameters will also become read-only parameters. P4-00=2 : Automatic adjustment mode 1
- It is suitable for occasions where the load inertia ratio changes frequently (the change of the inertia ratio from the minimum to the maximum is tens of seconds or more). In this mode, the servo monitors the change of the load inertia in real time and writes the identification result to parameter P4-10 every 30 minutes .
- The user needs to select the appropriate rigidity value (P4-01) according to the mechanical conditions. The system will automatically calculate the corresponding P4-02 , P4-03 , P4-05 , P4-29 according to the inertia value identified online each time. Related gain parameters such as , these parameters will also become read-only parameters.

P4-00=3 : Automatic adjustment mode 2

- With automatic adjustment mode 1 Same as above, but suitable for situations where the load inertia ratio changes in seconds.

P4-00=4 : Automatic adjustment mode 3

- With automatic adjustment mode 1 Same as the manual mode, but suitable

for situations where the load inertia ratio changes in the order of hundreds of milliseconds.

Please use the manual mode in the following situations:

- When using the automatic mode does not work well.
- The mechanical parts are not firmly connected, such as when there is backlash, and when the mechanical rigidity is particularly low.
- The load inertia ratio is too large (more than 20 times), or too small (less than 3 times), and the load inertia fluctuates.
- There is continuous low speed (less than 100 rpm) operation, and the speed of not less than 100 rpm and the acceleration time of not less than 2000 rpm/s do not last for at least 50 ms .
- The acceleration and deceleration time is not greater than 2000rpm/s , and the acceleration and deceleration torque is smaller than the friction torque.

P4- 01	0x2401	rigidity	Initial value	unit	Parameter properties	Control Mode	Display Mode
			13	-	Effective immediately	ALL	Decimal

Setting range : 0 ~4
Data size : U INT

Parameter function: Select the rigidity level

The following table shows the relationship between the rigidity setting value and the gain parameter. The larger the rigidity value, the faster the servo response, but too large a rigidity value may cause abnormalities such as oscillation . For EA300E-6R2-□□ and below models,

The factory setting is 13 , and the above setting is 11

P4- 01	P4- 02 Position loop proportional gain 1/s	P4- 03 Speed loop proportional gain Hz	P4- 05 Speed loop integral time constant ms	P4- 29 Torque command low pass smoothing constant number
0	2.0	1.5	370.0	15.00
1	2.5	2.0	280.0	11.00
2	3.0	2.5	220.0	9.00
3	4.0	3.0	190.0	8.00
4	4.5	3.5	160.0	6.00
5	5.5	4.5	120.0	5.00
6	7.5	6.0	90.0	4.00
7	9.5	7.5	70.0	3.00
8	11.5	9.0	60.0	3.00
9	14.0	11.0	50.0	2.00
10	17.5	14.0	40.0	2.00
11	32.0	18.0	31.0	1.26
12	39.0	22.0	25.0	1.03
13	48.0	27.0	21.0	0.84
14	63.0	35.0	16.0	0.65
15	72.0	40.0	14.0	0.57
16	90.0	50.0	12.0	0.45
17	108.0	60.0	11.0	0.38
18	135.0	75.0	9.0	0.30
19	162.0	90.0	8.0	0.25
20	206.0	115.0	7.0	0.20
twenty one	251.0	140.0	6.0	0.16
twenty two	305.0	170.0	5.0	0.13
twenty three	377.0	210.0	4.0	0.11
twenty four	449.0	250.0	4.0	0.09
25	500.0	280.0	3.5	0.08
26	560.0	310.0	3.0	0.07
27	610.0	340.0	3.0	0.07
28	660.0	370.0	2.5	0.06
29	720.0	400.0	2.5	0.06
30	810.0	450.0	2.0	0.05
31	900.0	500.0	2.0	0.05

P4- 02	0x2402	Position loop gain APR_P	Initial value	unit	Parameter properties	Control Mode	Display Mode
			48.0	1/s	Effective	PP/CSP	Decimal

					immediately		

Setting range : 1.0~2000.0
Data size : UINT

Parameter function: Set the gain APR_P of the position regulator and determine the responsiveness of the position control system.

APR_P The larger the value is set, the higher the position response frequency is, the better the tracking performance for the position command is, the smaller the position error is, and the shorter the positioning setting time is.

Too large a setting value may cause vibration.

P4- 03	0x2403	Position loop gain APR_P	Initial value	unit	Parameter properties	Control Mode	Display Mode
			27.0	1/s	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : 0.1~5000.0
Data size : UINT

Parameter function: Set the speed regulator gain ASR-P and determine the responsiveness of the speed control loop.

ASR_P The larger the value is, the higher the speed loop response frequency is, and the better the speed command tracking is. In order to increase the position loop gain to improve the servo system response performance, it is necessary to

Increase the setting value of the speed loop gain. However, please note that setting a value that is too large may cause vibration.

The response frequency of the speed loop must be 4 to 6 times higher than the response frequency of the position loop, otherwise it will cause vibration.

Position loop response frequency fp $APR\_P / 2$ Speed loop response frequency f ASR_P $P4\_10$

P4- 04	0x2404	Position regulator integral gain	Initial value	unit	Parameter properties	Control Mode	Display Mode
			21.0	1/s	Effective immediately	PP/CSP	Decimal

Setting range : 0.1~5000.0
Data size : UINT

Parameter function: Set the integral gain of the position regulator

P4- 05	0x2405	Speed loop integral time constant ASR_Ti	Initial value	unit	Parameter properties	Control Mode	Display Mode
			31.0	ms	Effective immediately	PP/CSP	Decimal

Setting range : 0.1~5000.0
Data size : UINT

Parameter function: Set the speed loop integral time constant. When the setting value is 3000.0 There will be no integral effect.

0 when stopping . However, if the setting is too small, it may cause vibration.

Generally speaking, the larger the load inertia, the larger the speed loop integral time constant should be set.

If the load inertia is larger than P4-10 The setting is consistent with the actual situation. The speed loop integral time constant ASR_Ti can be obtained using the following formula :

ASR_Ti $5000 / 2$ f

P4- 06	0x2406	Speed feed forward gain APR_Kp	Initial value	unit	Parameter properties	Control Mode	Display Mode
			30.0	%	Effective immediately	PP/CSP	Decimal

Setting range : 0.0~300.0
Data size : UINT

Parameter function: Set the speed feedforward gain.

The speed command calculated from the position command is multiplied by the ratio of this parameter and added to the speed command output by the position loop.

When the position control command changes smoothly, increasing this gain value can reduce the position following deviation and improve the position following performance. When the position control command does not change smoothly, the machine may vibrate, and reducing this gain value can reduce the vibration phenomenon.

P4- 07	0x2407	Speed feedforward filter time constant	Initial value	unit	Parameter properties	Control Mode	Display Mode
			5.00	ms	Effective immediately	PP/CSP	Decimal

Setting range : 0.00~10.00
Data size : UINT

Parameter function: Set the first-order inertia filter time constant of the speed feedforward gain.

When the position control command changes smoothly, reducing this filter time can reduce the position following deviation and improve the position following performance.

When the position control command does not change smoothly, increasing this filter time can reduce the operating vibration of the mechanism, but the position following deviation will increase.

P4- 08	0x2408	Speed feedback low pass filter time constant	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.00	ms	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : 0.00~20.00
Data size : UINT

Parameter function: Set the time constant for first-order filtering of speed feedback.

The motor rotation speed is obtained by differentiating the position of the encoder feedback. The rotation speed contains resonance and high-frequency interference signals. This parameter can eliminate noise, but

At the same time, it will cause delays, causing the loop response to slow down.

P4-10	0x240A	1st load to inertia ratio	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2.5	-	Effective immediately	ALL	Decimal

Setting range : 1.00~120.00

Data size : UINT

Parameter function: Setthefirst The ratio of total inertia to the motor rotor inertia.

$P4-10 \quad J_T / J_M$ J_T: Total inertia, i.e. load inertia + electronic rotor inertia, J_M: motor rotor inertia

When the inertia self-identification function is available, this parameter can be obtained through the inertia self-identification. When setting it yourself, please ensure that the set value is basically consistent with the actual situation.

When using manual gain setting, the user needs to adjust the speed loop gain value according to the mechanical operation conditions. Therefore, if more accurate data is not available, the factory value can be used and the adjustment of this parameter can be ignored.

If a relatively accurate load-to-inertia ratio is not obtained, vibration, abnormal noise or alarm may occur when the following functions are turned on.

Acceleration feedback (P4-22 bit0), speed observer (P4-22 bit3), torque feedforward (P4-24 , P4-25), external disturbance resistance (P4-28)

P4-11	0x240B	Second load to inertia ratio	Initial value	unit	Parameter properties	Control Mode	Display Mode
			1.0	-	Effective immediately	ALL	Decimal

Setting range : 1.00~120.00
Data size : UINT

Parameter function: Set the second The ratio of total inertia to the motor rotor inertia.

The system can be switched to use the second load inertia ratio P4-11 immediately through the function terminal J_SEL .

J_SEL Invalid use of 1st Load inertia ratio P4-10 J_SEL

Effective use of No. 2 Load inertia ratio P4-11

When the gain is in automatic adjustment mode, that is, P4-00=2 , 3 , 4 , this function is invalid.

When switching to the second load inertia ratio:

If P4-00=0 , the drive will continue to use P4-02 , P4-03 , P4-05 Equal gain parameters (note that the speed loop response frequency is the product of the speed loop gain and inertia); if P4-00=1 , the drive will automatically calculate new gain parameters based on the second inertia ratio and rigidity.

P4-12	0x240C	**PDFF** control coefficient	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	%	Effective immediately	ALL	Decimal

Control mode : PP/CSP
Setting range : 0~100
Data size : UINT
Display mode : decimal
Setting takes effect : Immediately

Parameter function: set to 0 When is IP Controller, when it is 100, it is PI Controller, 1~99 When it is a PDFF controller.

Using IP When the controller is used, the motor speed will not overshoot or the overshoot will be small, but the response will be slow.

Using Pi When the controller is used, the motor speed will overshoot, but the response is fast.

PDF The controller is a comprehensive IP and PI The closer the parameter is to 0 , the better the IP The stronger the effect, the smaller the effect.

P4- 13	0x240D	Rigidity adjustment factor	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.5	-	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : 0.5~1.0
Data size : UINT

Parameter function: This parameter is only used when P4-00 ≠ 0 , i.e., gain automatic adjustment mode 1 , 2 , 3 , 4 Used in P4-01 If a higher value cannot be set, increase the speed loop gain.

Its meaning is P4-03 With P4-13 In the automatic adjustment mode, increasing the setting value can increase the response of the servo in low rigidity situations. However, setting it too large will cause vibration.

P4-14	0x240E	Rigidity adjustment factor	Initial value	unit	Parameter properties	Control Mode	Display Mode
			75	-	Effective immediately	ALL	Decimal

Setting range : 0.5~1.0
Setting size : UINT

Parameter function: This parameter is only used when P4-00=1 , 2 , i.e. gain automatic adjustment mode 1. and2 It is used to determine the relationship between speed bandwidth and position bandwidth. This parameter is based on automatic

4 times the position bandwidth Generally, please do not adjust, especially do not adjust down

P4-15	0x240F	Gain switching conditions	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00H	-	Effective immediately	ALL	Decimal

Setting range : 00H~18H
Data size : UINT

Parameter function: set the conditions for gain switching

P4-15 = 0*H : only switch the position loop gain and speed loop gain;

P4-15 = 00H : Turn off the gain switching function;

P4-15 = 01H : Defined as DI for gain switching (GAIN_SEL) Terminal OFF → ON hour;

P4-15 = 02H : In position control mode, the position deviation is greater than parameter P4-18 When the setting value is100ppr command unit lag);

P4-15 = 03H : In position control mode, the speed command is greater than parameter P4-18 When the setting value is10rpm hysteresis);

P4-15 = 04H : The servo motor rotation speed is greater than P4-18. When the setting value is10rpm hysteresis);

P4-15 = 05H : Defined as DI for gain switching (GAIN_SEL) When terminal ON → OFF is invalid;

P4-15 = 06H : In position control mode, the position deviation is less than parameter P4-18 When the setting value is100ppr command unit

lag);

P4-15 = 07H : In position control mode, the speed command is less than parameter P4-18 When the setting value is10rpm hysteresis);

P4-15 = 08H : The servo motor rotation speed is less than parameter P4-18 When the setting value is10rpm hysteresis);

P4-15=1*H : only switch the speed loop integral, PI--->P , that is, cancel the speed loop integral effect. P4-15 =10H : turn off the integral switching function, and the speed loop integral is always valid;

P4-15 = 11H : Defined as DI for gain switching (GAIN_SEL) Terminal OFF → ON hour;

P4-15 = 12H : In position control mode, the position deviation is greater than parameter P4-18 When the setting value is100ppr command unit lag);

P4-15 = 13H : In position control mode, the speed command is greater than parameter P4-18 When the setting value is10rpm hysteresis);

P4-15 = 14H : The servo motor rotation speed is greater than parameter P4-18 When the setting value is10rpm hysteresis);

P4-15 = 15H : Defined as DI for gain switching (GAIN_SEL) When terminal ON → OFF is invalid.

P4-15 = 16H : In position control mode, the position deviation is less than parameter P4-18 When the setting value is100ppr command unit lag);

P4-15 = 17H : In position control mode, the speed command is less than parameter P4-18 When the setting value is10rpm hysteresis)
P4-15=18H : The servo motor rotation speed is less than parameter P4-18 When the setting value is10rpm of hysteresis)

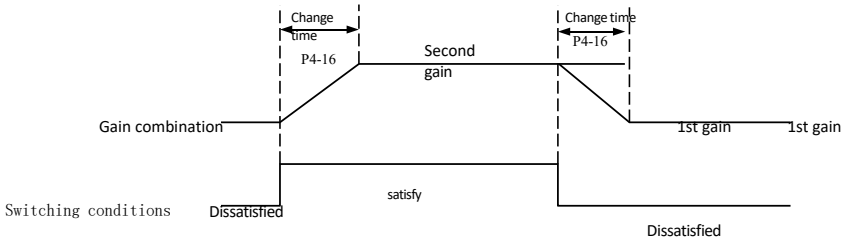
P4-16	0x2410	Gain switching change time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			5	ms	Effective immediately	ALL	Decimal

Setting range : **0~3000**
Data size : UINT
Parameter function: When the gain switching condition is met, the gain changes linearly and smoothly to the target gain value within this time (0 : turn off this function)

P4- 18	0x2412	Gain switching threshold	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	Pulse/Kpps/rpm	Effective immediately	ALL	Decimal

Setting range : **0~32768**
Data size : UINT
Parameter function: Set the gain switching threshold, the unit is based on P4-15 Settings

- When the motor stops, it switches to a lower gain to suppress vibration and squeaking noise
- When the motor stops, switch to a higher gain to increase the servo stiffness
- When the motor is running, switch to a higher gain to obtain better command following performance and shorter positioning time.
- Switch different gains according to the load equipment operation status to achieve optimal control



When the switching condition is met, the gain is shifted to the second Gain switching. If the switching condition is not met during the second gain operation, the gain will switch to the first gain. Gain switching.
When switching, the current gain combination is based on parameter P4-16 The setting time is linearly and smoothly changed to the target gain combination, and each parameter in the combination changes at the same time to avoid mechanical shock caused by sudden parameter changes. Once the switch starts, even if the switching conditions change, the switch will be completed and the switching conditions will be re-judged after completion.

P4-19	0x2413	The second position loop gain variation coefficient	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	%	Effective immediately	PP/CSP	Decimal

Setting range : 10~500
Data size : UINT
Parameter function: The rate of change of the proportional gain of the target position regulator when the gain switching conditions are met.

Target position regulator proportional gain APR_P1 =APR_P P4-19 100 %

P4- 20	0x2414	Second speed loop gain change coefficient	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	%	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : 10~500
Data size : UINT
Parameter function: When the gain switching condition is met, the change rate of the proportional gain of the target speed regulator.

Target speed regulator proportional gain ASR_P1 ASR_P P4-20 100 %

P4- 22	0x2416	Suppress performance extension 1	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00000B	-	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : 00000B~11111B
Data size : UINT
Parameter function: On the gain switch bar: switch for advanced suppression function.

bitX=0 : Function disabled

bitX=1 : Function enabled bit0 :

Acceleration feedback function

The acceleration feedback function uses software to differentiate the motor speed feedback signal to obtain acceleration, and then multiply the value by the acceleration feedback gain to compensate for the torque command. It is used to suppress the oscillation of the speed loop. This function occurs when the motor is elastically connected to the mechanical system, the load inertia is much larger than the motor inertia, and the system is unstable . When the servo system is in vibration, it can stabilize the servo system. Use the automatic gain mode (i e P4-00 ≠ 0 This function is invalid in torque control mode .

bit1 : Reserved bit2 : Reserved

bit3 : Reserved bit4 : Speed

observer function

The speed observer estimates the change in the state of the controlled object through software . When the frequency resonates, use to remove the high-frequency vibration component to stabilize the speed loop. Use the automatic gain mode (i e P4-00 ≠ 0) ţorque control mode

This function is invalid when

bit5 : Low noise mode. When this function is turned on, the current loop gain will be appropriately reduced, which can improve the noise.

P4- 23	0x2417	Speed Observer Cut-off Level	Initial value	unit	Parameter properties	Control Mode	Display Mode
			13	-	Effective immediately	PP/CSP/PV/CSV	Decimal

Setting range : **0~13**
Data size : UINT

Parameter function: Set the cutoff level of the built-in speed observer.

The larger the setting value, the higher the cutoff frequency of the speed observer, the wider the vibration suppression range, but the suppression strength will decrease.

P4- 24	0x2418	Torque feed forward gain	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Effective immediately	ALL	Decimal

Setting range : **0.0~200.0**
Data size : UINT

Parameter function: Set the value of acceleration feedforward gain.

Differentiate the speed command to get the acceleration torque, multiply it by this parameter and add it to the torque command output by the speed regulator to speed up the motor response.

Rated torque. Use automatic gain mode (i e P4-00 ≠ 0 This function is invalid in torque control mode .

P4- 25	0x2419	Torque feedforward filter time constant number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			5.00	ms	Effective immediately	ALL	Decimal

Setting range : **0.00~10.00**
Data size : UINT

Parameter function: Time constant for first-order low-pass filtering of acceleration torque.

The acceleration torque obtained by differentiating the speed command contains a large number of high-order harmonics. When it is superimposed on the torque command, it will cause high-frequency vibration of the motor torque.

The acceleration torque is low-pass filtered and then superimposed on the torque command to eliminate high-frequency harmonics and reduce vibration.

P4- 28	0x241C	External disturbance resistance gain	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Effective immediately	ALL	Decimal

Setting range : **-100.0~100.0**
Data size : INT

Parameter function: external disturbance compensation after disturbance observation. Used to reduce speed changes during load disturbances. Its meaning is:

Torque after compensation = torque before compensation + observed disturbance * P4-28 After the disturbance disappears, the compensation torque will be immediately cancelled.

The percentage of disturbance torque compensation to torque command uses automatic gain mode (ieP4-00 ≠ 0 This function is invalid in torque control mode .

P4- 29	0x241D	Torque command low pass smoothing constant number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.84	ms	Effective immediately	ALL	Decimal

Setting range : **0.00~100.00**
Data size : UINT

Parameter function: Set the time constant for the first-order low-pass filter of the torque command output by the speed regulator.

The torque command output by the speed regulator may contain high-order harmonic components due to factors such as speed feedback fluctuations, which may cause the motor to vibrate.

Filtering can eliminate higher-order harmonics, but it will cause phase delays and slow down the motor response.

P4-30	0x241E	Friction compensation smoothing time constant	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	ms	Effective immediately	ALL	Decimal

Setting range : **10~1000**
Data size : UINT

Parameter function: Perform first-order filtering on the friction compensation value to avoid mechanical vibration caused by sudden changes in the compensation value.

Friction compensation values include P4-31 , P4-32 , P4-33 , P4-34 The values set by the three parameters.

P4-31	0x241F	Viscous friction compensation gain	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	0.1%/1000rpm	Effective immediately	ALL	Decimal

Setting range : **0~1000**
Data size : UINT

Parameter function: Set the torque compensation value for the viscous friction load input to the speed regulator.

The higher the speed, the greater the viscous friction. Superimposing the viscous friction load in advance can increase the response. The setting value means that for every 1000rpm increase in motor speed , the required increase in speed is

Moment command value.

P4-32	0x2420	Torque command added value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Effective immediately	ALL	Decimal

Setting range : -100.0 ~100

Parameter function: For vertical axis, there is always gravity, and this value can be converted into a given torque and added to the torque command given.

P4-33	0x2421	Forward torque compensation value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Effective immediately	ALL	Decimal

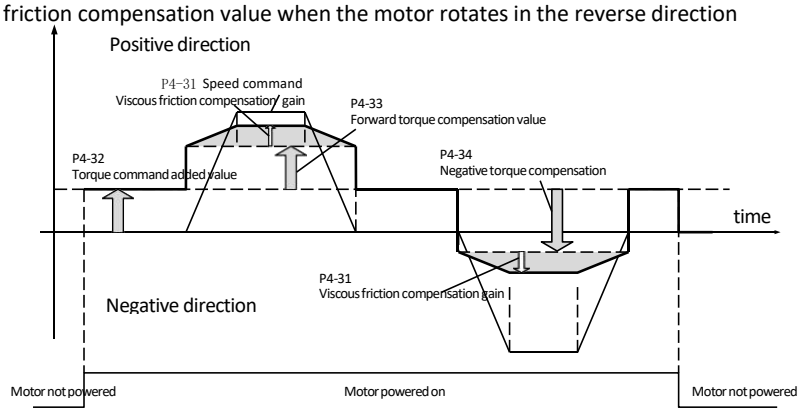
Setting range : -100.0~100.0
Data size : INT

Parameter function: Sliding friction compensation value when the motor rotates in the forward direction

P4- 34	0x2422	Reverse torque compensation value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0.0	%	Effective immediately	ALL	Decimal

Setting range : -100.0~100.0
Data size : INT

Parameter function: Sliding friction compensation value when the motor rotates in the reverse direction



- **P5 Group - Vibration Suppression Parameters Group**

P5-00	0x2500	Adaptive filter mode setting	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Re-power on to take effect	ALL	Decimal

Setting range : 0~2
Data size : INT

Parameter function : select the mode of adaptive filter.

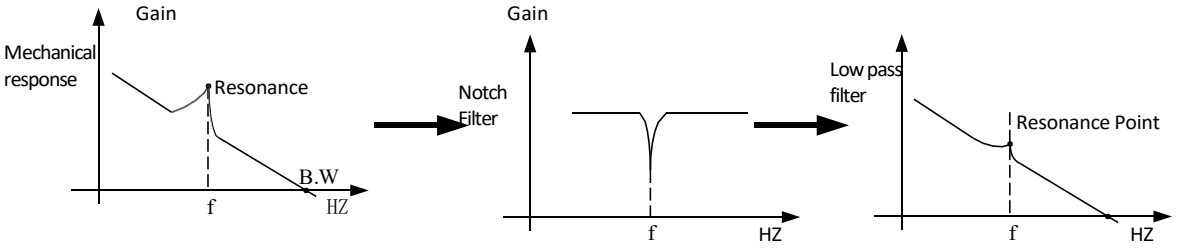
P5-00=0 : Manual setting 4 Notch Filter

P5-00=1 : Notch filter 3 and notch filter 4 Online automatic adjustment of depth and manual setting of width

P5-00=2 : Clear notch filter 3 and notch filter 4

If the mechanical system resonates during operation, it may be caused by the servo system being too stiff and responding too quickly. Reducing the gain may improve the situation, but it will reduce the system response speed. To suppress mechanical resonance without changing the gain, EA350 The servo drive provides low-pass filtering for command pulses (P1-15 There are two solutions:

The principle of vibration suppression is to use a notch filter to suppress the resonance peak of the mechanical response. The schematic diagram is as follows:



P5- 01	0x2501	Automatic vibration suppression detectionlevel Sensitivity	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	-	Effective immediately	ALL	Decimal

Setting range : 10~30000
Data size : INT

Parameter function : Set the amplitude of speed error. When resonance occurs, the speed will oscillate. Near the resonance point, the frequency of oscillation is close to normal distribution. If the width of the oscillation is large, the speed will oscillate.
At this parameter setting value, it can be considered as a resonance point.

Setting range : 50~5000

P5-02	0x2502	1st notch frequency	Initial value	unit	Parameter properties	Control Mode	Display Mode
			5000	Hz	Re-power on to take effect	ALL	Decimal

Parameter function : Set the center frequency of the first notch filter to 5000 Then this notch filter is invalid.

P5- 03	**0x2503**	**1st notch width**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			2	**-**	Re-power on to take effect	**ALL**	**Decimal**

Setting range : 0~20
Data size : INT

Parameter function :1st The larger the notch filter width, the greater the suppression near the center frequency.

P5- 04	**0x2504**	**1st notch depth**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**dB**	Re-power on to take effect	**ALL**	**Decimal**

Setting range : 0~99
Data size : INT

Parameter function :1st The notch depth of the notch filter. The smaller the value, the greater the suppression of the point.

P5-05	**0x2505**	**2nd notch frequency**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			5000	**Hz**	Re-power on to take effect	**ALL**	**Decimal**
P5-06	**0x2506**	**2nd notch width**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			2	**-**	Re-power on to take effect	**ALL**	**Decimal**
P5- 07	**0x2507**	**2nd notch depth**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**dB**	Re-power on to take effect	**ALL**	**Decimal**

Parameter function : Set the second Notch Filter

P5- 08	**0x2508**	**Notch frequency 3**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			5000	**Hz**	Re-power on to take effect	**ALL**	**Decimal**
P5-09	**0x2509**	**3rd notch width**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			2	**-**	Re-power on to take effect	**ALL**	**Decimal**
P5-10	**0x250A**	**Notch Depth 3**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**dB**	Re-power on to take effect	**ALL**	**Decimal**

Parameter function : Set the 3rd Notch Filter

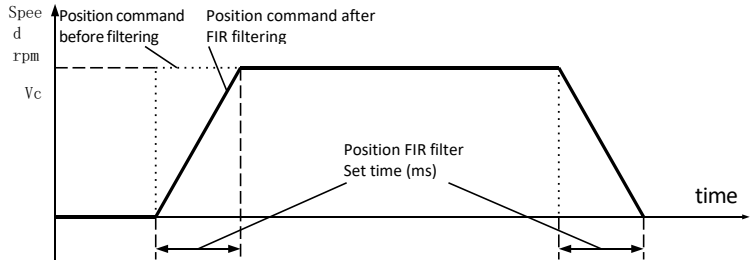
P5-11	**0x250B**	**4th notch frequency**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			5000	**Hz**	Re-power on to take effect	**ALL**	**Decimal**
P5-12	**0x250C**	**4th notch width**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			2	**-**	Re-power on to take effect	**ALL**	**Decimal**
P5-13	**0x250D**	**Notch Depth 4**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**dB**	Re-power on take effect	**ALL**	**Decimal**

P5-23	**0x251E**	**Position FIR filter**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0.0	**ms**	**Effective immediately**	**ALL**	**Decimal**

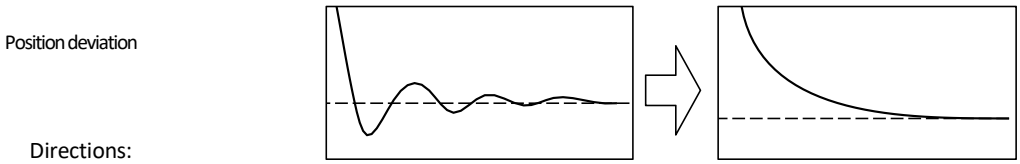
setting range : 0.5~1.0
Data size : UINT

Parameter function : Set position FIR The time constant of the filter.

The corresponding target speed is Vc Square wave position command, position FIR The filter setting value can be understood as reaching Vc time.



During the entire motion process, especially when the device vibrates at the moment of deceleration and stop, position FIR can be used The filter suppresses vibration. The following figure shows the effect of using FIR filter



Directions:

Measure the vibration waveform, calculate the vibration period and convert it into ms Unit input P5-23 .

- **P6 Group - Input and output parameter group**

P6-00	0x2600	DI Filter time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2	ms	Effective immediately	ALL	Decimal

Setting range : 0 ~ 20
Data size : UINT

Parameter function : set DI Terminal filter time, shutdown setting, effective immediately

To prevent strong external interference, you can use DI Terminal setting filter time. Its meaning is DI The terminal signal must maintain P6-00 The set time is

The driver will recognize it as a valid signal only after it is received.

For example, P6-00 Set to 2 , then DI The terminal signal must be maintained for 2ms to be recognized as valid by the driver.

P6- 01	0x2601	DI Level Logic	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00000000B	-	Effective immediately	ALL	Decimal

Setting range : 00000000 to 11111111
Data size : UINT
Display mode : Binary

Parameter function : set each DI The level logic of the terminal is set to stop and is effective after power is turned on again.

0 0 0 0 0 0 0 0

DI8 DI7 DI6 DI5 DI4 DI3 DI2 DI1

8 Road DI Can be set separately, for a certain bit, bit=0 , then the external input low level is valid; if bit=1 , then the external input high level is valid.

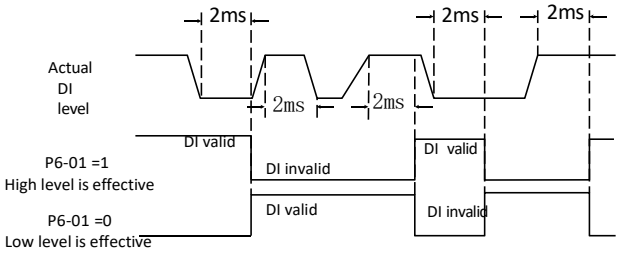


Figure 7-21 DI terminal filtering and level

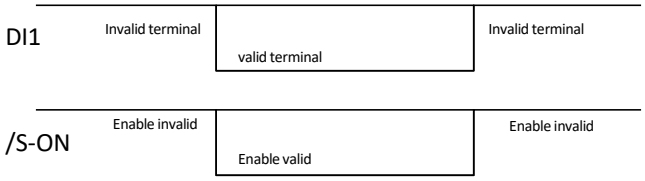
P6-02	0x2602	DI1 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			13	-	Restart the power supply	ALL	Decimal
P6-03	0x2603	DI2 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			14	-	Restart the power supply	ALL	Decimal
P6-04	0x2604	DI3 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			twenty two	-	Restart the power supply	ALL	Decimal
P6-05	0x2605	DI4 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2	-	Restart the power supply	ALL	Decimal
P6-06	0x2606	DI5 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			15	-	Restart the power supply	ALL	Decimal
P6-07	0x2607	DI6 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			6	-	Restart the power supply	ALL	Decimal
P6-	0x2608	DI7 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2	-	Restart the power supply	ALL	Decimal
08	0x2609	DI8 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			17	-	Restart the power supply	ALL	Decimal
P6- 09							

Setting range : 0 ~ 99
Data size : UINT

Parameter function : Set the function of DI1~DI8 terminals, see Table 8-1 . Stop setting, effective after power on again.

External 8 Road DI The corresponding function settings can be set in the range of 0~99 , but some of them are currently reserved.

- When a certain DI Set its function number, then the corresponding DI When valid, the selected event occurs. If P6-02=2 , then DI1 is set to alarm reset function, when DI1 When valid , if the servo has resettable warnings or alarms, these warnings or alarms will be cleared.



- Different DI The same function number can be set, and the corresponding logical relationship is AND, i.e. D1&D2 When it is valid, the corresponding function event will occur. For example, P6-02=13 , P6-03=13 , when DI1 and DI2 are valid at the same time, forward drive is prohibited; when one of them is invalid, forward drive is still allowed.

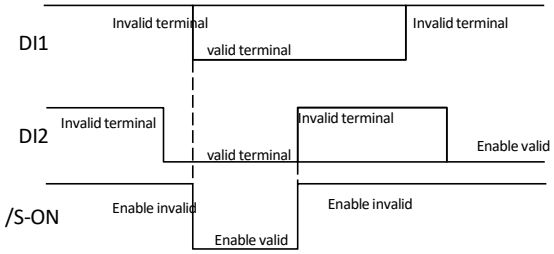


Table8-1 DI Input terminal function

Settings	name	Function Name	describe	Trigger method	Operation Mode
0	Disabled	Invalid terminal			
1	reserve				
2	ALM- RST	Alarm reset	ON - resets the resettable alarm when the abnormal condition has been resolved	Edge Trigger	P S T
3~11	reserve				
12	INHIBIT	Pulse Disable	ON- prohibit position command input OFF- allow position command input	Level trigger	P
13	P- OT	Forward drive disabled	ON- Forward drive is prohibited OFF- Forward drive is allowed	Level trigger	P S T
14	N- OT	Reverse drive prohibited	ON- reverse drive is prohibited OFF- reverse drive is allowed	Level trigger	P S T
15	GAIN- SEL	Gain switching	ON - switch to the second gain OFF - use the first gain	Level trigger	P
16	J- SEL	Inertia ratio switching	ON- Load inertia ratio 2 efficient OFF- Load inertia ratio 1 efficient	Level trigger	P S T
17~21	reserve				
twenty two	ORGP	External (origin) detector input	Rising edge: External detector is valid Falling edge: External detector is invalid	Edge Trigger	P S T
twenty three	SHOM	Origin return start signal	OFF → ON : Start the origin return function	Edge Trigger	P S T
twenty four	TL2	External torque limit	ON : External torque limit enabled OFF : External torque limit disabled	Level trigger	P S T
25	EMGS	Emergency Stop	ON : Emergency stop OFF : No function	Level trigger	P S T

45	TouchProbe1	Probe1 (Fixed DI7)	Rising edge: latch position (0X60BA) Falling edge: latch position (0X60BB)	Edge Trigger	P S T
46	TouchProbe2	Probe2 (Fixed DI8)	Rising edge: latch position (0X60BC) Falling edge: latch position (0X60BD)	Edge Trigger	P S T

P6-10	0x260A	DI Mandatory	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00000000B	-	Effective immediately	ALL	Binary

Setting range : 00000000B to 11111111B
Data size : UINT
Display mode : Binary
Parameter function : The number ending with B indicates that this parameter is a binary number. Please pay attention to this during communication.

bitX=1 , it indicates that the DI terminal corresponding to this bit is valid and the function corresponding to this DI terminal is enabled.

P6- 11	0x260B	DO On-off logic	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00000B	-	Effective immediately	ALL	Binary

Setting range : 00000B to 11111B
Data size : UINT
Display mode : Binary
Parameter function : Setting 5 RoadDO The logic of the output terminal is set to stop and is effective after power is turned on again.

0 0 0 0
DO4 DO3 DO2 DO1

0 : This bit corresponds to DO The terminal is valid at low level. When the event is valid, it is set to low level, and when it is invalid, it maintains high level.
1 : This bit corresponds to DO The terminal is valid at high level. When the event is valid, it is set to high level, and when it is invalid, it maintains low level.

P6-12	0x260C	DO1 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
P6-13			1	-	Restart the power supply	ALL	Decimal
P6-14	0x260D	DO2 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			2	-	Restart the power supply	ALL	Decimal
P6- 15	0x260E	DO3 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			8	-	Restart the power supply	ALL	Decimal
	0x260F	DO4 Function Number	Initial value	unit	Parameter properties	Control Mode	Display Mode
			12	-	Read-only	ALL	Decimal

Setting range : 0 ~ 99
Data size : UINT
Parameter function : Set the event corresponding to each DO , see Table 8-2 . Shutdown setting, effective after power on again
When the corresponding event occurs, it is set as the DO corresponding to the event. Terminal output. If P6-12=1 If the servo is ready, DO1 Terminal output low level (P6-11 bit0=0
hour)

Table8-2 DO Output terminal function table

Settings	name	Function Name	describe	Operation Mode
0	Disable	Invalid terminal		
1	S- RDY	Servo ready	Valid : Servo is ready and can receive S-ON command. Invalid : Servo is not ready and does not receive S-ON command. instruction	P S T
2	BK	Brake control	Valid - release the holding brake. Invalid - close the holding brake.	P S T
3	TGON	Motor rotation	Valid - the motor is rotating. Invalid - the motor stops rotating.	P S T
4	ZERO	Motor zero speed	Valid - the motor speed is zero. Invalid - the motor speed is not zero.	P S T
5	V- CLS	Speed arrival	Valid: The actual motor speed reaches or exceeds P2-08 Setting value	S
6	V- CMP	Consistent speed	Valid: During speed control, the absolute value of the difference between the actual motor speed and the speed command value is less than the setting value of P2-09.	S
7	PNEAR	Location close to	Valid: During position control, the number of position deviation pulses is less than the setting value of positioning approach width P1-23	P
8	COIN	Location Arrival	Valid: During position control, the number of position deviation pulses is less than the setting value of positioning completion width P1-24	P

9	C-LT	Torque limit signal	Valid - Motor torque is limited. Invalid - Motor torque is not limited.	P S
10	V-LT	Speed limit signal	Valid - Motor speed is limited. Invalid - Motor speed is not limited.	T
11	WARN	Warning Output	Valid: A warning event occurred	P S T
12	ALM	Alarm output	Valid: An alarm event has occurred	P S T
13	T-CMP	Torque arrival signal	Valid: The motor output torque reaches the set value. Invalid: The motor output torque does not reach the set value.	T
14	Home	Origin return signal	Valid: Return to origin completed Invalid: Origin return has not been completed	P S T

P6-16	**0x2610**	**DO1 Effective delay**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**ms**	**Effective immediately**	**ALL**	**Decimal**
P6-17	**0x2611**	**DO1 Invalid delay**	**Initial value**	**unit**	**Parameter properties**	**Control Mode**	**Display Mode**
			0	**ms**	**Effective immediately**	**ALL**	**Decimal**

P6-18	0x2612	DO2 Effective delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
P6-19	0x2613	DO2 Invalid delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
P6-20	0x2614	DO3 Effective delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
P6-21	0x2615	DO3 Invalid delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
P6-	0x2616	DO4 Effective delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
22	0x2617	DO4 Invalid delay	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal
P6- 23							

Setting range : 0 ~ 30000
Data size : UINT

Parameter function : set each DO Output valid and invalid delay time

P6- 24	0x2618	DO Forced output	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0000B	-	Effective immediately	ALL	Binary

Setting range : 0000B ~ 1111B
Data size : UINT
Display mode : binary

Parameter function : Force DO The output terminal is valid.

- **P7 Group -EtherCAT Communication parameter group**

P7-06	0x2706	EtherCAT Node Address	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Restart the power supply	ALL	Decimal

Setting range : 0 ~ 65535
Data size : UINT

Parameter function : The address of this machine as a communication slave.

P7- 07	0x2707	LAN9252 Monitor register ground Address Settings	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0xFFFF	-	Effective immediately	ALL	hexadecimal

Set to 0 When the node address is set to non- zero , the node address is assigned by P7-06. Direct settings.

Setting range : 0 ~
65535 **Data size** : UINT
Display mode : Hexadecimal

Parameter function : Set the EtherCAT to be monitored Slave Chip The address of the internal register. (Non-professional personnel are prohibited from operating, and the operation is only performed during debugging.)

P7- 08	0x2708	LAN9252 Monitor register values	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0x0000	-	Read-only	ALL	hexadecimal

Setting range : 0 ~ 65535
Data size : UINT
Display mode : Hexadecimal

Parameter function : address is P7-07 ESC of set value Real-time value of internal registers.

- **P8 Group - Extended Function Group**

P8-00	0x2800	JOG Jog speed	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	rpm	Effective immediately	ALL	Decimal

Setting range : 0 ~ 6000
Data size : UINT

Parameter function : refer to P8-01

P8- 01	0x2801	JOG Jog acceleration and deceleration time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			200	ms	Effective immediately	ALL	Decimal

Setting range : 2 ~ 30000
Data size : UINT

Parameter function : setJOG The motor rotation speed and acceleration/deceleration time during jogging. The basis for the acceleration/deceleration time is the time required for the motor to accelerate from 0 to the rated speed or vice versa.

The driver can be controlled by function parameter AF-02 To jog, you can also set it to JOG-P , JOG-N DI terminals to jog.

By function parameter AF-02 The servo must be OFF for jog operation. When the servo is OFF , the DI terminal can be used to perform inching andON .

P8- 02	0x2802	Offline inertia identification self-learning Moment	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	%	Effective immediately	ALL	Decimal

Setting range : 10 to 200

Data size : UINT

Parameter function : The percentage of the motor output torque relative to the rated torque of the motor during offline learning of the load inertia ratio.

The larger the setting value, the greater the possible mechanical impact will be, but the identification time and the number of motor rotations required will also be shorter. Please set an appropriate value according to the machine.

P8- 03	0x2803	Offline inertia identification maximum number of turns	Initial value	unit	Parameter properties	Control Mode	Display Mode
			10	Rev	Effective immediately	ALL	Decimal

Setting range : 1 to 20
Data size : UINT

Parameter function : Set the maximum number of turns allowed for offline inertia identification

If the system inertia cannot be successfully identified when the motor runs to this number of turns, or the motor cannot run to this number of turns during the inertia identification process, AL028 will be generated. alarm.

P8- 05	0x2805	Absolute encoder rotation number Upper limit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			30000	Rev	Effective immediately	ALL	Decimal

Setting range : 0 ~ 30000
Data size : UINT

Setting method: Enable the setting, disable it to take effect

Parameter function : Set / display the upper limit of the number of revolutions of the absolute encoder.

The internal program will calculate the current allowed forward and reverse rotation number N according to the actual situation. $_{Allow}$, N $_{Set}$ = min (N $_{Allowed}$, P8-05) , the final value is determined by P8-05 show.

When the absolute value is applied, if the current number of revolutions (d0-29) exceeds the upper limit, the current direction will be prohibited. When the number of revolutions is set to 0 , it can run continuously when used as an absolute value encoder without triggering an overtravel warning.

P8- 06	0x2806	How to use the absolute encoder choose	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Restart the power supply	ALL	Decimal

Setting range : 0 ~ 1
Data size : UINT

Parameter function : Select the method of using absolute value encoding

P8-06=0 : Used as an incremental encoder

P8-06=1 : Used as an absolute encoder (must be equipped with a battery encoder cable)

P8- 07	0x2807	Fan Control	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Effective immediately	ALL	Decimal

Setting range : 0 to 2
Data size : UINT

Parameter function : Control the operation of the drive cooling fan

P8-07=0 : Servo enable ON and alarm / warning when the drive cooling fan is running

P8-07=1 : The drive cooling fan starts running after power-on

P8-07=2 : Temperature control, when the temperature is greater than 50° , the fan is turned on, and when the temperature is less than 40°, the fan is turned off, and the temperature is maintained in between.

P8- 08	0x2808	Drive overload warning threshold	Initial value	unit	Parameter properties	Control Mode	Display Mode
			80	%	Effective immediately	ALL	Decimal

Setting range : 20 ~ 100
Data size : UINT

Parameter function : Set the warning threshold for drive overload, based on the rated current of the drive.

The driver has an overload protection function. When the driver's rated current is exceeded, an overload curve is generated. When the accumulated value reaches a certain value, the driver enters the alarm state. This parameter can be set to

The threshold of the drive overload early warning. When the accumulated value reaches the "alarm value * P8-08 ", the drive overload warning is issued. AlE04 , but it will not stop running .

P8- 09	0x2809	Motor overload warning threshold	Initial value	unit	Parameter properties	Control Mode	Display Mode
			80	%	Effective immediately	ALL	Decimal

Setting range : 20 ~ 100
Data size : UINT

Parameter function : Set the warning threshold for motor overload, based on the rated current of the motor.

The motor has an overload protection function. When the motor current exceeds the rated current, an overload curve is generated. When the accumulated value reaches a certain value, the alarm state is entered. This parameter can be used to set the motor overload.

The threshold for early warning. When the accumulated value reaches the "alarm value * P8-09 ", a motor overload warning is issued. AlE03, but it will not stop running .

P8-10	0x280A	Braking resistor value setting	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50	Ω	Effective immediately	ALL	Decimal

Setting range : 20 ~ 700
Data size : UINT

Parameter function : Set the resistance value of the brake resistor. Do not modify when using the built-in brake resistor, and set it according to the nominal value when using an external brake resistor.

P8-11	0x280B	Braking resistor power setting	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	W	Effective immediately	ALL	Decimal

Setting range : 20 ~ 30000
Data size : UINT

Parameter function : Set the power of the brake resistor. Do not modify when using the built-in brake resistor, and set it according to the nominal value when using an external brake resistor.

P8- 12	0x280C	Braking resistor discharge duty cycle	Initial value	unit	Parameter properties	Control Mode	Display Mode
			30	%	Effective immediately	ALL	Decimal

Setting range : 0 ~ 90
Data size : UINT

Parameter function : Set the percentage of brake pipe opening during braking. 400W That is, the default value below is 0. If an external braking resistor is used, please change it to 100 .

P8- 13	0x280D	Braking resistance derating percentage	Initial value	unit	Parameter properties	Control Mode	Display Mode
			40	%	Restart the power supply	ALL	Decimal

Setting range : 0 ~ 100
Data size : UINT

Parameter function : Set the derating of the braking resistor. Do not modify it when using the built-in braking resistor.

P8- 14	0x280E	Minimum load for motor stall determination	Initial value	unit	Parameter properties	Control Mode	Display Mode
			150.0	%	Effective immediately	ALL	Decimal

Setting range : 10.0~250.0
Data size : UINT

Parameter function : When the motor torque is greater than this parameter, it starts to determine whether it is stalled.
When the motor real-time speed is less than P8-15 The set value is less than 1/4 of the set speed , and the motor real-time torque is greater than P8-17 Set value, maintain P8-16 After some time, it is believed that
The motor is in a stalled state. In a stalled state, the maximum output of the motor is limited to P8-17 The motor will exit the stall state only after the speed reaches a certain value.

P8- 15	0x280F	Motor stall judgment speed	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	rpm	Effective immediately	ALL	Decimal

Setting range : 0~500
Data size : UINT

Parameter function : This parameter defaults to 0 , which means the motor stall protection function is turned off.
Set to non-zero The motor stall protection is turned on when the real-time motor speed is less than this value, and it starts to determine whether it is stalled.

P8- 16	0x2810	Motor stall judgment time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	ms	Effective immediately	ALL	Decimal

Setting range : 10~2000 Data
size : UINT

Parameter function : When the motor stall protection is turned on, set the duration to determine whether the motor is in a stall state

P8- 17	0x2811	Motor stall limit torque	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100.0	%	Effective immediately	ALL	Decimal

Setting range : 0.0~150.0
Data size : UINT

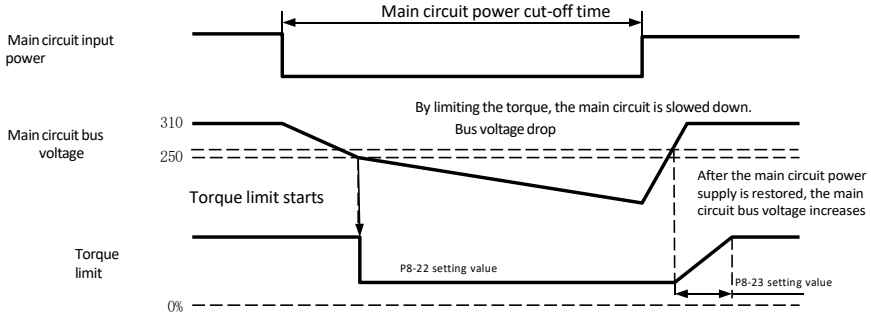
Parameter function: When the motor stall protection is turned on, set the maximum torque of the motor in the stall state

P8- 18	0x2812	Function switch 1	Initial value	unit	Parameter properties	Control Mode	Display Mode
			00100B	-	Effective immediately	ALL	Binary

Setting range : 00000B~11111
Data size : UINT
Parameter function :

bitX=0 : Function disabled bitX=1 : Function enabled

P8-18 Bit 0 : Torque limit function when the main circuit voltage drops
bit0=0 : Disable the torque limit function when the main circuit voltage drops, P8-22 , P8-23 invalid
bit 0 = 1 : Enable the torque limit function when the main circuit voltage drops. When the bus voltage is detected to be lower than 80 % of the rated value , the motor output torque will be limited to the value set by P8-22 . Use this function in combination with the instantaneous power failure retention function to continue running when the power supply voltage drops, avoiding shutdown due to alarm.

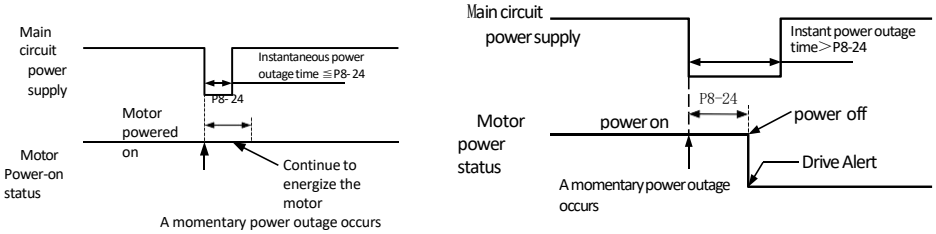


P8-18 bit1 : Instantaneous power failure retention function

bit1=0 : Disable instantaneous power failure retention function

bit1=1 : Enable instantaneous power failure hold function, which will enable power failure detection function by default and shield it within P8-24 time Alarm Old

When this function is turned on, even if the main circuit of the drive is instantly powered off, the The motor will continue to be powered on (servo ON) for the set time . If the instantaneous power failure time is less than the setting value of P8-24 , the motor will continue to be powered on. If it is greater than the setting value, the motor will no longer be powered on and the driver will AlOld or AlCCA and other alarms.



When the setting value of P8-24 is greater than or equal to the instantaneous power failure time , when the setting value of P8-24 is less than the instantaneous power failure time .

P8-18 bit2 : Power failure detection function (with bit1 Association

bit2=0 And bit0=0 : turn off the power failure detection function, and no detection will be performed when the main circuit power fails.

When using a vertical axis, be sure to enable the power-off detection function, otherwise the holding brake will not be closed immediately when the main circuit loses power.

bit2=1 : Enable power-off detection function.

If the instantaneous power failure holding function is not enabled at the same time, a power failure will occur immediately when the main circuit loses power. AlAlarm Old.

P8-18 bit3 : Reserved

P8-18 bit4 : Reserved

P8- 22	0x2816	Torque when main circuit voltage drops Limit value	Initial value	unit	Parameter properties	Control Mode	Display Mode
			50.0	%	Effective immediately	ALL	Decimal

Setting range : 1.0 ~ 100.0
Data size : UINT

Parameter function : Set the limit value of the motor output torque when the DC bus voltage of the driver is lower than 80% .

P8- 23	0x2817	Torque limitation when main circuit voltage drops Value release time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	ms	Effective immediately	ALL	Decimal

Setting range : 10 ~ 1000
Data size : UINT

Parameter function : When the voltage of the autonomous circuit returns to 90% of the rated value , the torque limit value returns to the original value within this time. See P8-18 bit0 Description.

P8- 24	0x2818	Momentary power failure holding time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100	ms	Effective immediately	ALL	Decimal

Setting range : 10 ~
1000 **Data size** : UINT

Parameter function : When the main circuit power supply is momentarily cut off, the time to keep the motor powered on.

P8- 25	0x2819	External torque limit	Initial value	unit	Parameter properties	Control Mode	Display Mode
			100.0	%	Effective immediately	ALL	Decimal

Setting range : 0.0 ~ 350.0

Data size : UINT

Parameter function : Set the external torque limit value, the benchmark is the rated torque of the motor.

P8- 26	0x281A	External torque switching limit rate 1	Initial value	unit	Parameter properties	Control Mode	Display Mode
			300.0	%/ms	Effective immediately	ALL	Decimal

Setting range : 0.1 ~ 500.0

Data size : UINT

Parameter function : WhenTL2 When the terminal is valid, the motor output torque limit value changes to P8-25 according to this slope. The unit is the torque limit value change amplitude relative to the setting value per millisecond.

Percentage of the motor's rated torque.

P8- 27	0x281B	External torque switching limit rate 2	Initial value	unit	Parameter properties	Control Mode	Display Mode
			300.0	%/ms	Effective immediately	ALL	Decimal

Setting range : 0.1 ~ 500.0
Data size : UINT

Parameter function: WhenTL2 When the terminal is invalid, the motor output torque limit value changes according to this slope to the value from P0-05 The value of the defined source. The unit is the torque limit value change amplitude per millisecond.
The percentage relative to the rated torque of the motor.

P8- 28	0x281C	External torque limit is effective, position deviation Poor alarm detection selection	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	-	Effective immediately	ALL	Decimal

Setting range : 0 ~ 1
Data size : UINT

Parameter function :WhenTL2 The terminal is valid, and the motor output torque is limited to P4-06 When the setting value is greater than , select whether to pause the excessive position deviation detection.

P8-28=0 : TL2 Excessive position deviation detection is still performed during the effective period of the terminal;
P8-28=1 : TL2 The excessive position deviation detection is suspended while the terminal is valid.

P8- 29	0x281D	External torque limit is invalid, alarm detection Invalid delay measurement	Initial value	unit	Parameter properties	Control Mode	Display Mode
			10000	ms	Effective immediately	ALL	Decimal

Setting range : 1 ~ 10000
Data size : UINT

Parameter function : P8-28=1 WhenTL2 is set When the terminal changes from valid to invalid, how long will it take to restore the excessive position deviation detection?

If P1-20 Set smaller, at TL2 During the period when the terminal is valid, if the motor is in a stalled state and the driver continues to receive position command pulses, then at TL2 Terminal to None
When the position deviation is not effective, the position deviation alarm may be detected immediately. Setting this parameter can delay for a certain period of time to allow the motor to run to reduce the position deviation and avoid the immediate position deviation alarm.

- **Pb Group - Origin return function group**

Pb-00	0x2B00	Zero return failure alarm time	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	ms	Effective immediately	ALL	Decimal

Setting range : 0 ~ 65535
Data size : UINT

Parameter function : Starting from receiving the origin return command, if the driver fails to locate to the origin within the time set by this parameter, the driver will displayA 1 0 /CAlarm, at the same timeALM Terminal action .

This parameter is set to 0 When the origin return is turned off, the monitoring of origin return will not be alarmed even if the origin return fails. **Note: It is recommended to set a suitable time for Pb-00 to avoid false alarms when the execution time is long.**

Pb- 12	0x2B0C	Absolute position electrical origin offset	Initial value	unit	Parameter properties	Control Mode	Display Mode
			0	PUL	Effective immediately	ALL	Decimal

Setting range: -2147483647 ~2147483647
Data size : DINT

Parameter function: After the origin return is completed, the position where the motor stops is the mechanical zero point. This parameter can be used to set the offset between the electrical zero point and the mechanical zero point.

After setting the electrical zero point, for the absolute value system, the subsequent position commands received will use the electrical zero point as the starting position reference. It should be noted that the data for setting the electrical zero point reference should be the motor encoder position composed of d0-29 and d0-30 , not the data of d0-36 .

The electrical zero point is based on the absolute position data of the encoder, so unless the following operations are performed, the electrical zero point is fixed.

- Replace the motor.
- Reset Pb-12 The value of .
- The machine origin was changed and the origin return was performed again.
- Execute the operation of clearing encoder multi-turn data (AF-16=2) .

For incremental systems, the electrical zero point can also be used as the starting reference for the position. However, after the system loses power, when it is powered on again, the electrical origin will become the Pb-12 offset between the motor position at the time of power-on .

Pb-12 The set pulse number corresponds to the encoder pulse unit.

Chapter 9 Alarm Warning and Handling

9.1 Alarm diagnosis and treatment measures

When the servo drive alarm occurs, the digital operator will display the alarm "AL" . The most recent alarm can be checked by P0-18 Check .

The alarm displays and their handling measures are as follows:

AL001: Short circuit alarm
A 002:Hardware overcurrent
AC00: Software overcurrent

Alarm reason	examine	Treatment
Driver output short circuit	1 : Check the wiring status between the motor and the driver or whether the wire is short-circuited. 2 : Check if the motor is damaged	1 : Eliminate the short circuit condition and prevent the metal conductor from being exposed. 2 : Replace the damaged motor
Motor wiring error	Check the wiring sequence of the motor to the drive	Re-wire according to the wiring sequence in the instruction manual
Control parameter setting abnormality	Check whether the set value is much larger than the factory value	Restore to default values and then correct them step by step
The command changes too much	Check whether the control input command changes too drastically	Correct the input command change rate or enable the filtering function
The resistance of the external braking resistor is too small or Short Circuit	Check whether the external braking resistor meets the specifications.	Use a brake resistor that meets the requirements of the manual and set P8-10 correctly. andP8-11 parameter
Drive Hardware Alerts	When the alarm still occurs after all the above problems are eliminated	Send to dealer or original manufacturer for repair

A 003: AD initialization alert

Alarm reason	examine	Treatment
Drive Hardware Alerts	After power off and restart, does this alarm still occur?	Send to dealer or original manufacturer for repair

AL004 : Memory abnormality

Alarm reason	examine	Treatment
Parameter data writing exception	After power off and restart, does this alarm still occur?	Replacing the drive
Storage too frequently	the EEPROM of the drive. conduct Write Operation	RAM for parameters that need to be written frequently. address

A 005: System parameter abnormality

Alarm reason	examine	Treatment
There is a conflict in the set parameters	Check the parameters set before the alarm	Fix wrong parameters

A 007: Encoder abnormality 1

Alarm reason	examine	Treatment
Encoder loose	CN5 on the drive Connector to encoder	Reinstall
Encoder wiring error	Check whether the encoder wiring follows the recommended wiring in the manual.	Correct wiring
Encoder wiring is bad	CN5 on the drive Check whether the wiring at both ends of the servo motor encoder is in good condition, including whether the shielding layer is intact.	Reconnect the wiring
Encoder damage	Eliminate wiring problems, this alarm still occurs	Replace the motor

AL008: Encoder error 2

Alarm reason	examine	Treatment
AB of incremental encoder Signal abnormality	same A007	same A007
Absolute encoder CRC Verification Error		

A 009: Encoder error 3

Alarm reason	examine	Treatment
Incremental encoder Z Signal abnormality	same A007	same A 007
Absolute encoder communication error		

A 00A: Undervoltage

Alarm reason	examine	Treatment

The main circuit input voltage is lower than the rated allowable Voltage value	Check whether the main circuit input voltage and wiring are normal	Recheck the power wiring
No input voltage in the main circuit	Check whether the main circuit voltage is normal	Re-check the power switch
Power Error	Check whether the power supply meets the specification definition	Use the correct power supply

A 006: Overvoltage

Alarm reason	examine	Treatment
The main circuit input voltage exceeds the allowable value	Check whether the main circuit voltage is within the allowable range	Use the correct power supply
Power input error	Check whether the power supply meets the specification definition	Use the correct power supply
Motor deceleration too fast	Check if the system inertia is too large and the deceleration is too fast	Extend the deceleration time or use a suitable external braking resistor.
The load inertia is large and the brake resistor is not connected	Does overvoltage occur during stopping?	Install a brake resistor with appropriate capacity and resistance, and set the brake resistor parameters correctly.
Drive Hardware Alerts	When the main circuit voltage is within the allowable range and the motor is not running This alert still occurs	Send to dealer or original manufacturer for repair

A 00d A 00E: Motor overload/Driver overload

Alarm reason	examine	Treatment
Continuous use exceeding rated load	1 : Monitor d0-01 Whether it continues to exceed 100% 2 : Monitor d0-46 Whether the rated value is continuously exceeded 3 : Monitor d0-47~49 Is it continuing to increase?	1 : Increase motor capacity or reduce load 2 : Increase the drive capacity or reduce the load
Motor and encoder wiring errors	Check U , V , W And encoder wiring	Correct wiring
The motor power line is broken or in poor contact	1 : Check whether the motor power line and the driver are reliably connected 2 : Check whether the connector between the power line and the motor is reliably connected, especially for the specifications using plastic connectors.	1 : Tighten the screws to eliminate problems such as poor contact and poor cable crimping. 2 : Secure the joint so that it will not shake or be subjected to external tension. 3 : Check whether the reed in the plug is deformed and make corrections.
Improper control parameter settings	1 : Is the machine vibrating or the motor making abnormal noises? 2 : Acceleration and deceleration settings are too fast	1 : Adjust position and speed gain values 2 : Slow down the acceleration and deceleration time

A 010: Drive overheated

Alarm reason	examine	Treatment
Ambient temperature is too high	Check whether the ambient temperature and humidity are within the allowable range	Improve the installation environment
The drive cooling fan is damaged.	Check whether the cooling fan is running during operation	Replace a fan that is not operating
The heat dissipation of the servo drive is affected ring	1 : Check whether the driver installation meets the requirements 2 : Check if the drive's heat sink is blocked	1 : Install the driver correctly according to the requirements of Chapter 2 2 : Clear the blockage

A1012: Overspeed

Alarm reason	examine	Treatment
UVW Phase sequence error	View UVW Is the phase sequence correct?	Connect wires in correct phase sequence
Improper setting of overspeed judgment parameters	Check if the speed setting parameter is too small	Correctly set the overspeed parameter value
The speed input command changes too much	Check whether the input analog voltage signal is abnormal	Adjust the rate of change of the input signal or adjust the filter
Encoder is disturbed	Is the wiring layout appropriate? Is the system grounded?	Adjust the line layout to ensure reliable grounding of the system

A 013: Position deviation is too large

Alarm reason	examine	Treatment
Position following error alarm value is too small	Confirm whether the parameters are appropriate	Increase 0x6065 Setting value
The 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 the specification
Gain value is set too small	Determine if the setting value is appropriate	Correctly set the gain value
Torque limit too low	Confirm the torque limit value	Correctly adjust the torque limit value
Load inertia is too large	Calculate the ratio of load inertia to motor rotor inertia	Reduce load inertia or re-evaluate motor capacity

A104 : Input phase loss

Alarm reason	examine	Treatment
Main circuit power supply abnormality	Check L1 , L2 , L3 Is the power cord loose or is it only single-phase input?	Connect the device to a normal three-phase power supply. If the problem persists, send the device to the dealer or the original manufacturer for repair.
Driver parameter setting error	Set the single-phase drive to three-phase power supply	Correctly set parameters

A 015: Motor phase sequence error

Alarm reason	examine	Treatment
is inconsistent with the given direction	Check U , V , W Is the wiring correct?	If the wiring is correct and the problem persists, send the device to the dealer or the original manufacturer for repair.

A 016: Drive abnormality

Alarm reason	examine	Treatment
Driver setting parameters are abnormal	-	View d2-09~d2-10 and the driver nameplate and record them, then contact the dealer or the original manufacturer

A 017: Braking resistor overload

Alarm reason	examine	Treatment
The brake resistor is not connected or the capacity is too small	1 : Check the connection status of the braking resistor 2 : Calculate the braking resistance value	1 : Reconnect the brake resistor 2 : Use a suitable braking resistor
Braking IGBT Invalidation	Checking the brake IGBT Is it damaged?	Send to dealer or original manufacturer for repair
Parameter setting when external braking resistor is connected mistake	Confirm the braking resistor (P8-10) and the braking resistor capacity (P8-11) Parameter setting value	Correctly set parameters

AI018 : Encoder overheating

Alarm reason	examine	Treatment
Absolute encoder overheating	Check whether the motor working environment temperature is too high	Lower the ambient temperature or force air cooling on the motor

A 019: The absolute encoder battery voltage is low

Alarm reason	examine	Treatment
Absolute encoder battery voltage is lower than 3.1V	Measuring battery voltage	Replace the battery (please keep the encoder and driver CN5 Replace the battery when the terminals are well connected and the drive is powered on . If the battery is replaced when the encoder has no power, an Al01A alarm will occur when the drive is powered on again.)

A 01A: Absolute encoder battery voltage is too low

Alarm reason	examine	Treatment
The absolute encoder battery voltage is lower than 2.5V . Multi-lap position information has been lost	Measuring battery voltage	Replacement battery

A 01b: Driver and motor matching error

Alarm reason	examine	Treatment
The driver and motor do not match	1 : Check whether the voltage level of the motor and the driver is consistent 2 : Check whether the motor code in the driver matches the motor nameplate.	1 : Correctly match the driver and motor 2 : Enter the motor code correctly

A 01C : Origin return failed

Alarm reason	examine	Treatment
Pb-00 The parameter setting value is too small	Check Pb-00 Is the setting value appropriate?	Increase Pb-00 Value
External detector or limit switch failure	Check external detectors, limit switches and wires	Troubleshooting Alarms

A 01d Power failure

Alarm reason	examine	Treatment
With the servo enabled	Check Pb-00 Is the setting value appropriate?	Increase Pb-00 Value
External detector or limit switch failure	Check external detectors, limit switches and wires	Troubleshooting Alarms

A 01F: System restart

Alarm reason	examine	Treatment
After some operations are completed, the drive needs to be restarted. start	none	Cut off the power supply to the drive and then re-apply it

A 020: EtherCAT Error in initializing Ethernet chip

Alarm reason	examine	Treatment
The configuration file is not burned	After connecting to the master station, check the servo panel	Burn the configuration file
Drive Alert	Drive Alert	Replace the servo drive

A 021: EtherCAT Error in initializing Ethernet chip

Alarm reason	examine	Treatment
Drive Alert	Drive Alert	Replace the servo drive
Communication abnormality	Is there a ground wire?	Connect the wires in the correct way

A 022: EtherCAT Communication disconnection

Alarm reason	examine	Treatment
Master and Slave EtherCAT Connecting Break	Check whether the network cable is properly connected	Connect the network cable correctly, restart the servo drive or set 0x6040 Setting 0x86 Perform an error reset

A 023: EtherCAT PDO Communication write operation to read-only object dictionary

Alarm reason	examine	Treatment
Via PDO Write operations to read-only object dictionaries	Check the properties of the object dictionary	Perform correct operations according to the corresponding attributes of the object dictionary
Via PDO You need to power on again to Write operation to the effective object dictionary		

AI 024 : EtherCAT PDO The index and sub-index of the object dictionary to be found are not found

Alarm reason	examine	Treatment
Host computer configuration PDO Object dictionary error	Check whether the object dictionary configured on the host computer exists in the servo.exist	Modify to the correct object dictionary

A 025: EtherCAT PDO The communication synchronization time setting exceeds the range

Alarm reason	examine	Treatment
After the network switches to running mode, the synchronization cycle The period is set to less than 1ms	Confirm the synchronization cycle setting in the controller	Modify the synchronization period setting to a value greater than 1ms

A 032: Electronic gear ratio setting range error

Alarm reason	examine	Treatment
electronic gear ratio setting is unreasonable	Check whether the setting values of the electronic gear ratio related parameters are appropriate	Adjusting parameters

ALO39 : The serial encoder line number setting is wrong

Alarm reason	examine	Treatment
Detect the number of lines currently connected to the encoder WithPD-16 Inconsistent setting values	Check the motor code Is the setting correct?	Set the correct motor code

9.2 Warning diagnosis and treatment measures

the servo drive generates a warning , an alarm display "AL E" will appear on the digital operator . The warning indicates that the system has detected an abnormality, but the motor will not stop running . Please check the cause of the warning and eliminate the problem immediately. The warning display and its treatment measures are as follows:

: Drive overheat warning

Warning reason	examine	Treatment
Ambient temperature is too high	Check whether the ambient temperature and humidity are within the allowable range	Improve the cooling conditions of the servo drive and reduce the ambient temperature
The drive cooling fan is damaged.	Check whether the drive cooling fan is running during operation	Replace a fan that is not operating
The installation direction of the servo drive or the air inlet and outlet of the cooling fan are blocked	1 : Check whether the driver installation meets the requirements 2 : Check if the drive's heat sink is blocked	1 : Install the driver according to the provisions of Chapter 2 2 : Clear the blockage
Servo drive alarm	Restart after a power outage	Restart after a period of power outage. If the alarm still sounds, replace the servo drive.

: Motor overload warning

Warning reason	examine	Treatment
Motor load reaches P8-09 Set motor Overload warning threshold	1 : AL 00d AL00E 2: P8-09 parameter setting is too small	1 : AL 00d and AL00E 2 : Increase the setting value of P8-09 appropriately

: Drive overload warning

Warning reason	examine	Treatment
Driver load reaches P8-08 Set the drive Drive overload warning threshold	1 : AL 00d and AL00E 2: P8-08 parameter setting is too small	1 : AL 00d and AL00E 2 : Increase the setting value of P8-08 appropriately

: Brake overload warning

Alarm reason	examine	Treatment
The brake resistor is not connected or the capacity is too small	1 : Check the connection status of the braking resistor 2 : Calculate the braking resistance value	1 : Reconnect the brake resistor 2 : Use a suitable braking resistor
Load inertia is too large	Calculate whether the load / rotor inertia ratio is appropriate	Reduce the load inertia or replace the motor with a larger inertia
Improper parameter setting	Confirm the braking resistor value (P8-10) and power (P8-11) Parameter setting value	Correctly set P8-10 and P8-11 parameter
	Check whether the braking resistance derating percentage (P8-13) is appropriate.	When using an external braking resistor, if the power is sufficient, increase P8-13 Settings
	Check whether the deceleration time is too short	Extend the deceleration time

: Forward overtravel warning

Alarm reason	examine	Treatment
P-OT terminal is valid and the command is forward. instruction	Verify the position of the positive limit switch	1 : Release the positive limit switch 2 : Give reverse instructions
Running beyond the positive limit position	Confirm the current position of the motor and the value of P1-26	Correction command and P1-26 setting value Set P1-26 to the maximum value and turn off its function
The absolute value system operates in a positive direction exceeding the allowable The number of turns allowed and the command is positive	Is the setting value of P8-05 appropriate?	Adjust the setting value of the reverse command P8-05
The servo system is not stable enough	Confirm the set control parameters and load inertia	Re-correct control parameters or re-evaluate motor capacity

: Reverse overtravel warning

Alarm reason	examine	Treatment
N-OT terminal is valid and the command is reverse instruction	Confirm the status of the reverse limit switch	1 : Release the reverse limit switch 2 : Give a forward instruction
Running beyond the reverse limit position	Confirm the current position of the motor and the value of P1-28	1 : Correction command and P1-28 setting value 2 : Set P1-28 to the maximum value and disable its function
Absolute value system running in reverse direction exceeds the allowed The number of turns allowed and the command is reverse	Is the setting value of P8-05 appropriate?	1 2 : Adjust the setting value of the forward command P8-05
The servo system is not stable enough	Confirm the set control parameters and load inertia	Re-correct control parameters or re-evaluate motor capacity

ALE09 Warning for too many times of communication writing parameters to EEPROM (after the alarm, the parameters can still be written normally)

Warning reason	examine	Treatment
This time the power is on, the host computer /PLC/ touch screen Changing parameters too many times	RAM is used for frequently changed parameters address	Change parameters in real time and use corresponding RAM Address (not stored in EEPROM) , see 9.5.3 for details Chapter Description

ALE0A : Request to power on again

Warning reason	examine	Treatment
Re-power on to take effect. Parameters have been changed.	-	After the parameter setting is completed, restart the power

ALE0B : Braking resistor not connected warning

Warning reason	examine	Treatment
Braking resistor not connected	1 : Is the built-in brake resistor short-circuit connected (P+ and D)? 2 : When using an external braking resistor, check whether the wiring is disconnected. 3 : Measure the braking resistor in power-off state to see if it is normal 4 : The main circuit bus voltage is too low, you can check it through d0-16 Check if the voltage is too low	1. After connecting the wires, power on again. 2. Replace the brake resistor 3. Make sure the main circuit voltage is not too low

Chapter 10 Specifications

10.1 AC220V Grade Driver Rating

Model EA300E-		0R9-1B	1R6-1B	2R5-1B	4R8-2B	6R2-2B	011-2B
Adapting motor encoder		17/23bit Serial encoder, RA-CODER compliant Format					
Adaptive motor power (kW)		0.05	0.1/0.2	0.4	0.75	1.0	1.5
Maximum allowable motor power (kW)*		0.05	0.2	0.4	0.8	1.2	2.0
Rated output current (Arms)		0.9	1.6	2.5	4.8	6.2	11.0
Instantaneous maximum output current (Arms)		3.2	4.8	7.5	14.4	18.6	27.5
power supply	Main power supply	Single-phase AC220V , -15 % ~ + 10% , 50/60Hz			-		
		-			Three-phase AC220V , -15 % ~ + 10% , 50/60Hz		
	Control power supply	Single-phase AC220V , -15 % ~ + 10% , 50/60Hz					
Braking resistor	Built-in brake resistor	-	-	-	50 /100W	50 /100W	50 /100W
	Minimum external resistance value	50	50	50	40	40	

* : Maximum permissible AC permanent magnet synchronous servo motor power. The rated current of the motor cannot be greater than the rated output current of the driver.

10.2 AC380V Grade Driver Rating

Model EA300E-		5R6-3B	8R5-3B	013- 3B	017- 3B	022- 3B	028- 3B	038- 3B	052-3B	062- 3B
Adapting motor encoder		17/23bit Serial encoder, RA-CODER compliant Format								
Adaptive motor power (kW)		1.5	2.0	3.0	4.4	5.5	7.5	18.0	22.0	30.0
Maximum allowable motor power (kW)*		1.8	2.4	3.9	5.2	7.5	13.5	20.0	24.0	32.0
Rated output current (Arms)		5.6	8.5	13.0	17.0	22.0	28.0	38.0	52.0	62.0
Instantaneous maximum output current (Arms)		16.8	25.5	32.0	45.9	55.0	70.0	95.0	130.0	145
power supply	Main power supply	Three-phase AC380V , -15%~+10% , 50/60Hz								
	Control power supply	Single-phase AC380V , -15%~+10% , 50/60Hz								
Braking resistor	Built-in brake resistor	50 /100W	50 /100W	50 /100W	-	-	-	-	-	-
	Minimum external resistance value	50	40	40	30	30				

* : Maximum permissible AC permanent magnet synchronous servo motor power. The rated current of the motor cannot be greater than the rated output current of the driver.

☞

A driver with AC380V input can drive a 220V AC permanent magnet servo motor if the following conditions are met

1: The motor power cannot exceed the maximum allowable motor power of the driver.

2: The motor rated current is not greater than the driver rated output current.

3: The motor winding withstand voltage level reaches or exceeds AC1500V.

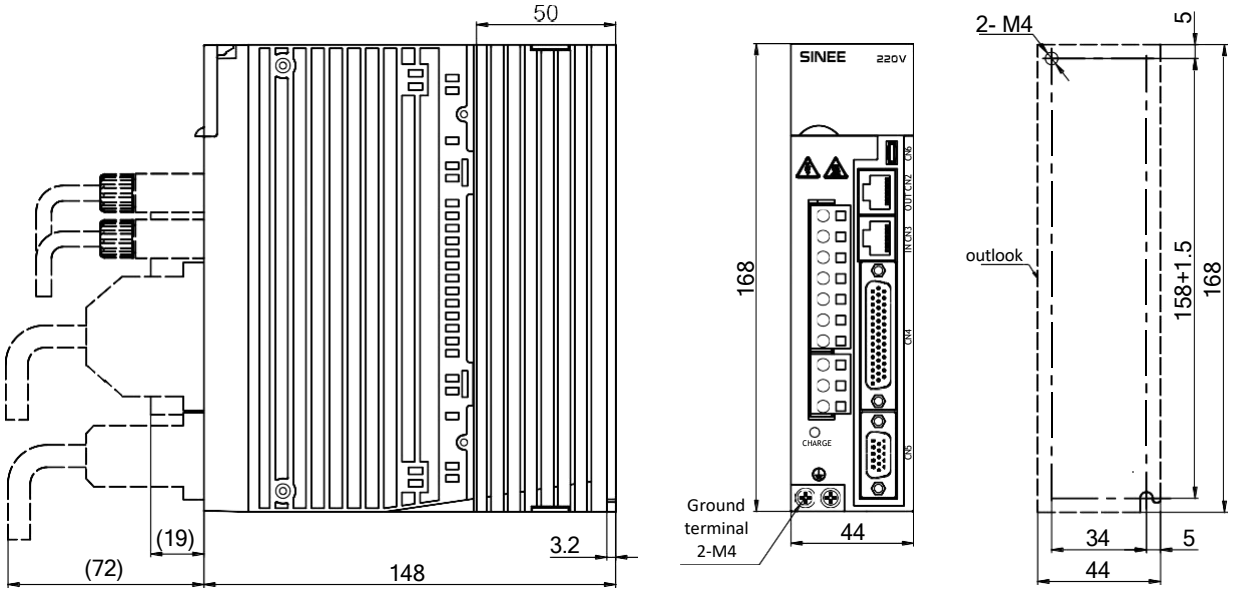
4: The rated voltage of the motor is correctly set to 220V on the driver.

10.3 EA300E Servo Drive Specifications

Basic Specifications	Control method			IGBT : PWM Control, sinusoidal current drive mode. 220V , 380V ; single-phase or three-phase full-wave rectification	
	Encoder feedback			17bit Serial incremental encoder, 23bit Serial Absolute Encoder	
	Front panel			Button5 5 LED Display, main power CHARGE	
	Regenerative braking			Can be installed basically inside or outside	
	Conditions of Use		Ambient temperature	Working temperature 0～40°	
			Ambient humidity	Working/Storage: ≦90%RH (no condensation)	
			Vibration / shock resistance	4.9m/s ^{2} /19.6m/s ^{2}	
			Protection level	IP10	
			Pollution degree	2 class	
			Altitude	Less than 1000m	
	Cooling method			Fan Cooling	
EtherCAT Slave Specifications	EtherCAT Basic Specifications		Communication Protocol	EtherCAT protocol	
			Support Services	CoE (PDO , SDO)	
			Instruction synchronization cycle	1ms or its integer multiple	
			Synchronous mode	DC- Distributed Clocks	
			Physical Layer	100BASE- TX	
			Baud rate	100Mbit/s	
			Duplex mode	Full Duplex	
			Topology	Linear	
			Transmission Media	Shielded Super 5 Category 1 or better Ethernet cable	
			Transmission distance	The distance between two nodes is less than 50 rice	
			Number of slaves	No more than 100 tower	
			EtherCAT Frame length	44 Bytes ~1498 byte	
			Process data	44 Bytes ~1498 byte	
			Communication bit error rate	1/1000000000	
	EtherCAT Hive		FMMU unit	4	
			Storage Synchronization Snap-in	4	
			Process Data RAM	4K	
			Distributed Clock	64 -bit	
			EEPROM capacity	16K	
	Supported operation modes CIA402			Profile Position Mode Profile Speed Mode Velocity ModeProfile Torque Mode Interpolation Position Control Mode Position Mode Cyclic Synchronous Position ModeCyclic Synchronous Speed Mode Synchronous Velocity ModeCyclic Synchronous Torque ModeHoming Mode	
performance	Speed torque control mode	Speed Fluctuation	Load changes	0~100 % load: maximum 0.3%	At rated speed
			Power supply voltage fluctuation	Rated voltage ±10 %: Maximum 0.3%	
			Ambient temperature	0~ 50 ℃: 0.3% max.	
		Speed ratio		1:5000	Rated load, minimum speed for continuous and smooth operation ／Rated speed
		Bandwidth		1.0KHz (17bit and23bit encoder)	
		Torque control accuracy		±3% (current repeatability)	
		Soft start time setting		0~30s (acceleration and deceleration can be set separately)	
	Position control mode	Feedforward compensation		0~100% (setting resolution 1%)	
		Positioning completion width		1~65535 command units (setting resolution 1 command unit)	
		Minimum setting time		5ms (no-load, from rated speed to positioning completion)	
Input and output information Number	Digital input signal	Function assignment possible		Servo enable, alarm reset, pulse deviation counter clear, speed command direction selection, position / speed multi-stage switching, internal command trigger, control mode switching, pulse prohibition, forward drive prohibition, reverse drive prohibition, forward jog, negative Jog	
	Digital output signal	Function assignment possible		Servo ready, brake output, motor rotation output, zero speed signal, speed approach, speed arrival, position approach, position arrival, torque limit, speed limit, warning output, alarm output	
Built-in functions	Overtravel (OT) prevention function			P-OT , N-OT Stop immediately when in motion	
	Electronic gear ratio			1.0 ≤ B/A ≤64000.0	
	Protection function			Overvoltage, undervoltage, overspeed, overheat, overload, overspeed, overtemperature, encoder alarm, brake resistor overload alarm position error Difference is too large, EEPROM Alarm, communication abnormality, etc.	
	RS232 Communications			Status display, user parameter setting, monitoring display, alarm tracking display, JOG Run and autotune operation, speed, Torque command signal, etc.	
	other			Gain adjustment, alarm recording, JOG run	

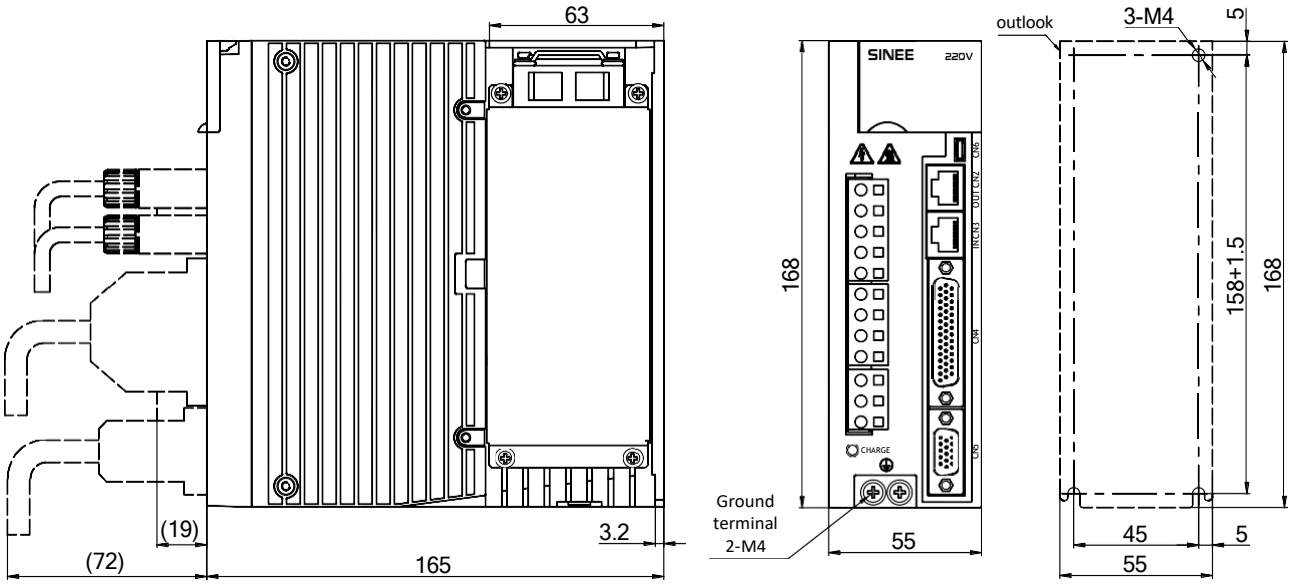
10.4 EA300E Servo drive size

SIZE A : EA300E-0R9-1B EA300E-1R6-1B EA300E-2R5-1B Dimensions



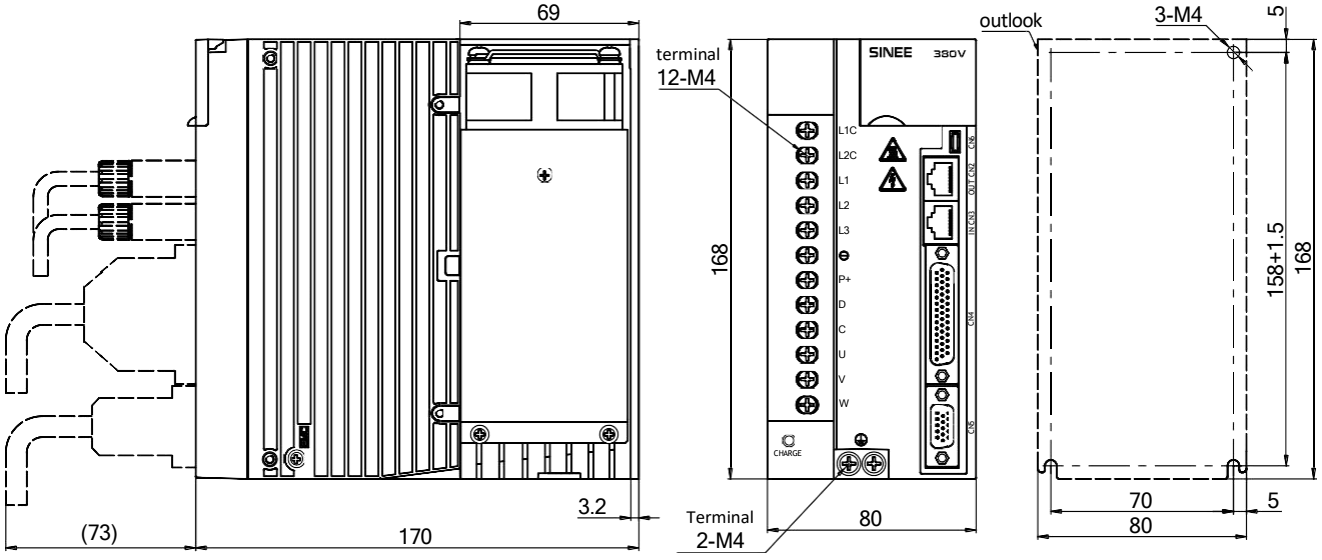
Installation hole processing diagram

SIZE B : EA300E-4R8-2B EA300E-6R2-2B Dimensions



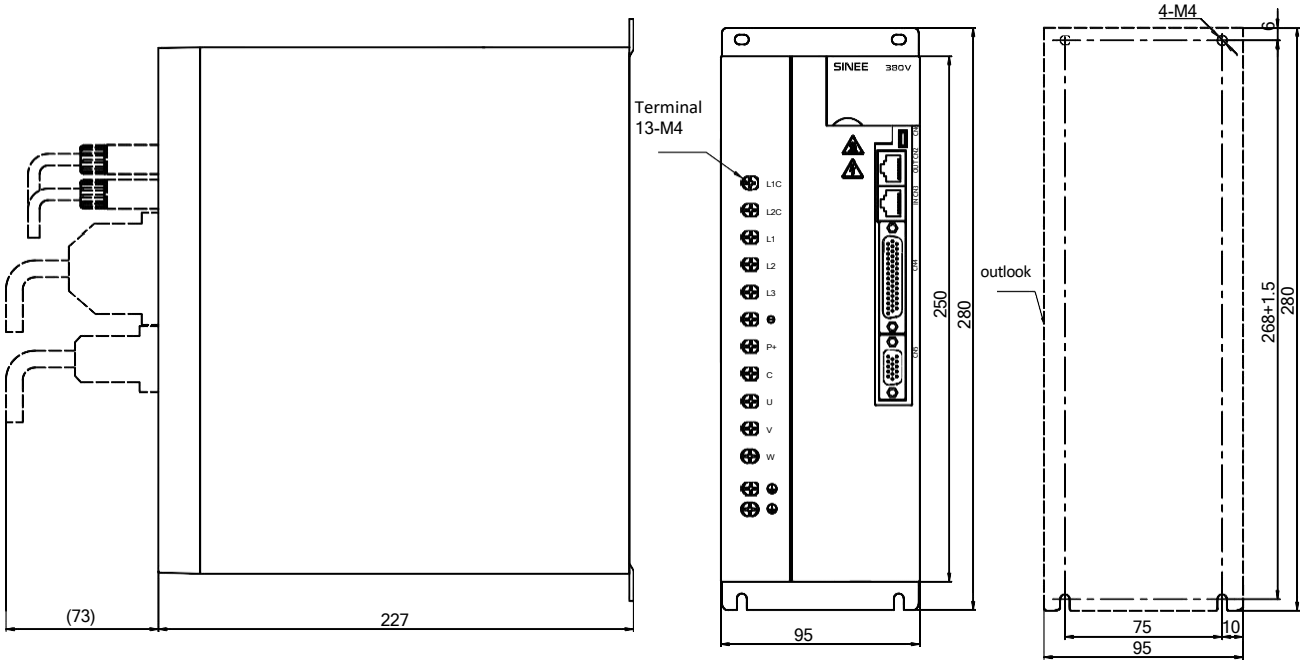
Installation hole processing diagram

SIZE C : EA300E-5R6-3B EA300E-8R5-3B EA300E-013-3B EA300E-011-2B Dimensions



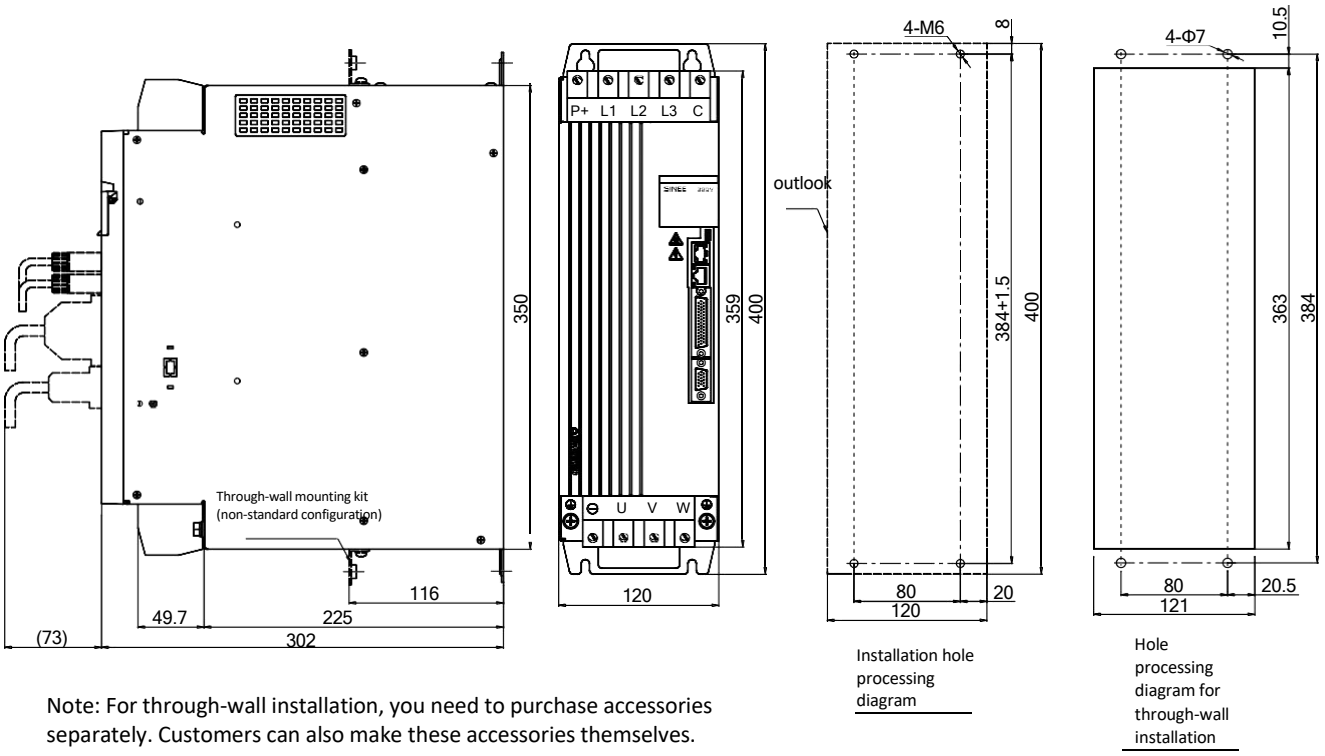
Installation hole processing diagram

SIZE D : EA300E-017-3B EA300E-022-3B EA300E-028-3B Dimensions



Installation hole processing diagram

SIZE E： EA300E-038-3B EA300E-052-3B EA300E-062-3B Dimensions



Installation hole processing diagram

Hole processing diagram for through-wall installation

Note: For through-wall installation, you need to purchase accessories separately. Customers can also make these accessories themselves.

10.5 Servo motor specifications

SES 08 - 0R7- 30- 2 F B Y 1 - XX

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

No.1 Bit Series	No.2 Motor flange size	No.3 Rated output power of
SER : Standard servo motor SES : High performance servo motor SEC : High power servo motor	04： 40mm 06： 60mm 08： 80mm 09 : 86mm 11: 110mm 13 : 130mm 18 : 180mm 20: 200mm 23 : 230mm 26 : 266mm	0R1 : 100W 0R2 : 200W 0R4 : 400W 0R7 : 750W 1R0 : 1000W 1R5 : 1500W 2R0 : 2000W 4R4 : 4400W 5R5 : 5500W 7R5 : 7500W 011 : 11kW 029 : 29kW
No.4 Rated speed of the motor	**No.7 Moment of inertia type**	
10 ： 1000rpm 15 ： 1500rpm 20 ： 2000rpm 25 : 2500rpm 30 : 3000rpm	A : Low inertia B : Medium inertia C : High inertia	
No.5 Voltage level		**No.9 Position selection**
2 : 220V 3 : 380V		Empty: No option 1 : With holding brake (DC24V) 2 : With oil seal 3 : With holding brake and oil seal 4 : With fan *4
No.6 Bit encoder type	**No.8 Output shaft type**	
B : 17bit incremental encoder *3 F : 23 bits Absolute encoder	X : Optical axis, without keyway *1 Y： With U Keyway, with screw hole *2 Z : with double round keyway and screw hole	**No.10 Special specifications**

*1 : Non-standard variety, not recommended.

*2 : Some types may have double round keyways, but except for 130 Flange motor, key width and height with U The keyway is the same as that of the chapter.

*3 :80 only Motors with flanges of 200mm and below are available.

*4 :Only130 Motors with flanges of specifications above 3000 are available. No conventional products are available and need to be customized.

The above 10 model factors of servo motors cannot be combined at will. Please refer to the selection guide or consult our company.

10.5.1 Common characteristics of servo motors:

Motor insulation class	F Class
Insulation withstand voltage	1500V 60s
Insulation resistance	DC500V , 10M or above
Motor temperature resistance grade	B
Protection level	Fully enclosed self-cooling IP65 (Except the shaft through part)
Usage Environment	Ambient temperature 0-40 ° Relative humidity 20-80% (no condensation)
Installation	Flange installation
Direction of rotation	When viewed from the load side under the forward command, the motor rotates in the counterclockwise direction (CCW).

10.5.2 Holding brake specifications:

Motor method Lan size	Motor Rated torque	Rated Voltage	Static Friction Torque	Rated power	closure Voltage	release Voltage	Calibration pull-in Action time	Calibration release Action time
mm	Nm	VDC	Nm	W	VDC	VDC	ms	ms
40	0.32 ≤	24	0.35	3.5	22	1.5	63	55
60	0.64~1.27		2	6.3				
80	1.3~3.5		4	10.4			87	72
86	3.2~3.5		4	10.4				
110	2~6		10	11.6				
130	3.2~15		20	19.5			110	95
180	17~35		44	25			140	120
180	≥ 36		74	45			152	130
200	35~95.5		120	95			165	140
230	70~184		200	120			230	180

1：The holding brake is used to keep the motor locked after shutdown and cannot be used for braking.
2: The user must prepare the 24V power supply required for the holding brake. The 24V on the servo drive must not be used. At the same time, the capacity of the 24V power supply should be at least 1.5 times the rated power of the holding brake (excluding the capacity of the 24V power supply required to power other devices).
3: The action time of the holding brake varies depending on the circuit. The above time is for reference only. Please confirm it based on the actual product.
4: The static friction torque is the static friction torque provided by the brake when the motor is stationary. If there is an external impact, the motor cannot be guaranteed to be stationary.

10.5.4 SES Series servo motor parameter table:

Servo motor model	Voltage level V	Rated Power W	Rated speed rpm	Maximum speed rpm	Rated current A	Instantaneous maximum current A	Rated torque Nm	Instantaneous maximum torque Nm	Torque constant Nm/A	Moment of Inertia Kg.cm2*10- 4	Adapter driver EA300E-
SES04-005-30-2 □ AY □	AC 220	50	3000	6000	0.6	1.8	0.16	0.48	0.26	0.02(0.02)	0R9-1 □
SES04-0R1-30- 2 □ AY □		100	3000	6000	1.1	3.3	0.32	0.96	0.29	0.04(0.04)	1R6- 1 □
SES06-0R2-30- 2 □ BY □		200	3000	6000	1.6	4.8	0.64	1.92	0.44	0.29 (0.34)	1R6- 1 □
SES06-0R4-30- 2 □ BY □		400	3000	6000	2.3	6.9	1.27	3.81	0.59	0.56 (0.61)	2R5- 1 □
SES08-0R7-30- 2 □ BY □		750	3000	5000	4.0	12	2.4	7.2	0.653	1.56 (1.66)	4R8- 2 □
SES08-1R0-30- 2 □ BY □		1000	3000	5000	6.0	18	3.2	9.6	0.538	2.03 (2.13)	6R2- 2 □
SES13-0R8-15-2FBY		850	1500	3000	6.9	17	5.39	13.8	1.72	13.95(16.1)	011-2B
SES13-0R8-15-3FBY	AC 380	850	1500	3000	3.5	8.5	5.39	13.8	1.72	13.95(16.1)	5R6-3B
SES13-1R3-15-3FBY		1300	1500	3000	5.4	14	8.34	23.3	1.78	19.95(22.1)	5R6-3B
SES13-1R8-15-3FBY		1800			8.4	20	11.5	28.7	1.5	26.1(28.1)	8R5-3B
SES18-2R9-15-3FBY □		2900			11.9	28	18.6	45.1	1.7	46.0 (53.9)	013- 3B
SES18-4R4-15-3FBY		4400			16.5	40.5	28.4	71.1	1.93	67.5 (75.4)	017- 3B
SES18-5R5-15-3FBY		5500			20.8	52	35	87.6	1.8	89.0(96.9)	022- 3B
SES18-7R5-15-3FBY		7500			25.7	65	48	119	1.92	125.0(133)	028- 3B
SES18-3R6-20-3FBY □		3600	2000	2500	9.5	28.5	16.7	50.16	2.1	46.0(53.9)	013- 3B

Note: 1 The values in () are those with brakes;

2 : When equipped with oil seal, the rating should be reduced by 10% .

3 : Rated torque indicates the continuous permissible torque when mounted on an aluminum heat sink of the following dimensions and at an ambient temperature of 40 °C.

40 , 60 , 80 Flange motor：250*250*6mm ;90 , 110 Flange motor : 300*300*10mm

130 Flange motor 400*400*15mm 180 Flange motor: 550*550*20mm

10.5.5 SER Series servo motor parameter table:

Servo motor model	Voltage level V	Rated Power W	Rated speed rpm	Maximum speed rpm	Rated current A	Instantaneous maximum current A	Rated torque Nm	Instantaneous maximum torque Nm	Torque constant Nm/A	Moment of Inertia Kg.cm ^{2} *10 $^{-4}$	Adapter driver EA300E-
SER06-0R2-30-2 □ AY □	AC 220	200	3000	5500	1.2	3.6	0.64	1.92	0.53	0.18(0.18)	1R6-1 □
SER06-0R4-30-2 □ AY □		400	3000	4500	2.3	6.9	1.27	3.81	0.55	0.3(0.3)	2R5-1 □
SER08-0R7-30-2 □ AY □		750	3000	4500	4.3	12.9	2.4	7.20	0.56	1.01(1.02)	4R8-2 □
SER08-0R7-20-2 □ AY □			2000	3000	3.0	9.0	3.5	10.50	1.17	1.59(1.6)	
SER08-1R0-30-2 □ AY □		1000	3000	4000	4.0	12.0	3.2	10.50	0.88	1.59(1.6)	
SER09-0R7-30-2 □ BZ □		750	3000	4000	3.4	10.2	2.4	7.20	0.71	2.42(2.43)	
SER11-0R6-30-2 □ BY □		600	3000	4000	2.5	7.5	2.0	6.00	0.8	3.03(3.05)	2R5-1 □
SER11-1R0-20-2 □ BY □		1000	2000	2500	5.0	15.0	5.0	15.00	1.0	7.22(7.24)	6R2-2 □
SER11-1R2-30-2 □ BY □		1200	3000	3500	4.9	14.7	4.0	12.00	0.82	5.54(5.56)	
SER11-1R8-30-2 □ BY □		1800	3000	3500	6.6	19.8	6.0	18.00	0.91	8.55(8.57)	011-2 □
SER13-0R7-20-2 □ BY □		750	2000	2500	3.88	11.6	3.65	10.95	0.94	6.17(6.19)	4R8-2 □
SER13-1R0-10-2 □ BY □		1000	1000	1500	4.72	14.2	9.55	28.65	2.02	17.14(17.16)	6R2-2 □
SER13-1R0-20-2 □ BY □			2000	2500	4.72	14.2	4.77	14.31	1.01	8.71(8.73)	
SER13-1R0-30-2 □ BY □			3000	3500	4.96	14.9	3.27	9.81	0.66	6.17(6.19)	
SER13-1R5-10-3 □ BY □	AC 380	1500	1000	1500	5.4	13.5	14.32	35.80	2.65	25.58(25.6)	5R6-3 □
SER13-1R5-20-3 □ BY □			2000	2500	4.1	10.3	7.16	17.90	1.75	12.08(12.1)	
SER13-1R5-30-3 □ BY □			3000	3500	4.2	10.5	4.78	11.95	1.14	8.71(8.73)	
SER13-2R0-20-3 □ BY □		2000	2000	2500	6.5	16.3	9.55	23.88	1.47	17.14(17.16)	8R5-3 □
SER13-2R0-30-3 □ BY □			3000	3500	5.8	14.5	6.5	16.25	1.12	12.08(12.1)	
SER13-3R0-20-3 □ BY □		3000	2000	2500	9.6	24.0	14.32	35.80	1.49	25.58(25.6)	013-3 □
SER13-3R0-30-3 □ BY □			3000	3500	8.3	20.8	9.55	23.88	1.15	17.14(17.16)	

Note 1 : The values in parentheses are those with brakes.

2 : When equipped with oil seal, the rating should be reduced by 10% .

3 : Rated torque indicates the continuous permissible torque at an ambient temperature of 40 °C on an aluminum heat sink of the following dimensions .

40 , 60 , 80 Flange motor: 250*250*6mm 90 , 110 Flange motor: 300*300*10mm 130 Flange motor 400*400*15mm

10.5.6 SEC Series servo motor parameter table:

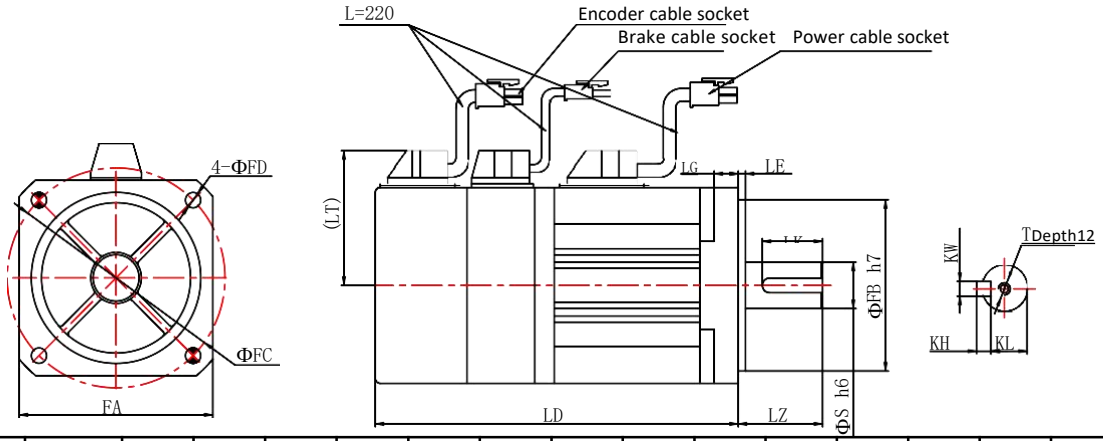
Servo motor model	Voltage level V	Rated Power kW	Rated speed rpm	Maximum speed rpm	Rated current A	Instantaneous maximum current A	Rated torque Nm	Instantaneous maximum torque Nm	Torque constant Nm/A	Moment of Inertia Kg.cm2*10-4	Adapter driver EA300E-
SEC20-011-20-3FBY □	AC 380	11.1	2000	2300	twenty two	44	53	106	2.4	72 (74)	028-3B
SEC20-015-20-3FBY □		14.7			28	56	70	140	2.5	97.7 (99.8)	028-3B
SEC20-011-15-3FBY □		11.0	1500	1800	twenty one	42	70	140	3.3	97.7 (99.8)	028-3B
SEC20-013-15-3FBY □		13.2			23	46	84	168	3.6	114 (116)	028-3B
SEC20-015-15-3FBY □		15.0			27	54	95.5	191	3.52	130.8 (133)	028-3B
SEC23-011-15-3FBY □		11.0			22	55	70	175	3.2	260 (262.2)	028-3B
SEC23-015-15-3FBY □		15.0			36	90	95.5	239	2.7	380 (382.2)	038-3B
SEC23-018-15-3FBY □		18.5			43	99	118	271	2.7	380 (382.2)	052-3B
SEC23-022-15-3FBY □		22.0			52	120	140	322	2.7	500 (502.5)	052-3B
SEC23-029-15-3FBY □		29.0			61	134	185	407	3.0	620 (622.5)	062-3B

Note 1 : The values in parentheses are those with brakes.2 : When equipped with oil seal, the rating shall be reduced by 10% ;

3 : These motors are equipped with cooling fans, which are AC380V Three-phase power supply. When installing, make sure that the fan's air outlet direction is blowing toward the output shaft end. Otherwise, please replace the R and S of the fan power supply. Two phases.

• Servo motor size

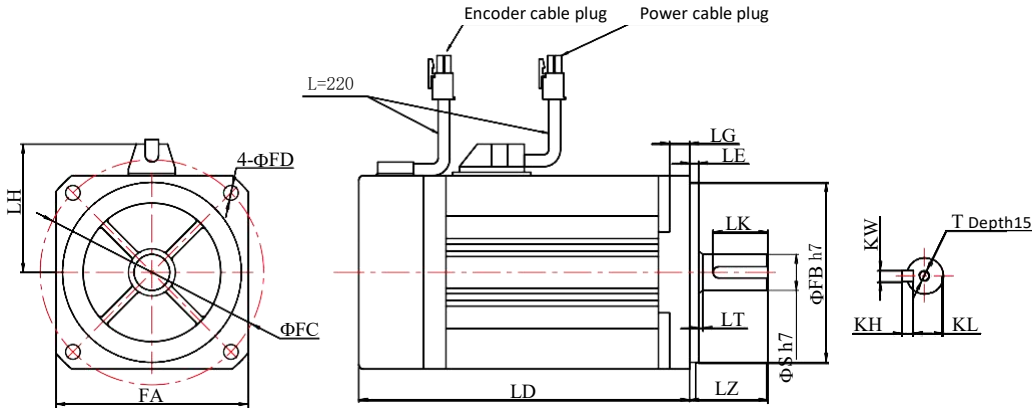
• SES Series 40 , 60 , 80 Flange servo motor size



Motor specifications	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LT (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	quality (kg)
SES04-005-30-2 □ AY □	86.5 (119.5)	40	30	46	4.5	25.5	14	3	8	37	8	6.3	3	3	M3	0.4 (0.6)
SES04-0R1-30-2 □ AY □	100.5 (133.5)	40	30	46	4.5	25.5	14	3	8	37	8	6.3	3	3	M3	0.47 (0.67)
SES06-0R2-30-2 □ BY □	93.7 (120.2)	60	50	70	4.5	30	20	3	8	48	14	11	5	5	M5	1.01 (1.40)
SES06-0R4-30-2 □ BY □	110.7 (137.2)	60	50	70	4.5	30	25	3	8	48	14	11	5	5	M5	1.37 (1.78)
SES08-0R7-30-2 □ BY □	122.4 (150.6)	80	70	90	6.3	35	25	3	10	58	19	15.5	6	6	M5	2.4 (2.8)
SES08-1R0-30-2 □ BY □	136.4 (164.6)	80	70	90	6.3	35	25	3	10	58	19	15.5	6	6	M5	3.0 (3.4)

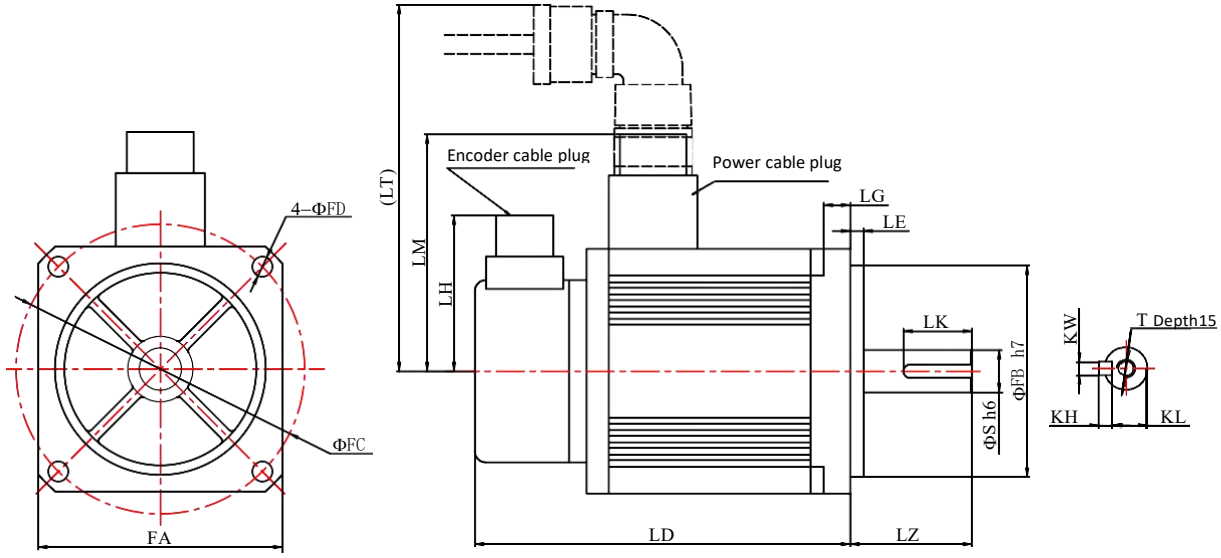
Note: The SES04 motor has only two mounting holes as shown in the shaded figure.

• SER Series 60 , 80 , 86 Flange servo motor size



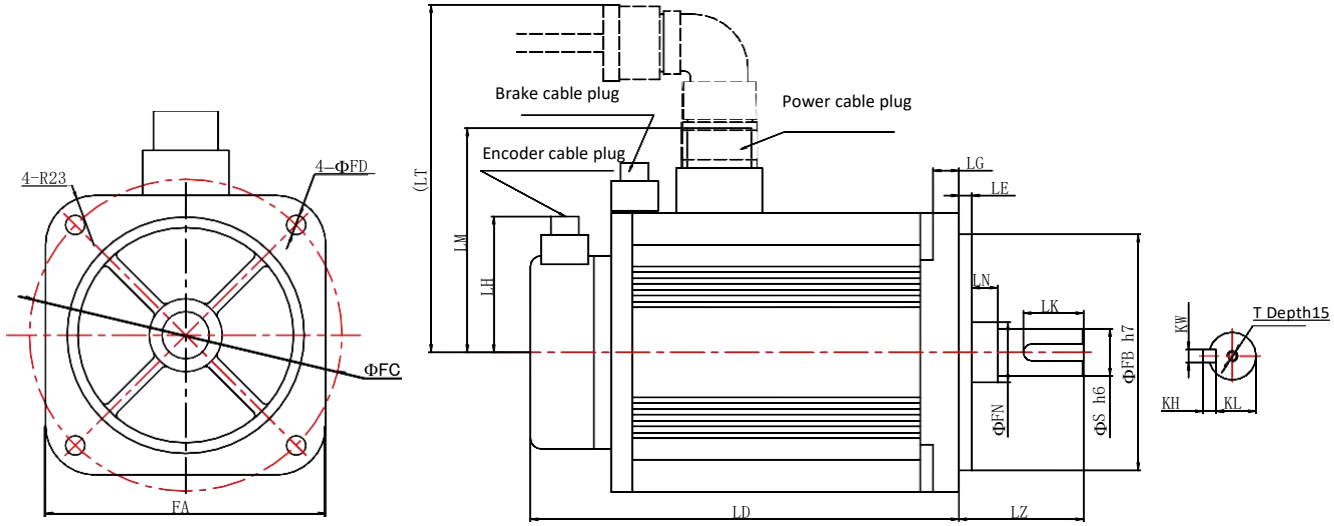
Motor specifications	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LH (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	quality (kg)
SER06-0R2-30-2 □ AY □	113.5 (147)	60	50	70	5.5	30	22.5	3	8	44	14	11	5	5	M5	1.01 (1.40)
SER06-0R4-30-2 □ AY □	134 (168)	60	50	70	5.5	30	22.5	3	8	44	14	11	5	5	M5	1.37 (1.78)
SER08-0R7-30-2 □ AY □	141.5 (173)	80	70	90	6.5	35	25	3	8	55	19	15.5	6	6	M5	2.47 (3.33)
SER08-0R7-20-2 □ AY □ □	171.5 (203)	80	70	90	6.5	35	25	3	8	55	19	15.5	6	6	M5	3.40 (4.10)
SER08-1R0-30-2 □ AY □	171.5 (203)	80	70	90	6.5	35	25	3	8	55	19	15.5	6	6	M5	3.40 (4.10)
SER09-0R7-30-2 □ BY □	148 (183)	86	80	100	6.5	35	25	3	9	58	16	13	5	5	M5	3.24 (3.94)

- **SER Series 110 , 130 Flange servo motor size**



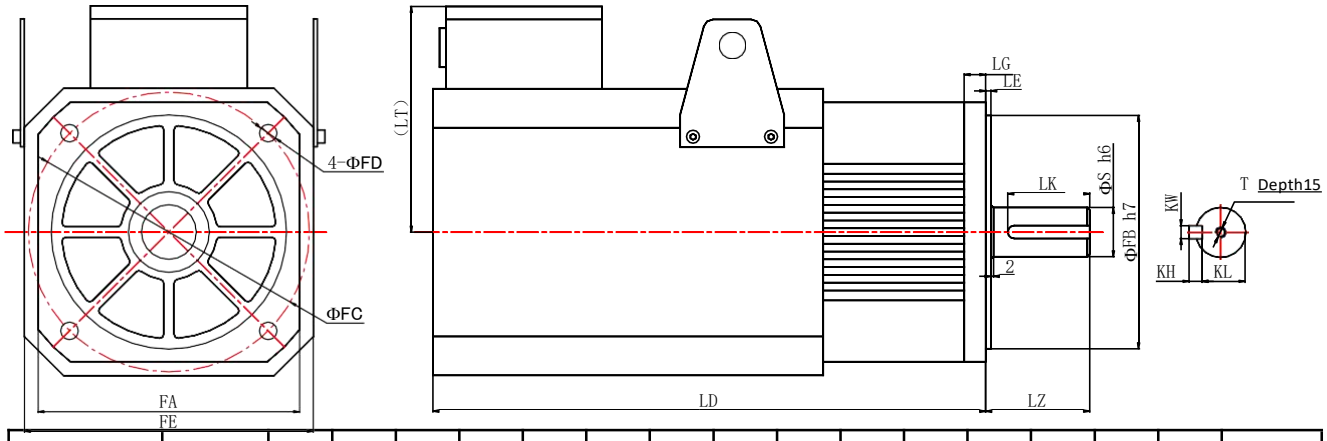
Motor model	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LH (mm)	LM (mm)	LT (mm)	S	KL	KH	KW	T	(kg)
SER11-0R6-30-2□BY□	155.5 (210.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	3.93 (5.39)
SER11-1R0-20-2□BY□	205.5 (260.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	6.42 (7.88)
SER11-1R2-30-2□BY□	185.5 (240.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	5.46 (6.92)
SER11-1R8-30-2□BY□	218.5 (273.5)	110	95	130	9	55	31	6	9	-	107	176	19	15.5	6	6	M6	7.26 (8.72)
SER13-0R7-20-2□CY□	150 (205)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	5.20 (6.90)
SER13-1R0-10-2□BY□	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)
SER13-1R0-20-2□BY□	165 (220)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	6.41 (7.94)
SER13-1R0-30-2□BY□	150 (205)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	5.31 (6.89)
SER13-1R5-10-□□BY□	265 (320)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	13.82 (15.40)
SER13-1R5-20-□□BY□	185 (240)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	7.89 (9.43)
SER13-1R5-30-□□BY□	165 (220)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	6.40 (7.96)
SER13-2R0-20-3□BY□	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)
SER13-2R0-30-3□BY□	185 (240)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	7.85 (9.47)
SER13-3R0-20-3□BY□	265 (320)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	13.81 (15.34)
SER13-3R0-30-3□BY□	215 (270)	130	110	145	9	58	45	6	12	-	117	186	22	18	7	8	M6	10.12 (11.67)

- **SES Series 130 , 180 Flange servo motor size**



电机规格型号	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LH (mm)	LM (mm)	LT (mm)	LN (mm)	FN (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	qualit y (kg)
SES13-0R8-15-3FBY□	150.9 (183.4）	130	110	145	9	58	27.5	6	12	63.3	105	230	12	28	19	16	5	5	M5	5.83 (17.8)
SES13-1R3-15-3FBY□	166.9 (199.4）	130	110	145	9	58	28	6	12	63.3	105	230	12	28	22	18.5	6	6	M5	7.25 (9.3)
SES13-1R8-15-3FBY□	184.9 (217.4)	130	110	145	9	58	29	6	12	63.3	105	230	12	28	24	20	8	8	M5	8.8 (10.8)
SES18-2R9-15-3FBY□	173.3 (231)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	13 (19.5)
SES18-3R6-20-3FBY□	173.3 (231)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	17.5 (24)
SES18-4R4-15-3FBY□	197.3 (255)	180	114.3	200	13.5	79	65	3.2	18	63.3	135.5	230	0	35	35	30	8	10	M12	17.5 (24)
SES18-5R5-15-3FBY□	236.3 (278)	180	114.3	200	13.5	113	96	3.2	18	114.3	145.5	230	0	42	42	37	10	12	M16	22 (27.8)
SES18-7R5-15-3FBY□	282.3 (324)	180	114.3	200	13.5	113	96	3.2	18	114.3	145.5	230	0	42	42	37	10	12	M16	29.5 (35)

- **SEC Series 200 , 230 Flange servo motor size**



Motor specifications	LD (mm)	FA (mm)	FB (mm)	FC (mm)	FD (mm)	FE (mm)	LZ (mm)	LK (mm)	LE (mm)	LG (mm)	LT (mm)	S (mm)	KL (mm)	KH (mm)	KW (mm)	T (mm)	quality (kg)
SEC20-011-20-3FBY	387.5 (487.5)	200	180	215	13.5	221	80	63	4	16.5	180	38	33	10	10	M8	45 (60.5)
SEC20-011-15-3FBY	425 (525)	200	180	215	13.5	221	80	63	4	16.5	180	38	33	10	10	M8	51 (66.5)
SEC20-013-15-3FBY □	451 (551)	200	180	215	13.5	221	80	63	4	16.5	180	38	33	10	10	M8	58 (73.5)
SEC20-015-15-3FBY	462.5 (562.5)	200	180	215	13.5	221	80	63	4	16.5	180	38	33	10	10	M8	65 (84)
SEC23-011-15-3FBY	400 (500)	230	200	250	14.5	260.5	110	90	5	21	218.5	42	37	8	12	M12	45 (66.5)
SEC23-015-15-3FBY	458 (558)	230	200	250	14.5	260.5	110	90	5	21	218.5	45	39.5	9	14	M12	77.5 (99)
SEC23-018-15-3FBY	458 (558)	230	200	250	14.5	260.5	110	90	5	21	218.5	45	39.5	9	14	M12	77.5 (99)
SEC23-022-15-3FBY	508 (608)	230	200	250	14.5	260.5	110	90	5	21	218.5	45	39.5	9	14	M12	92.5 (114)
SEC23-029-15-3FBY	558 (658)	230	200	250	14.5	260.5	110	90	5	21	218.5	48	43	9	14	M16	107 (12 8 . 5)

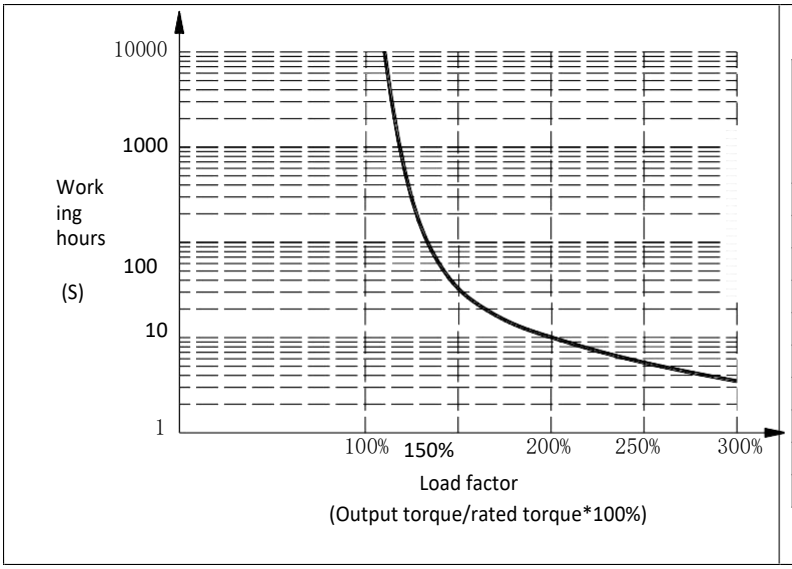
• Servo motor overload characteristics

- **Overload protection definition**

  Servo motor overload protection is a protection function to prevent the motor from overheating

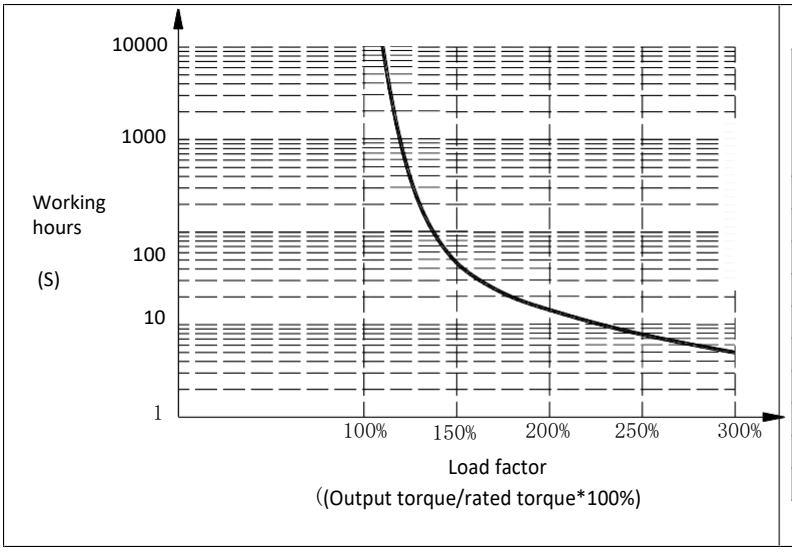
- **Causes of servo motor overload**
  - When the motor runs beyond the rated torque, it continues to run for too long.
  - The ratio of load to motor rotor inertia is too large and acceleration and deceleration are too frequent.
  - The motor power line or encoder wiring is incorrect.
  - Improper setting of servo drive gain causes motor oscillation.
  - A motor with a holding brake was operated without releasing the holding brake.
- **Relationship between servo motor load and running time**

40 , 60 , 80 , 86 Flange servo motor



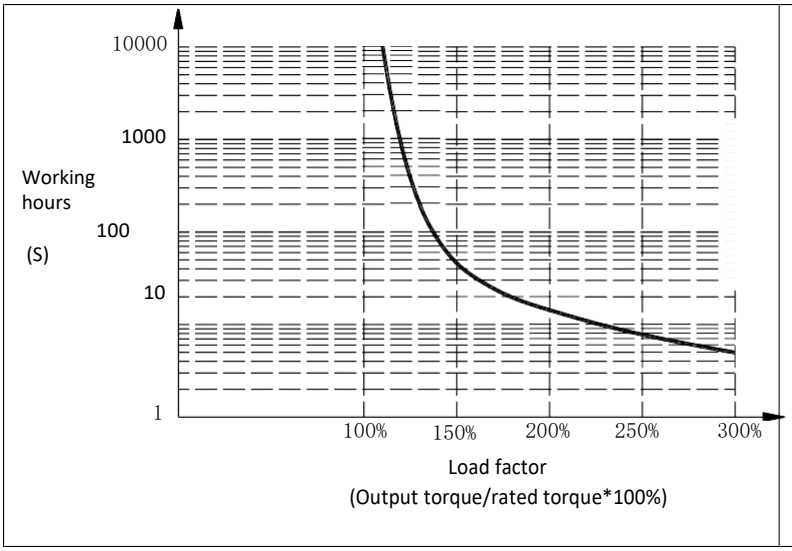
Load factor (%)	Working hours (S)	
	40 Flangemotor	60 , 80 ,86 Flange motor
120	235.5	327.3
140	31.4	44.0
160	15.7	22.0
180	10.0	14.0
200	7.1	10.0
220	5.4	7.6
240	4.3	6.0
260	3.5	4.9
280	2.9	4.1
300	2.5	3.5

110 , 130 , 180 Flange servo motor



Load factor (%)	Working hours (S)	
	110、130 Flange motor	180 Flange motor
120	471.1	608.8
140	62.9	81.2
160	31.4	40.6
180	20.0	25.8
200	14.3	18.5
220	10.9	14.1
240	8.6	11.1
260	7.0	9.0
280	5.9	7.8
300	5.0	6.4

200 , 230 flange servo motor



Load factor(%)	Working hours(S)
	200 、 230Flange motor
120	525
140	110
160	60
180	38
200	18
220	11
240	8