

Samkoon

S8N Series AC Servo Driver

User Manual



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1 Safety Precautions

1.1 General Safety Precautions

When installing, operating, or maintaining all series of AC servo drivers of our company, the safety precautions in this section must be followed.

All Safety Precautions

To ensure personal and equipment safety, follow all safety precautions marked on the equipment and specified in this manual during installation, operation, and maintenance. The "Caution", "Warning", and "Danger" items in this manual are supplementary to all safety precautions, not an exhaustive list.

Local Laws and Regulations

Operate the equipment in compliance with local laws and regulations. The safety precautions in this manual are only supplementary to local safety standards.

Basic Installation Requirements

Personnel responsible for installing and maintaining our products must undergo strict training, understand various safety precautions, and master correct operation methods before performing installation, operation, or maintenance:

- Only qualified or trained personnel are allowed to install, operate, and maintain the equipment;
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment;
- Replacement and modification of equipment or components (including software) must be completed by personnel certified or authorized by our company;
- Operators shall promptly report faults or errors that may cause safety issues to the person in charge.

Grounding Requirements

The following requirements apply only to equipment requiring grounding:

- Ground the equipment first during installation; disconnect the ground wire last during removal;
- Do not damage the grounding conductor;
- Do not operate the equipment without installing the grounding conductor;
- The equipment shall be permanently connected to the protective ground. Before operating the equipment, check the electrical connections to ensure reliable grounding.

Equipment Safety

- Before operation, securely fix the equipment to an electrical cabinet or other stable objects (such as a desktop or floor);
- Do not block the ventilation ports during system operation;
- Use tools to tighten screws when installing the equipment;
- Remove empty packaging materials from the equipment area after installation.

1.2 Electrical Safety

Covers safety precautions for high voltage, thunderstorms, large leakage current, power cables, and fuses.

High Voltage (Danger)

- ★ High-voltage power supplies provide power for equipment operation. Direct contact or indirect contact through humid objects may cause fatal hazards.
- ★ Irregular or incorrect high-voltage operations may lead to accidents such as fires or electric shocks.

Thunderstorm Weather (Danger)

This requirement applies only to equipment installed outdoors.

- ★ Do not perform outdoor high-voltage or AC operations during thunderstorms; otherwise, there is a risk of death.

Large Leakage Current

- ★ The equipment must be grounded before power is turned on; otherwise, personal and equipment safety may be endangered.

Power Cables (Danger)

- ★ Irregular or incorrect high-voltage power operations may cause accidents such as fires or electric shocks.
- ★ Turn off the power switch before installing or removing power cables.
- ★ The power supply voltage must be compatible with the driver voltage; otherwise, personal and equipment safety may be endangered.
- ★ Confirm the correct labeling of power cables before connection.
- ★ Do not touch the terminal blocks after power is turned on.
- ★ A suitable air switch must be connected in series between the power cable and the driver to protect personal and equipment safety.
- ★ After turning off the power, wait for 5 minutes to discharge the main circuit before performing maintenance or restarting; otherwise, electric shock may occur.

Fuses (Danger)

- ★ Equipment fuses must be replaced by personnel certified or authorized by our company;
- ★ When a fuse on the equipment blows, replace it with a fuse of the same model and specification.

1.3 Air Environment Safety

Covers safety precautions for the equipment operating environment.

(Danger)

- ★ Do not place the equipment in an environment with flammable, explosive gases or smoke, and do not perform any operations in such an environment.
- ★ Do not place the equipment in an environment with corrosive gases, and do not perform any operations in such an environment.

1.4 Mechanical Safety

Covers safety precautions for motors, drilling, fans, and handling heavy objects.

Motor (Danger)

- ★ Poor insulation of the motor may damage the equipment and even endanger life safety. Use motors with insulation class B or higher; otherwise, there is a risk of electric shock.

Drilling

- ★ Improper drilling may damage the driver cable, and metal shavings generated during drilling may enter the servo driver and cause a short circuit of the circuit board.
- ★ Before drilling on the cabinet, move the cables inside the cabinet first.
- ★ Prevent metal shavings from falling into the AC servo driver, and clean up the metal shavings promptly after drilling.

Fan

- ★ The cooling fan operates at high speed, and improper operation may cause equipment damage.

When replacing components, properly place components, screws, tools, and other objects to avoid falling into the running fan and damaging the fan or equipment.

Handling

- ★ When handling heavy objects, prepare for load-bearing to avoid being crushed or sprained by heavy objects:
 - Wear protective gloves when handling the driver to avoid scratching hands.
 - When handling heavier drivers, keep your back straight and move steadily to avoid sprains.
 - When taking the driver out of the electrical cabinet, hold the bottom edge of the driver instead of the panel or power terminals.

1.5 Others

Covers safety precautions for cable binding and cable operation at low temperatures.

Cable Binding

- ★ Signal cables should be bound separately from high-current cables or high-voltage cables.

Cable Laying

At low temperatures, severe impact and vibration may cause brittle cracking of the plastic outer sheath of the cable. To ensure safety, follow the following requirements:

- All cables should be laid at a temperature above 0°C.
- If the storage environment temperature of the cable is below 0°C, the cable must be stored at a temperature above 0°C for more than 24 hours before laying.
- Handle cables with care, especially in low-temperature environments.

2 Product Information

2.1 Drive Product Information

2.1.1 Drive Model Description

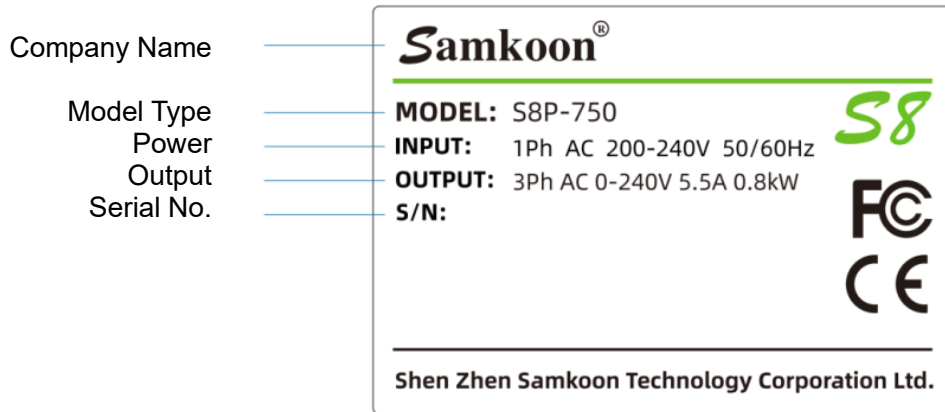


Figure 2-1 Drive Nameplate Identification

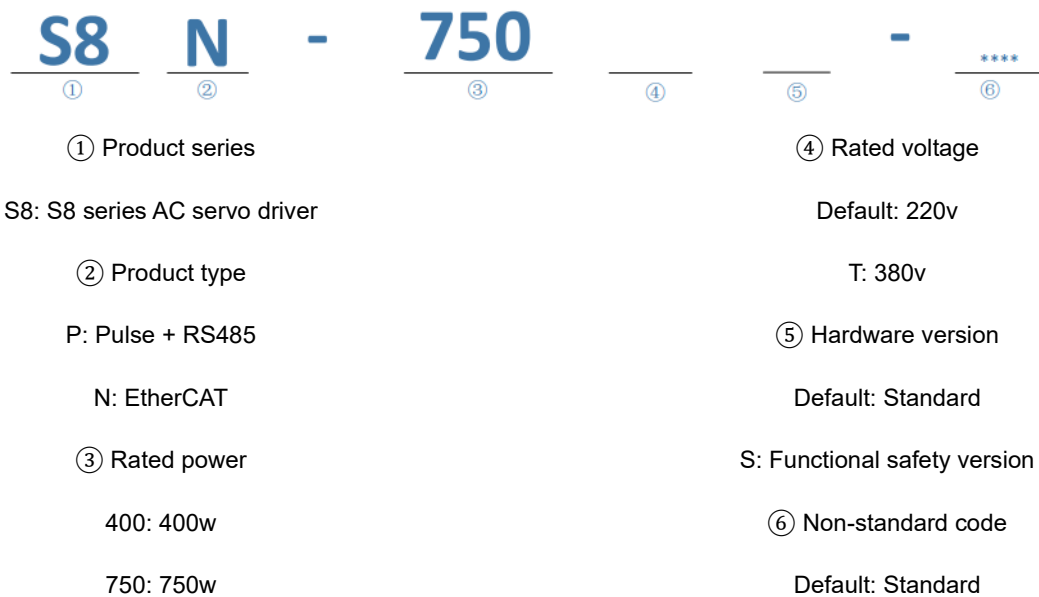


Figure 2-2 Servo driver model identification

2.1.2 Structure of Servo Driver

Drive Interface Definition



Figure 2-3 Composition Structure of S8 Series Servo

2.2 Matching of Servo Drives and Motors

The S8 series AC servo drives are compatible with motors as shown in the table below.

Table 2-1 Motor Compatibility Table for S8 Series AC Servo Drives

Servo Driver \ Servo Motor	S8P-400	S8N-400	S8P-750	S8N-750
60HS-A01330-CS2B2	●	●	⊙	⊙
60HS-A01330-CS2B3	●	●	⊙	⊙
60HS-A01330-CM2B2	●	●	⊙	⊙
60HS-A01330-CM2B3	●	●	⊙	⊙
80HS-A02430-CS2A2	○	○	●	●
80HS-A02430-CS2A3	○	○	●	●
80HS-A02430-CM2A2	○	○	●	●
80HS-A02430-CM2A3	○	○	●	●

- In the table, "O" indicates that it cannot be matched, "●" indicates a standard match, and "⊙" indicates a possible match;
- Currently, the driver models cannot match all motors, and the motor models are not comprehensive (below 400W). They will be updated one after another with product development in the future;
- The motors and drivers matched in the above table are based on the relationship of rated output power. The

detailed models, wires, etc. need to be selected according to the specific needs of users (such as encoder type, presence or absence of brake, etc.).

- ★ It is prohibited to adapt motors other than those listed in the above table without the permission or authorization of our company. Otherwise, it may cause damage to the motor and even endanger personal safety.

2.3 Drive Dimensions

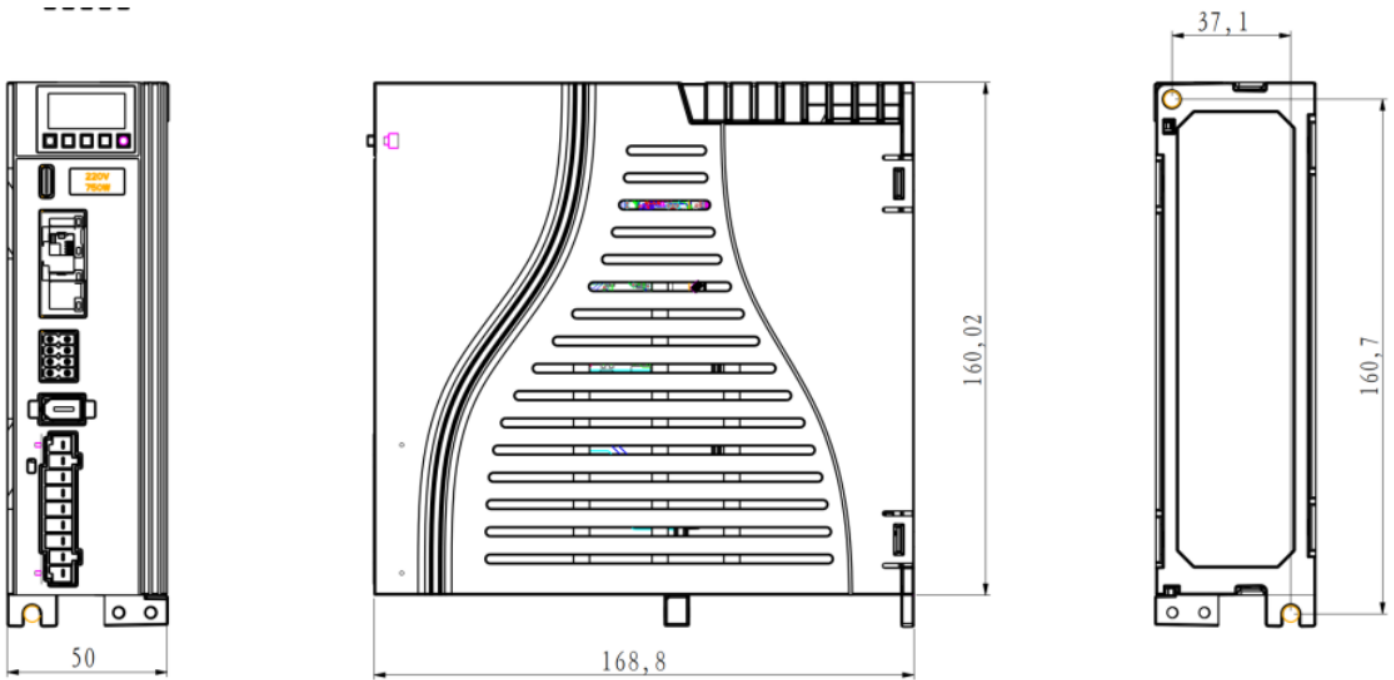


Figure 2-4 Dimension drawing of S8N-400/ S8N-750

2.4 Motor Product Information



Figure 2-6 Motor Nameplate Identification

80 HS - A 024 30 - CS 2 A 2

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Code	Meaning	Options
①	Flange Size	60: 60x60mm

		80: 80x80mm
②	Series	HS: HS Series Motor
③	Resolution	2: 17-bit Absolute Encoder
④	Rated Torque	013: 1.3 N.m 024: 2.4 N.m
⑤	Rated Speed	30: 3000 rpm
⑥	Encoder Type	C: Magnetic Encoder
⑦	Encoder Category	S: Single-turn M: Multi-turn
⑧	Input Voltage	A: AC 220V
⑨	Shaft End	A: Flat Key (Width 6mm) B: Flat Key (Width 5mm)
⑩	Brake	2: No Brake 3: With Brake

Figure 2-7 Motor Model Identification

3 Installation and Wiring

3.1 Installation and Dimensions

When installing, operating, or maintaining all series of drivers of our company, the safety precautions in this section must be followed. If the equipment needs to be used outside the specified environmental conditions, please consult our company in advance.

3.1.1 Installation Environment

- Operating temperature: 0~40°C (no freezing);
- Operating humidity: Relative humidity below 80% (no condensation);
- Storage temperature: -20~60°C;
- Storage humidity: Relative humidity below 80% (no condensation);
- Vibration: Below 4.9 m/s²;
- Atmospheric pressure: 86kPa~106kPa;
- Do not use in direct sunlight;
- Install in a well-ventilated place with little moisture and dust;
- Install in an environment free of corrosive, flammable gases, oil fumes, cutting fluids, cutting chips, iron powder, etc.

Caution

- ★ When using in a vibrating environment, install shockproof devices on the mounting surface of the servo driver to avoid vibration transmission to the servo driver;
- ★ Do not apply excessive impact force when transporting, installing, or disassembling the motor, especially the encoder part. Do not directly lift the motor power cable or encoder cable during transportation;
- ★ When installing terminal blocks, tighten the fixing screws at both ends of the terminals to avoid loosening due to external interference during use;
- ★ When using in an environment with corrosive gases, take measures to prevent corrosive gases from invading. Although corrosive gases will not cause immediate damage to the servo driver, they will cause aging of electronic components or circuit boards, affecting service life.

3.1.2 Installation Direction and Space

Reserve sufficient space in the electrical cabinet to ensure hot air circulates from bottom to top for effective heat dissipation of the servo driver. Please strictly follow the installation space requirements shown in the figure below.

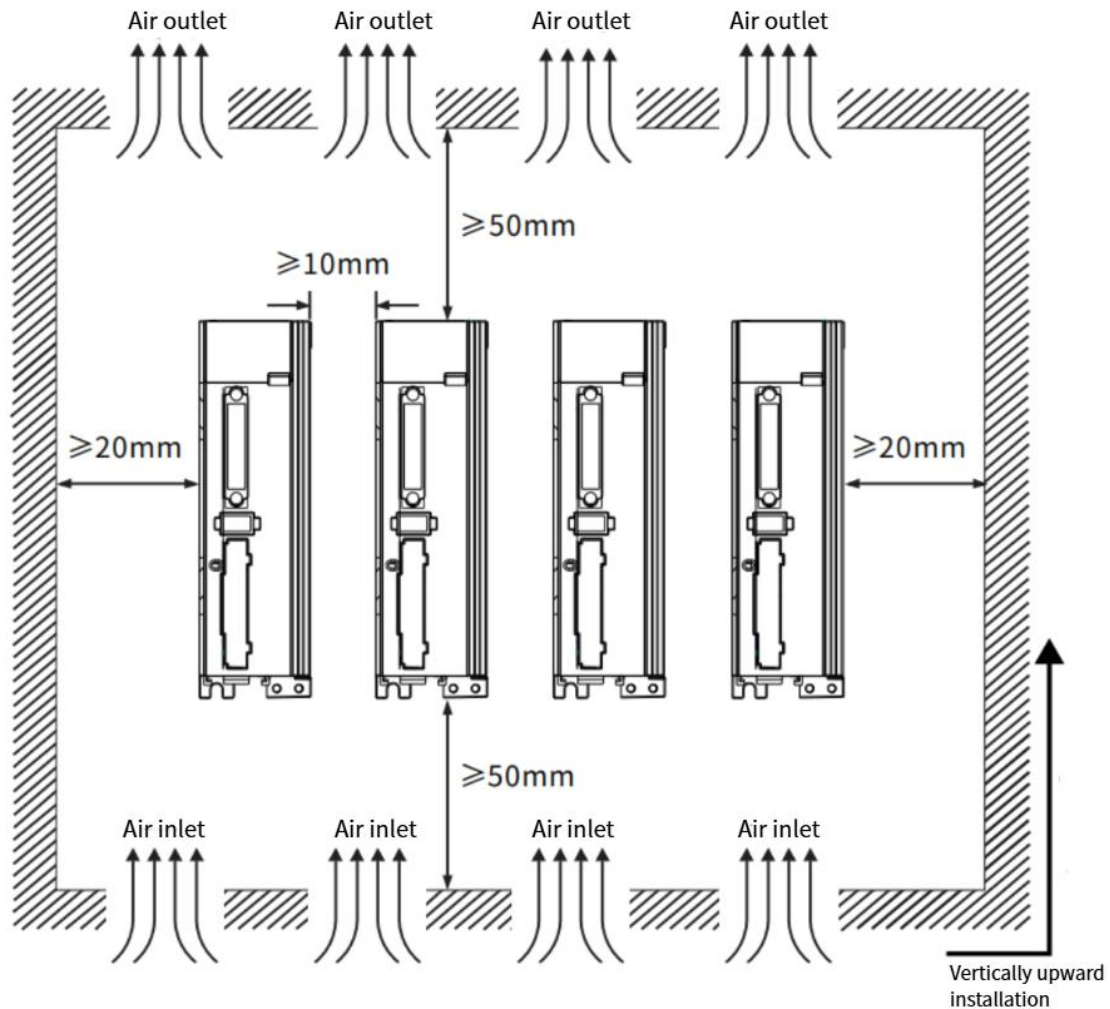


Figure 3-1 Installation Space for S8 Series AC Servo Drivers

Installation Instructions

- ★ The installation direction must be perpendicular to the wall.
- ★ Cool the servo driver by natural convection or fans.

For long-term operation, it is recommended to use the product at an ambient temperature below 40°C to ensure reliable performance. If the ambient temperature exceeds 40°C , place it in a well-ventilated place;

If this product is installed in an electrical cabinet, ensure the size and ventilation conditions of the electrical cabinet prevent overheating of all internal electronic devices.

Caution

- ★ The service life of the driver depends on the temperature around its internal electrolytic capacitors. When electrolytic capacitors approach the end of their service life, their electrostatic capacity will decrease and internal resistance will increase, which will affect the normal operation of the driver (e.g., false alarms such as overvoltage on the bus). Therefore, the ventilation conditions of the installation environment play a decisive role in the service life of the driver;
- ★ After power-off, do not attempt to disassemble the driver or motor immediately to prevent electric shock or scalding. Wait for the stored electricity of the driver to be discharged or the external iron shell of the driver to cool down before performing related operations.

3.1.3 Servo Motor Dimensions

The motor characteristics and installation dimensions are shown in Table 3-1.

Table 3-1 Motor Body Length L1

Motor Model	Encoder Type	Body Length Without Brake (mm)	Body Length With Brake (mm)
60HS-A01330-CS2B2	Magnetic Encoder (C)	92	121
60HS-A01330-CS2B3	Magnetic Encoder (C)	92	121
60HS-A01330-CM2B2	Magnetic Encoder (C)	92	121
60HS-A01330-CM2B3	Magnetic Encoder (C)	92	121
80HS-A02430-CS2A2	Magnetic Encoder (C)	101	135
80HS-A02430-CS2A3	Magnetic Encoder (C)	101	135
80HS-A02430-CM2A2	Magnetic Encoder (C)	101	135
80HS-A02430-CM2A3	Magnetic Encoder (C)	101	135

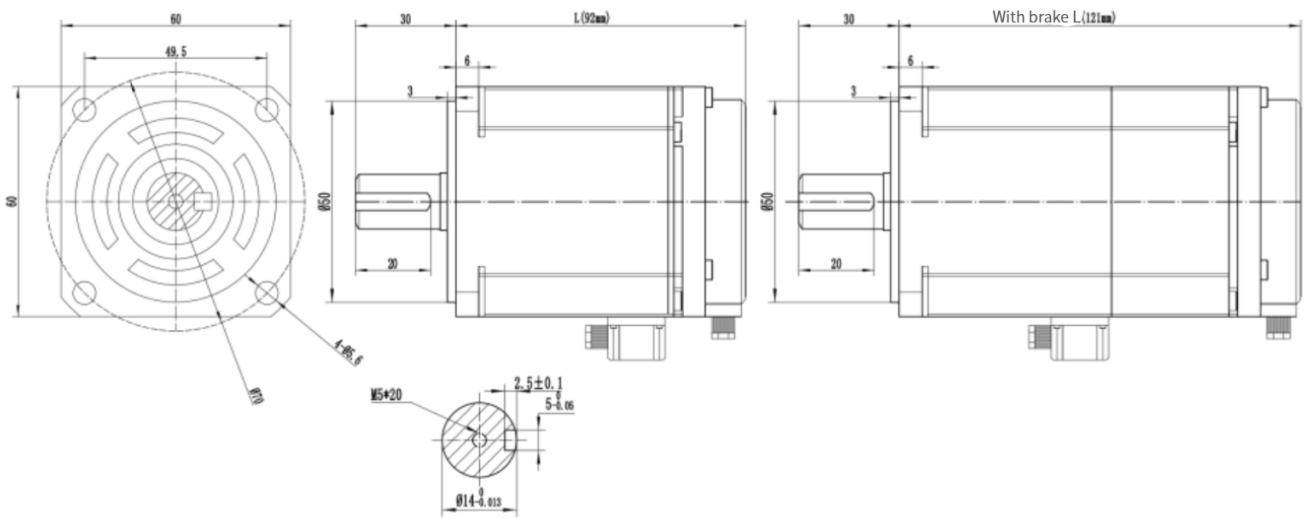


Figure 3-2 Dimensions of 60HS Series Motors

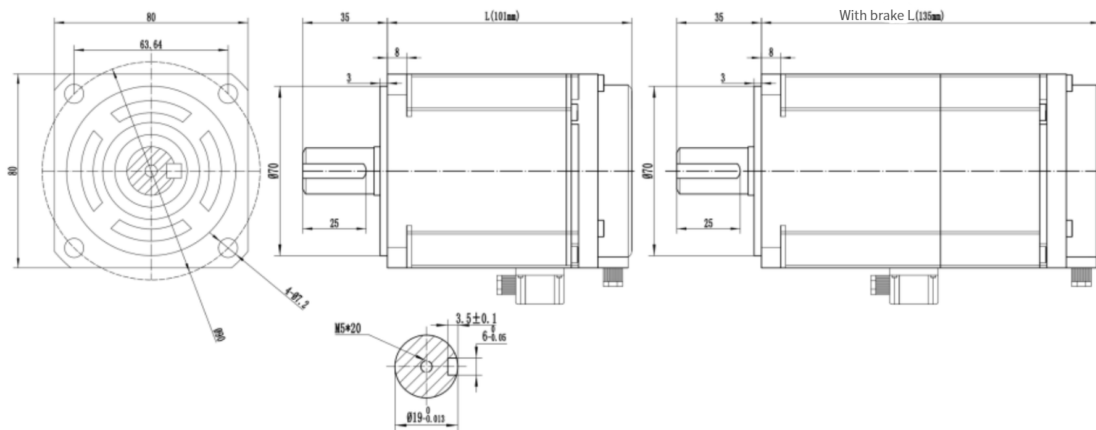


Figure 3-3 Dimensions of 80HS Series Motors

3.1.4 Servo Motor Technical Specifications

Table 3-2 General Parameter Specifications of Servo Motors

Motor Model	Rated Power (W)	Rated Voltage (V)	Rated Current (A)	Rated Torque (N·m)	Maximum Torque (N·m)	Rated Speed (rpm)	Maximum Speed (rpm)
60HS-A01330-CS2B2	400	220	2.50	1.27	3.2	3000	6000
60HS-A01330-CS2B3	400	220	2.50	1.27	3.2	3000	6000
60HS-A01330-CM2B2	400	220	2.50	1.27	3.2	3000	6000
60HS-A01330-CM2B3	400	220	2.50	1.27	3.2	3000	6000
80HS-A02430-CS2A2	750	220	4.4	2.39	6	3000	6000
80HS-A02430-CS2A3	750	220	4.4	2.39	6	3000	6000
80HS-A02430-CM2A2	750	220	4.4	2.39	6	3000	6000
80HS-A02430-CM2A3	750	220	4.4	2.39	6	3000	6000

3.2 Wiring and Terminal Definitions

3.2.1 Wiring and Terminal Definitions

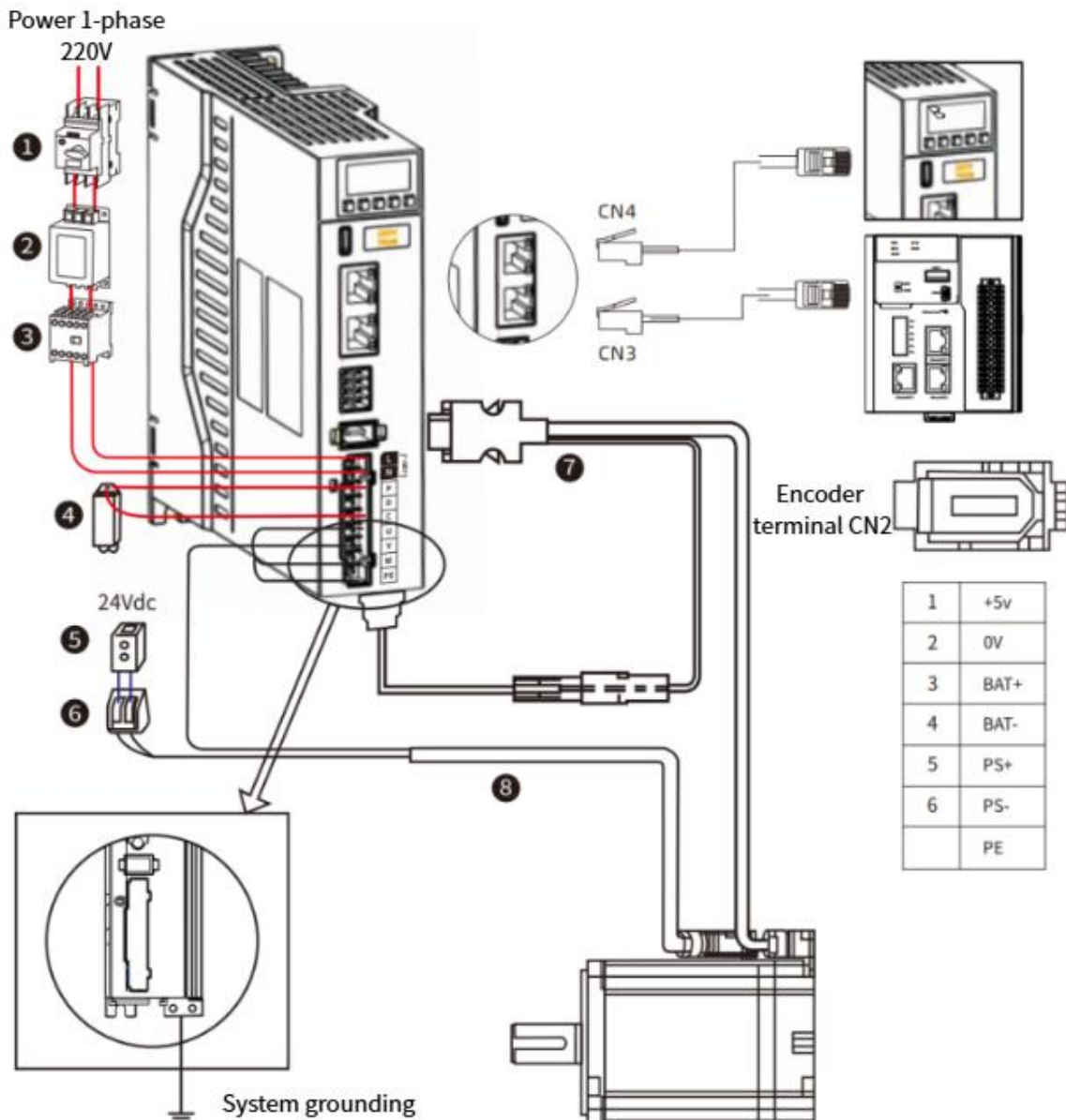


Figure 3-6 Wiring Diagram of S8 EtherCAT Series AC Servo Driver

No	Name	Description
1	Wiring Circuit Breaker	Cuts off the circuit in case of overcurrent in the power cable
2	Noise Filter	Installed to prevent external noise from the power cable
3	Magnetic Contactor	Turns on/off the servo power supply. A surge suppressor shall be installed during use
4	Brake Resistor	Connect an external brake resistor to the P-C terminals when the bus capacitor is insufficient
5	Brake Power Supply	24Vdc voltage source, used when the servo motor is equipped with a brake
6	Magnetic Contactor	Brake control signal for turning on/off the brake power supply. A surge suppressor shall be installed during use; it is recommended to use the servo DO to control the magnetic contactor
7	Control Cable	Not a standard accessory; terminals are provided, and the cable needs to be self-made or purchased separately
8	Encoder Cable	For motor wiring; select a cable of appropriate length according to actual requirements
9	Motor Power Cable	

Precautions

- To protect the power circuit, select an air circuit breaker matching the power capacity as the current protection device.
- The electromagnetic contactor is used in conjunction with the coil surge absorber to connect or disconnect the main power supply of the driver via a controller.
- It is strictly forbidden to use the magnetic contactor for motor start and stop operations, otherwise the driver may be damaged.
- To prevent the motor from interfering with the driver, the ground wire of the motor's power cable must be connected to the driver's housing terminal.

Wiring Instructions

- ★ It is recommended to use the accessory cables for the AC servo driver of our company.
- ★ Use voltage-resistant cables with a rated voltage of AC 600V or above and a rated temperature of 75°C or above.
- ★ Ensure the bending radius of the cable is more than 10 times its outer diameter.
- ★ When used in a high ambient temperature, select heat-resistant cables as ordinary cables are prone to deterioration.
- ★ The outer sheath material of cables based on polyvinyl chloride (PVC) resin tends to harden and crack at low temperatures; special care should be taken when using the cables in an environment where the temperature is below 0°C.

The relationship between wire specifications and permissible current is illustrated in the following example for reference when selecting cables.

Example: Selecting a cable under the following conditions: main circuit power supply is three-phase AC 220V,

current 35A, ambient temperature 30°C.

Step 1: Select a cable with a wire diameter of 3.5 ~ 5.5mm².

Step 2: Calculate the applicable permissible current.

Applicable permissible current = Basic permissible current × Current reduction coefficient × Current correction coefficient

$$\begin{aligned} &= 37 \times 0.7 \times 1.414 \\ &\approx 36.6 \text{ (A)} > 36 \text{ (A)} \text{ Qualified.} \end{aligned}$$

Therefore, select a 3-core copper stranded cable with a cross-sectional area of 3.5mm².

Step 3: If the selected cable is unqualified, increase the proposed wire diameter and repeat the above steps until qualified.

Basic permissible current of copper stranded cable

Nominal Cross-Sectional Area of Conductor (mm ²)	Basic Allowable Current (A)
2~3.5	27
3.5~5.5	37
5.5~8	49
8~14	61
14~22	88
22~30	115
30~38	139

Current Reduction Factor

The reduction factor varies depending on the type of cable. The current reduction factor is shown in the table below when the cable is wound in a synthetic resin conductor shuttle, synthetic resin tube, metal conductor shuttle, metal tube, or flexible conduit.

Number of Wires in the Same Conduit	Current Reduction Factor
1~3	0.7
4	0.63
5~6	0.56
7~15	0.49
16~40	0.43
41~60	0.39
> 60	0.34

The basic allowable current and current reduction factor described in this example may change due to specification modifications, so please confirm with the cable manufacturer before selecting the cable.

3.2.2 Command Terminal CN1 Definition

1) Control Signal Port Definition

The S8 command terminal CN1 includes pulse and direction input pins, switch input pins, switch output pins, and encoder feedback output pins. In pulse sequence command mode, the pin diagrams on the CN1 connector are as follows:

DO1	DI1
DO2	DI2
DO3	DI3
COMY	COMX

Control Terminal CN1-A Definition

Terminal Description

★ The command terminal is an 8PIN plug. Determine the pin order according to the above figure.

Table 3-6 Command Terminal CN1 Signal Definition

Function	Name	Description
Input	DI1	Input 1 (Default Function: Positive Overtravel)
Input	DI2	Input 2 (Default Function: Negative Overtravel)
Input	DI3	Input 3 (Default Function: Home Switch)
Input Common Terminal	COMX	Input Common Terminal (24V Input)
Output	DO1	Output 1 (Default Function: Servo Ready)
Output	DO2	Output 2 (Default Function: Fault Output)
Output	DO3	Output 3 (Default Function: Brake Output)
Output Common Terminal	COMY	Output Common Terminal (0V Output)

2) Digital input pin

Taking DI1 as an example, the internal circuit of the digital input terminal:

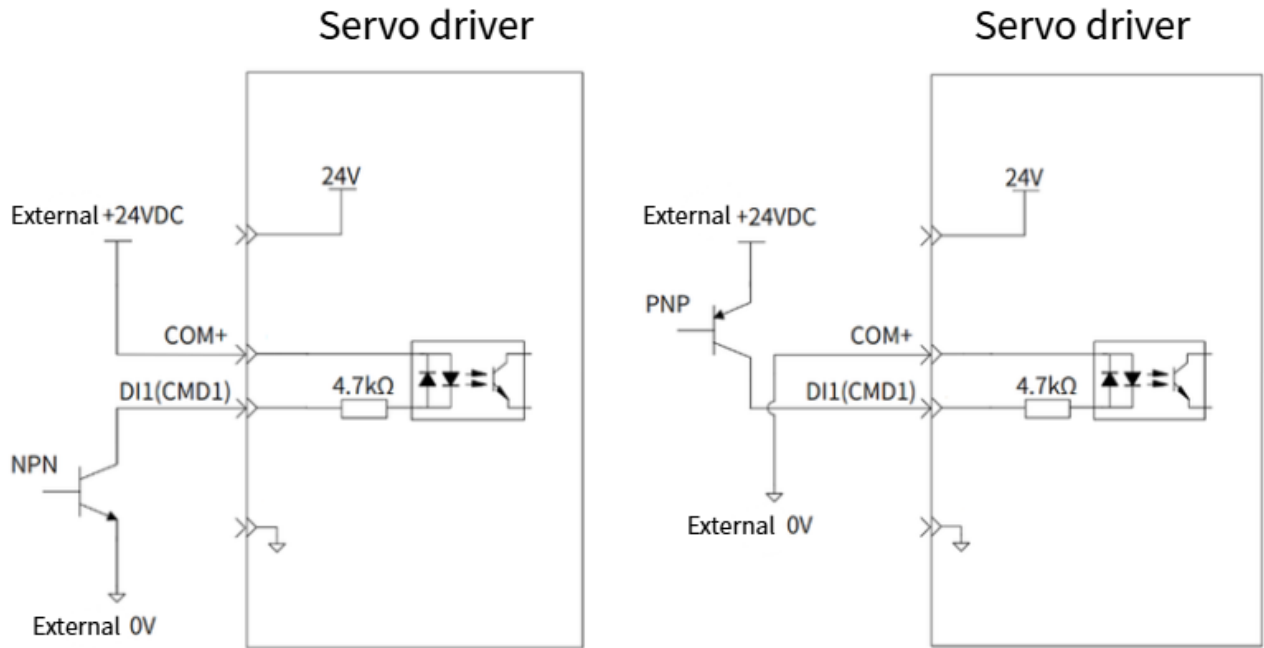


Figure 3-12 Digital input (input IO)

Precautions:

- ★ The arrows in the figure represent "input" or "output", rather than the actual direction of the current.
- ★ Not supporting mixed use of PNP and NPN inputs.

3) Drive relay or optocoupler

The digital output by transistors and can drive relays or optocouplers. The reference circuit is as follows:

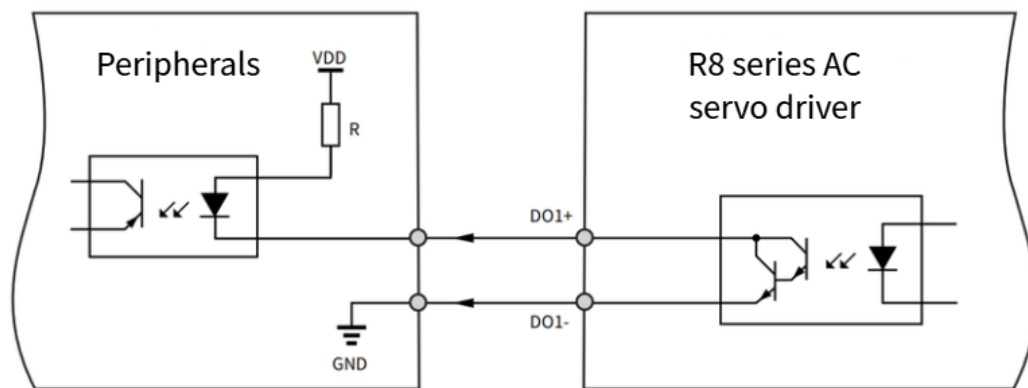


Figure 3-14 digital output (output IO, drive optocoupler)

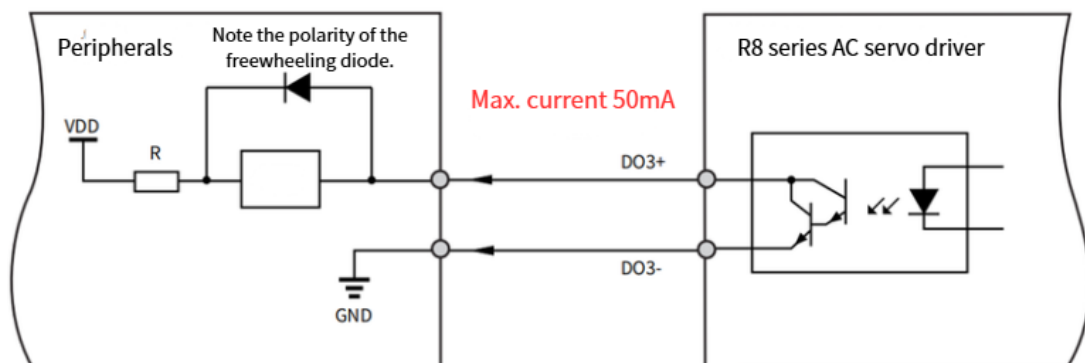


Figure 3-15 digital output (output IO, drive relay)

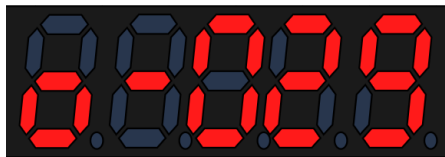
Precautions:

- ★ VDD: 12 ~ 24V, reversing the polarity of the driving power supply can cause the driver to malfunction
- ★ Select the appropriate resistor R based on the driving current $\leq 50\text{mA}$
- ★ The arrows in the figure represent "input" or "output", rather than the actual direction of the current

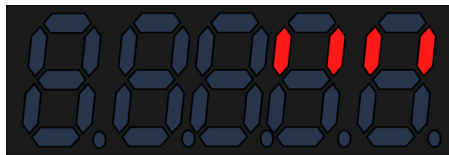
3.2.3 Confirmation of Input Signal Status

The steps to confirm the input signal status through the driver panel are as follows:

Press the MODE button to switch to the monitoring parameter digital display and find the o-029 parameter, then click the SET button



When the optocoupler is not conducting, the input is at a high level, and the upper 4 points (LED) light up. When the optocoupler is conducting, the input is at a low level, and the lower 4 points (LED) light up. For example, all four input IO digital are in a non-conductive state, from right to left is DIN1~DIN4.



Confirmation of output Signal Status

The steps to confirm the input signal status through the driver panel are as follows:

Press the MODE button to switch to the monitoring parameter digital display and find the o-030 parameter, then click the SET button



When the optocoupler is not conducting, the input is at a high level, and the upper 4 points (LED) light up. When the optocoupler is conducting, the input is at a low level, and the lower 4 points (LED) light up. For example, all four output IO digital are in a non-conductive state, from right to left is DO1~DO4.



3.3 Selection Instructions for Braking Resistors

3.3.1 Braking Resistance Operating Conditions

When the torque and speed of the motor are in opposite directions, energy is transmitted back to the driver from the motor end, causing the main cable voltage to increase. When it reaches the braking point, the energy can only

be consumed through the braking resistor. At this point, the braking energy must be consumed according to the braking requirements, otherwise it will damage the servo drive. The braking resistor can be built-in or external. Special note: Internal and external braking resistors cannot be used at the same time.

In the following situations, the servo motor operates in regenerative mode. When using the servo driver, attention to selecting regenerative braking resistors based on the actual situation.

- With a large inertia load and high acceleration;
- Continuously descending and running on the vertical axis;
- The servo motor is dragged by the load and runs continuously;

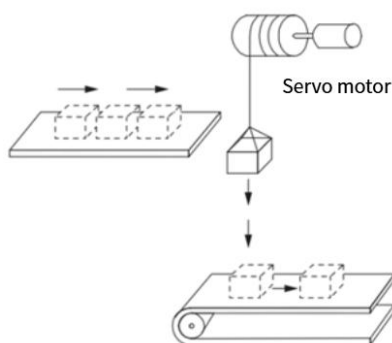


Figure 3-18 servo with brake situation

The specifications of the S8 series servo built-in regenerative resistor are shown in Table 3.5 below

Rated output	400W	750W	1000W	1.5KW	2.6KW	3.0KW
Resistance value	/	50Ω	50Ω	40Ω	50Ω	50Ω
Allowable power Pa	/	50W	60W	60W	80W	80W

Table 3.4 S8 servo built-in regenerative resistor resistance and power

Note:

1. The S8 series servo drive with a power of 400W or more is equipped with a built-in regenerative resistor. When the power of the built-in resistor is insufficient, please calculate and add an external regenerative resistor according to the following method.
2. When the braking function is not required, the braking function can be turned off by setting parameters. Refer to the parameter settings section P00 for parameter settings P00-05/P00-06/P00-07.

3.3.2 Calculation of Braking Resistance

➤ **Ignore load torque in Reciprocating motion state**

The capacity calculation of the regenerative resistor during acceleration and deceleration of the operating cycle shown in the following figure serves as an example to illustrate the calculation steps. Assuming the motor performs a reciprocating motion, the kinetic energy will be converted into electrical energy and fed back to the main cable capacitor during braking. When the main cable voltage exceeds the braking voltage, the braking resistor will consume the excess feedback energy. The motor speed curve is as follows: there are two decelerations from rated speed to 0 within one motion cycle, ignoring the load torque, friction torque, and energy consumption of servo motor coil resistance during the deceleration process.

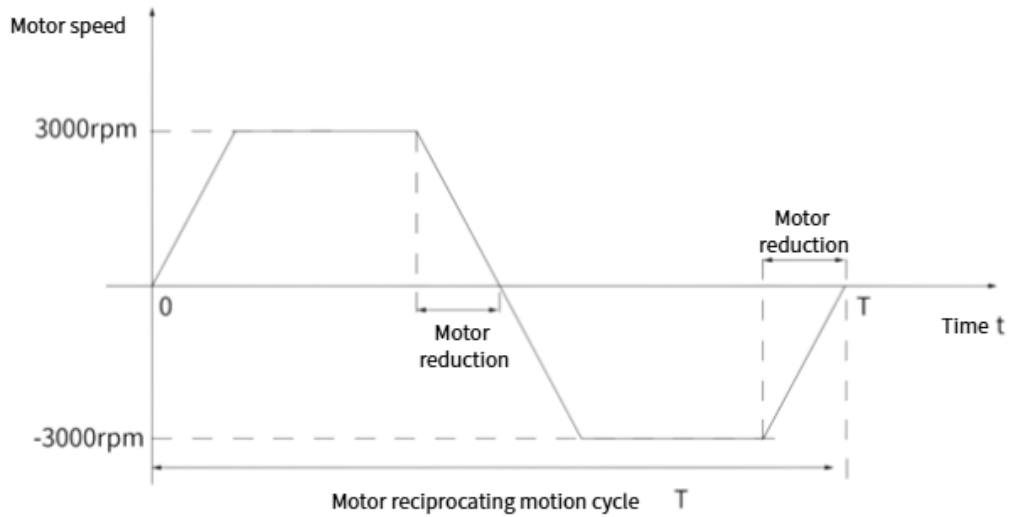


Figure 3.19 diagram of acceleration and deceleration motion cycle of motor

Step	Calculation project	Symbol	Calculation formula and explanation
1	Rotating energy of servo system	E_i	Calculate based on the load inertia ratio J_r , actual rotational speed W , and the number of decelerations N during the motion cycle, combined with Table 3.7 E_m
2	Find the absorbed energy of the servo unit	E_c	Select according to Table 3.7 based on the servo model
3	Calculate the energy consumed by the regenerative resistor	E_k	$E_k = E_i - E_c$
4	Calculate the average power of the regenerative resistor	W_k	$W_k = E_k / (0.2 \times T)$

Table 3.5 Calculation Table of Servo Regenerative Resistance Power

Attachment: ES-EK unit is joules; WK unit is watts; T is the cycle of repeated operation of the servo motor, unit is seconds; In the calculation formula of WK in the table above, 0.2 is the value when the load rate of the regenerative resistor is 20%. The load rate of the regenerative resistor is related to the heat dissipation conditions, and an appropriate coefficient can be selected for calculation according to the following text.

The capacity of the regenerative resistor should be set to a value that matches the allowable capacity of the connected external regenerative resistor. The set value varies depending on the cooling state of the external regeneration resistor.

- When using self cooling method (natural convection cooling): set to a value below 20% of the regenerative resistance capacity (W).
- When using forced air cooling method: set to a value below 50% of the regenerative resistance capacity (W).

Example

When the capacity of the self cooling external regeneration resistor is 100W, $100W \times 20\% = 20W$. The servo related parameters can be changed by setting P00-05 to select the external braking ,and resistor heat dissipation method.

The energy data generated by the motor from a no-load speed of 3000rpm to a standstill is as follows:

Motor Capacity (W)	Servo Motor Model	Inertia (kg.cm²)	Braking Energy Em (J) Generated When Decelerating from No-Load 3000rpm to Standstill	Maximum Braking Energy EC (J) Absorbable by the Capacitor
100	40HK-A00330-CS2B2	0.06	0.3	14.7
100	40HK-A00330-CS2B3	0.08	0.4	14.7
200	60HK-A00630-CS2B2	0.3	1.48	14.7
200	60HK-A00630-CS2B3	0.32	1.58	14.7
200	60HK-A00630-CS2B3-A	0.28	1.38	14.7
400	60HK-A01330-CS2B2	0.65	3.21	14.7
400	60HK-A01330-CS2B3	0.67	3.31	14.7
400	60HK-A01330-CS2B2-A	0.52	2.57	14.7
750	80HK-A02430-CS2A2	1.71	8.46	14.7
750	80HK-A02430-CS2A3	1.8	8.9	14.7
750	80HK-A02430-CS2A2-A	1.48	7.32	14.7
1000	80HK-A03230-CS2A2	2.15	10.63	24.9
1000	80HK-A03230-CS2A3	2.24	11.08	24.9
1000	80HK-A04025-CM2A2-A	2.4	11.87	24.9
1000	130HK-A04025-CS2A2	7.2	35.6	24.9
1000	130HK-A04025-CS2A3	8.7	43.02	24.9
1000	130HK-A04025-CS2A2-A	8.5	42.03	24.9
1300	130HK-A05025-CS2A2-A	12.6	62.31	37.4
1500	130HK-A06025-CS2A2	10.3	50.93	44.5 (220V Driver) / 32.7 (380V Driver)
1500	130HK-A06025-CS2A3	11.8	58.35	44.5 (220V Driver) / 32.7 (380V Driver)
1500	130HK-A10015-CS2A2-A	19.4	95.93	44.5 (220V Driver) / 32.7 (380V Driver)
2000	130HK-A07725-CS2A2	10.3	50.93	44.5 (220V Driver) / 32.7 (380V Driver)
2000	130HK-A10020-CS2A2	12.7	62.8	44.5 (220V Driver) / 32.7 (380V Driver)
2000	130HK-A07725-CS2A2-A	15.3	75.66	44.5 (220V Driver) / 32.7 (380V Driver)
2300	130HK-A15015-CS2A2	19.7	97.42	44.5 (220V Driver) / 32.7 (380V Driver)
2300	130HK-A15015-CS2A2-A	27.7	136.98	44.5 (220V Driver) / 32.7 (380V Driver)

Motor Capacity (W)	Servo Motor Model	Inertia (kg.cm ²)	Braking Energy Em (J) Generated When Decelerating from No-Load 3000rpm to Standstill	Maximum Braking Energy EC (J) Absorbable by the Capacitor
2600	130HK-A10025-CS2A2	12.7	62.8	44.5 (220V Driver) / 32.7 (380V Driver)
2600	130HK-A10025-CS2A2-A	19.4	95.93	44.5 (220V Driver) / 32.7 (380V Driver)
3000	130HK-A19015-CS2A2-A	35.4	175.05	44.5 (220V Driver) / 32.7 (380V Driver)

Table 3-6 S8 series servo energy absorption

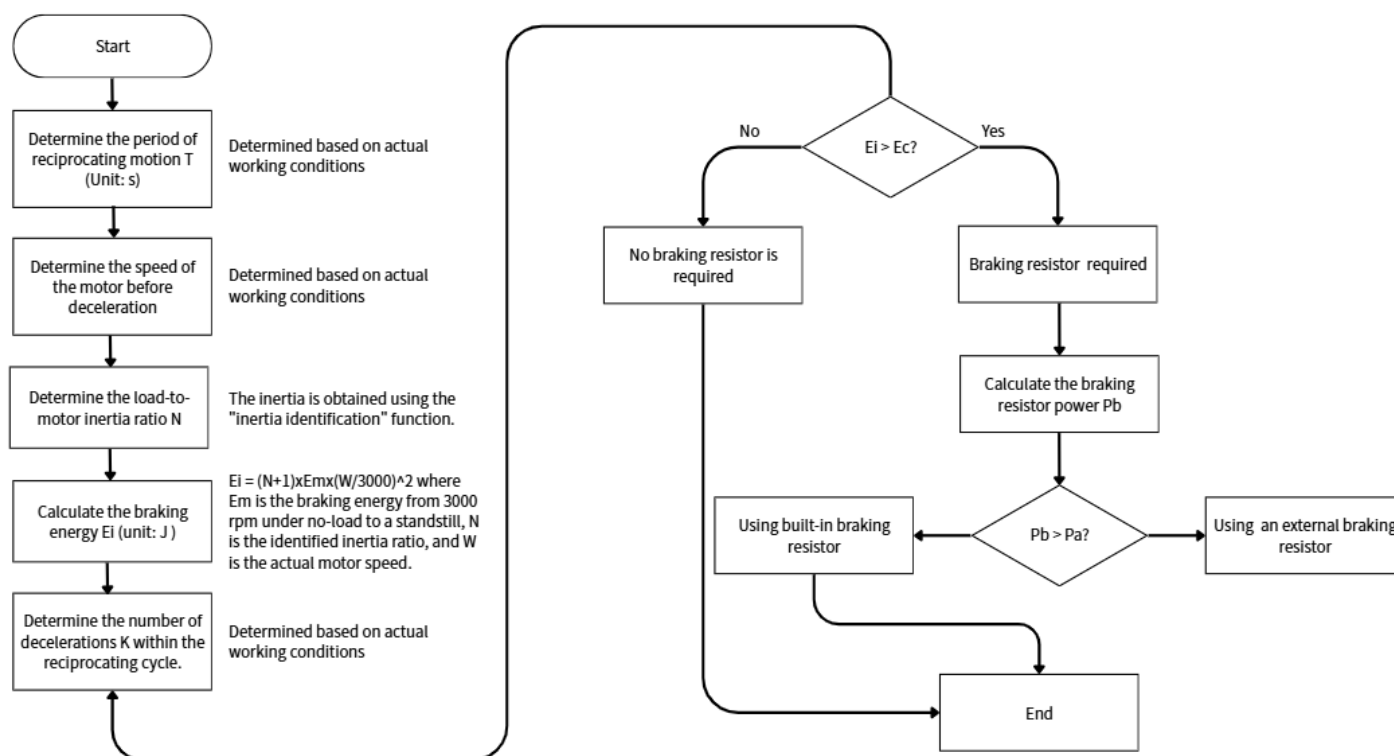


Figure 3.20 Calculation of Braking Resistors

- Example: A S8-750 servo is paired with an 80HK-A02430-CS2A2 motor for reciprocating periodic motion. $T = 2S$, When operating at a maximum speed of 3000rpm and a load inertia ratio of 10.00, with 2 decelerations per cycle, the required braking resistor power is:

$$P_b = \frac{2 \times [(N+1) \times E_m - E_c]}{T} = \frac{2 \times [(10+1) \times 8.46 - 14.7]}{2} = 78.36W$$

When the braking energy is greater than the capacity of the built-in braking resistor $P_a = 40W$ (which can be found according to Table 3.5), and an external braking resistor needs to be used. The recommended power of the external braking resistor is $P_b / (1 - 80\%) = 390W$:

$$P_b = \frac{2 \times [(N+1) \times E_m \times (1500/3000)^2 - E_c]}{T} = \frac{2 \times [(10+1) \times 8.46 \times 0.25 - 14.7]}{2} = 8.56W$$

When the braking energy is greater than the capacity of the built-in braking resistor $P_a = 40W$, no need add an external braking resistor.

If the driver operates at an ambient temperature above 50 °C, please use it with a rated built-in resistance of 20%.

Use an external braking resistor

When $P_b > P_a$ An external braking resistor needs to be connected. At this point, depending on the cooling method of the braking resistor, set P00.05 to 2 or 3.

When the external braking resistor needs to be reduced by 80%, that is $P_r = P_b / (1 - 80\%)$, and ensure that it is greater than the minimum resistance value allowed by the driver. Connect the two ends of the external braking resistor to "P ⊕" and "C" respectively, and remove the wire between terminals "P ⊕" and "D".

Please refer to Chapter 3.2 Wiring and Terminal Definitions for the wire specifications. According to the different cooling methods of the braking resistor, set P00-05 to 1 or 2 and confirm the following parameters:

Function code	Data name	Set range	Unit	Value	Effective method	Set method	Set mode
P00-06	External regenerative resistor power	1~65535	W	40	Effective immediately	Stop Set	Ordinary users
P00-07	External regenerative resistor resistance value	1~1000	Ω	50	Effective immediately	Stop Set	Ordinary users

Related parameters

Function code	Data name	Set range	Unit	Value	Effective time	Set method	Set mode
P00-05	Select set	0- Use built-in regenerative resistor 1. Use an external regenerative resistor 2. Use an external regeneration resistor and cool it down with a fan 3- Do not use regenerative resistors	--	0	immediate	Stop set	Ordinary users
P00-06	Resistor power	1~65535	W	40	immediate	Stop set	Ordinary users
P00-07	Resistor value	1~1000	Ω	50	immediate	Stop set	Ordinary users

- Reverse charging state with load torque

In some special situations, the motor torque output is opposite to the direction of rotation, and the motor performs negative power. External energy is generated by the motor and fed back to the driver. When the load is in a continuous power generation state, it is recommended to adopt a common DC bus scheme or use external braking resistors to release the energy of the bus capacitor.

Taking 750W (rated torque 2.39N · m) as an example, when the external load torque is 60% of the rated torque and the speed reaches 1500rpm, the power feedback to the driver is $(60\% \times 2.39) \times (1500 \times 2 \pi \div 60) = 225W$. Considering that the braking resistor needs to be reduced by 80%, the power of the external braking resistor is $225 \div (1 - 80\%) = 1125W$, and the resistance value is 50 Ω .

4 Panel display and button operation

4.1 Panel Composition

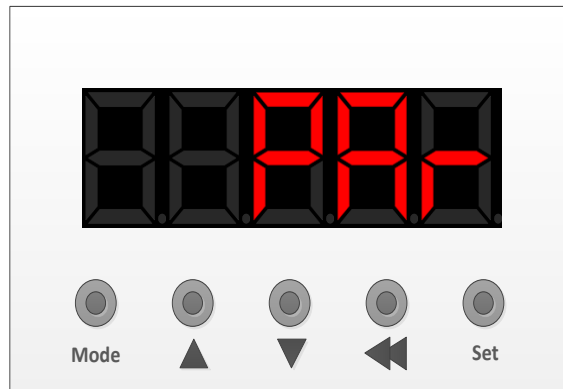


Figure 4-1 LED panel

As shown in the above figure, Samkoon S8 series servo drive panel consists of five digital tubes and five buttons.

The functions of the buttons are shown in the table below:

Table 4-1 LED panel button function

Name	Function
Tubes	5-digit digital tubes
Mode	Mode/Return button, switch menu/return to previous level
▲	Flip up key, menu page/numerical increase
▼	Flip down button, menu page/numerical decrease
◀	Shift, shift operation when setting values
Set	Set button, confirm settings

4.2 Servo panel common displays

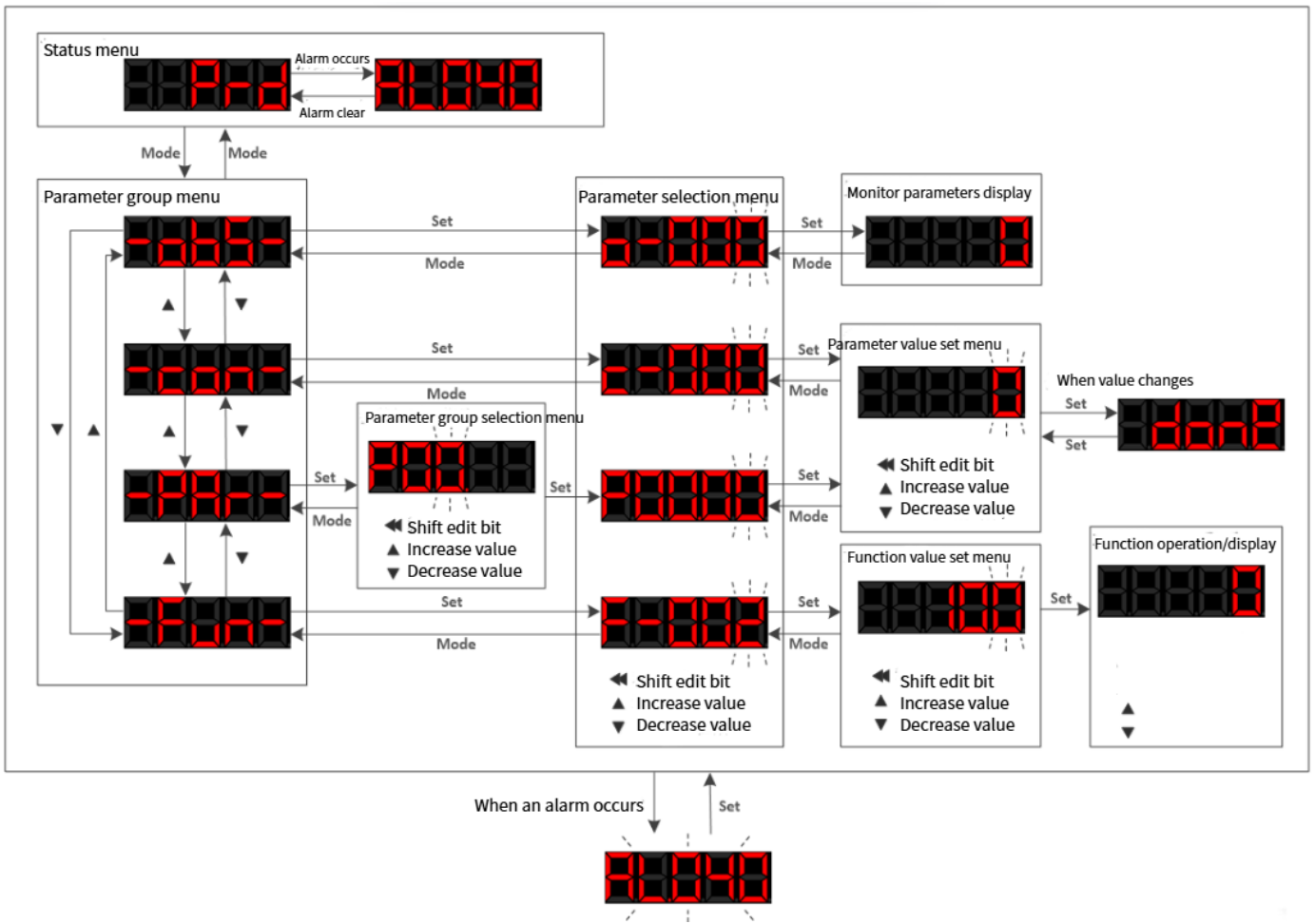


Figure 4.3 common panel display diagram

Display	Meaning
	Port 0 (Input Port) Connection Status On: Physical layer communication connection established; Off: Physical layer communication connection not detected
	Port 1 (Output Port) Connection Status On: Physical layer communication connection established; Off: Physical layer communication connection not detected
	Communication Status 1: Initialization state; S: Safe operation state; P: Pre-operation state; 0: Operation

Display	Meaning
	state
	Control Mode U: No control mode; P: Profile Position mode; S: Profile Velocity mode; T: Profile Torque mode; S.: Cyclic synchronous velocity mode; T: Cyclic synchronous torque mode; H: Home mode; P: Cyclic synchronous position mode
	Servo Status nr: Servo not ready; ru: Servo running; rd: Servo ready

Figure 4-4 Meanings of Each Position on the Panel

4.3 Monitoring Display

The P13 are the drive monitoring parameter group, which can be used to monitor the operating status of the servo drive.

By setting the function code P00-08 when servo is power on (default monitoring parameter on the panel), the display panel will automatically switch from the "servo status display interface" to the "monitoring parameter display interface". The parameter group where the parameter is located is the P13 monitoring parameter group, turn to group number P00-08 set value.


The P00-08 parameter have set "-1" by default, and the function is not turned on. The parameter is a decimal digits, with the lower 2 digits representing the group ID and the upper 2 digits representing the parameter group ID. If set to 1921, since the parameter group ID is in hexadecimal and the group ID is in decimal, the actual displayed value is the P13-21 bus voltage monitoring value.

The relevant function codes are as follows:

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P00-08	Panel default data	-1~32767	-	-1	Effective immediately	Anytime	Ordinary user

4.4 Auxiliary Function Parameters (Fun Group Parameters)

Auxiliary functions are used to perform functions related to setting and adjusting servo units.

Display on the panel . Read as P12 group of auxiliary function parameters in the upper software or 485 bus.

4.4.1 F-000 servo restart

The servo restart function can perform a soft reset of the servo and restore the power on state of the servo drive.

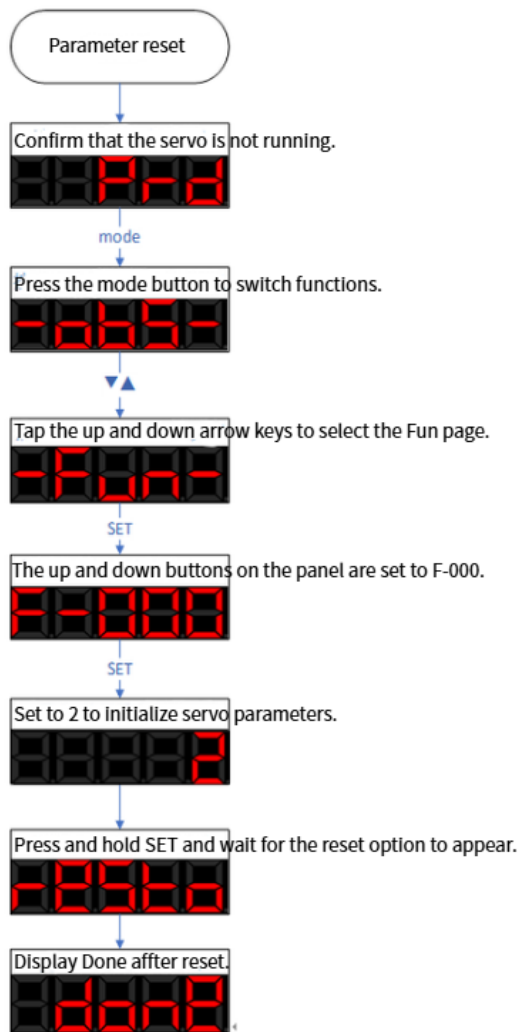


Figure 4.4 servo restart diagram

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P12-00	Servo restart	0-none operate	--	0	Effective immediately	Anytime	Ordinary user
		1-servo restart					
		2-restore factory mode					

4.4.2 F-001 Alarm clear

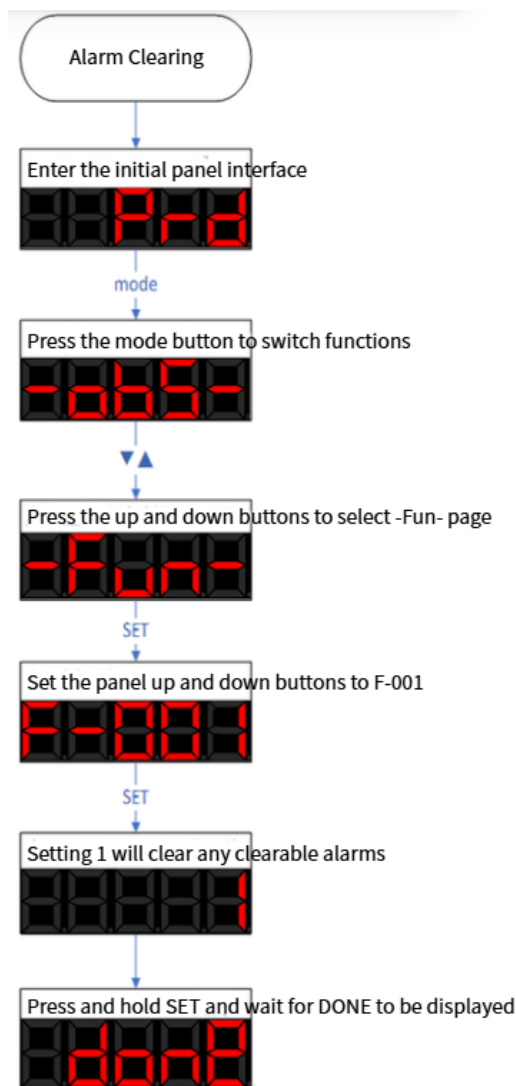


Figure 4.5 Alarm clear diagram

The alarm clearing function can clear the current alarm and restore the servo operation status. There are two ways to clear the alarm:

- ① Write '[1] Clear current alarm' through the function code 'F-001 Alarm Clear'.
- ② Use the DI terminal to input the alarm clearing signal. By default, DI2 is configured with the alarm clearing function ("P1-05 DI2 terminal function selection" is set to "[2] alarm clearing"). when DI2 input "ON" will trigger the alarm clearing action.

➤ Attention

- If you need to clear the alarm when the enable signal is in effect, please set the P0B-29 parameter to 1
- Please check and eliminate the cause of the alarm before the alarm clearing action. If the current alarm condition still exists, the alarm clearing action will not take effect.
- For some alarms that need to be eliminated by changing parameter settings, it is important to confirm

whether the modified parameters need to be restarted to take effect, such as the "AL.113 restart prompt" is a low priority warning and will not prompt when there are other alarms present.

- Not all alarms can be cleared. You can check and confirm whether the alarm can be cleared through the "6.3.1 Software Alarm Attribute Table"

4.4.3 F-002 JOG enable

To test operate the servo motor and driver, the JOG operation function can be used to confirm whether the servo motor can rotate normally, and whether there are any abnormal vibrations or sounds during rotation. This parameter can be set through the panel.

The operation of JOG is located in Fun-002, and the servo drive needs to be in the non enable and non alarm state at this time.

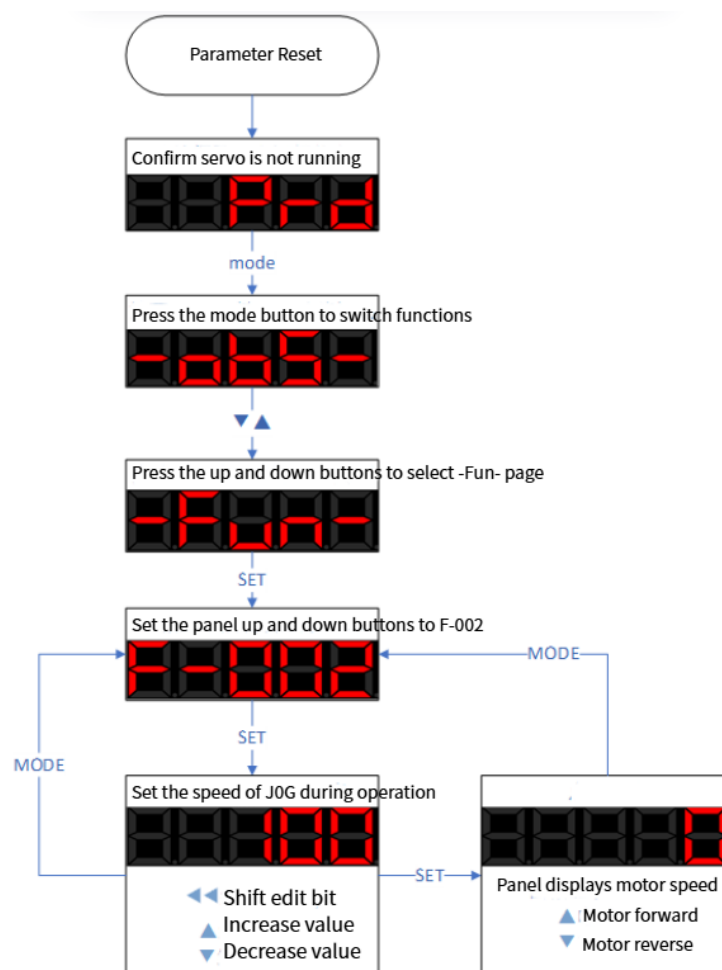


Figure 4.6 JOG test running diagram

4.4.4 F-003 Inertia identification

Inertia identification is the foundation of debugging. When ensuring that the motor has a movable stroke of more than 1 circle in both directions,. If the stroke does not meet the requirements or the load inertia ratio is too large (>30 times), please estimate a suitable inertia ratio and set value to C-011. The process of inertia identification is shown in the following figure:

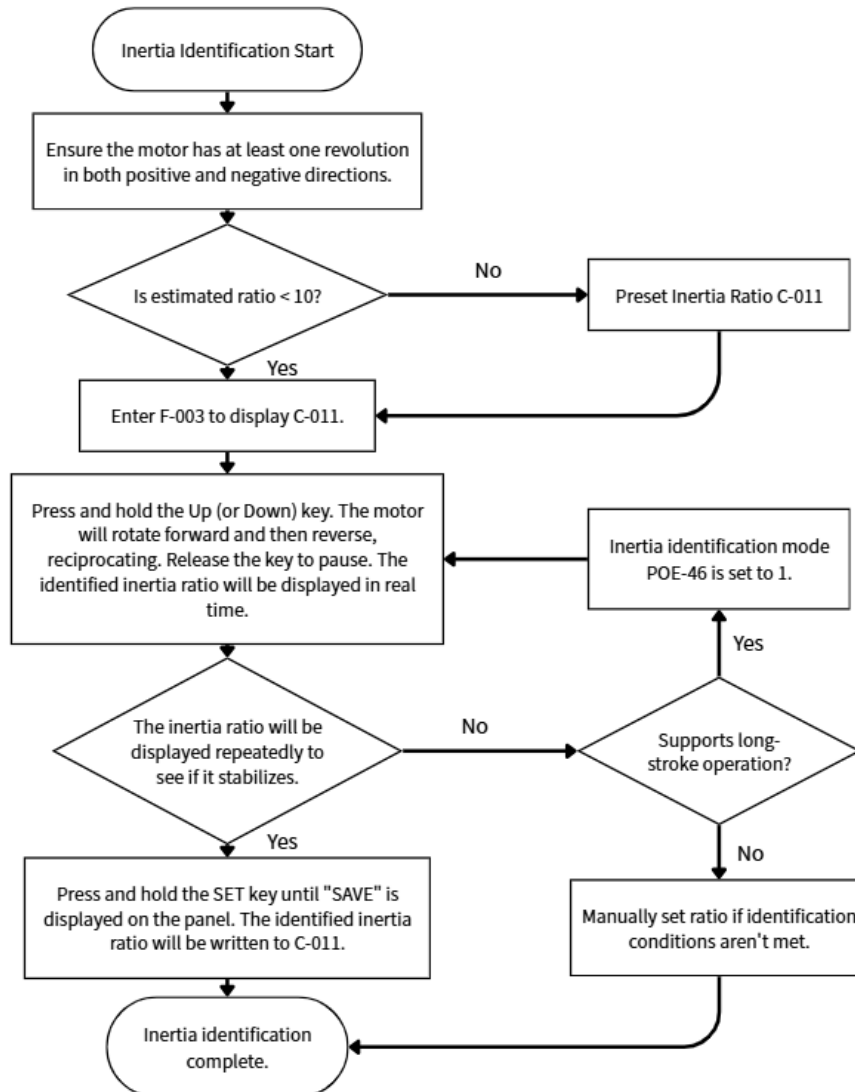


Figure 4-7 process of inertia identification

➤ Notes:

- If under the default value of C-011=100%, the actual speed cannot keep up with the command due to the inertia ratio being too small, resulting in identification failure, the load inertia ratio C-011 needs to be preset. The preset value is recommended to gradually increase from 500% until it can be identified normally.
- Offline inertia identification mode is generally recommended to use triangular wave mode. If there are situations where the identification effect is not good, try using step rectangular wave mode.
- Pay attention to the mechanical stroke when POE-46=1 to prevent accidents caused by overtravel during offline inertia identification.

Relevant code below:

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P0E-46	Offline inertia identification mode	0 – triangular wave mode 1 – JOG mode		0	Effective immediately	Stop set	ALL
P0E-47	Offline inertia identification speed amplitude	100~1000	m rp	500	Effective immediately	Stop set	ALL
P0E-48	Offline inertia identification acceleration and deceleration time	20~800	ms	125	Effective immediately	Stop set	ALL
P0E-49	Offline inertia identification waiting time	50~10000		800	Effective immediately	Stop set	ALL
P0E-50	Offline inertia identification of stroke cycles	0~65535	1 0.0 rev	0	Effective immediately	Set Anytime	ALL

Conditions for effective inertia identification:

- The actual maximum speed of the motor is higher than 150rpm;
- The actual speed during acceleration and deceleration reaches more than 3000 rpm/s;
- The load torque is relatively stable and cannot undergo drastic changes;
- Maximum identifiable inertia of 30 times;
- When the mechanical rigidity is extremely low or the backlash of the transmission mechanism is large

(such as chains), it may be identification failure

4.5 User Password

After the user password (P00-12) function is enabled, the user holds the parameter setting permission, and other operators can only view and cannot change the parameter values.



The steps for setting a user password are as follows:



Figure 4.8 user password set diagram

After setting the user password, it will take effect when powered on again. If P.lock is displayed when modifying other parameters, enter P00.12 parameter, press and hold the SET button, and then write the password again

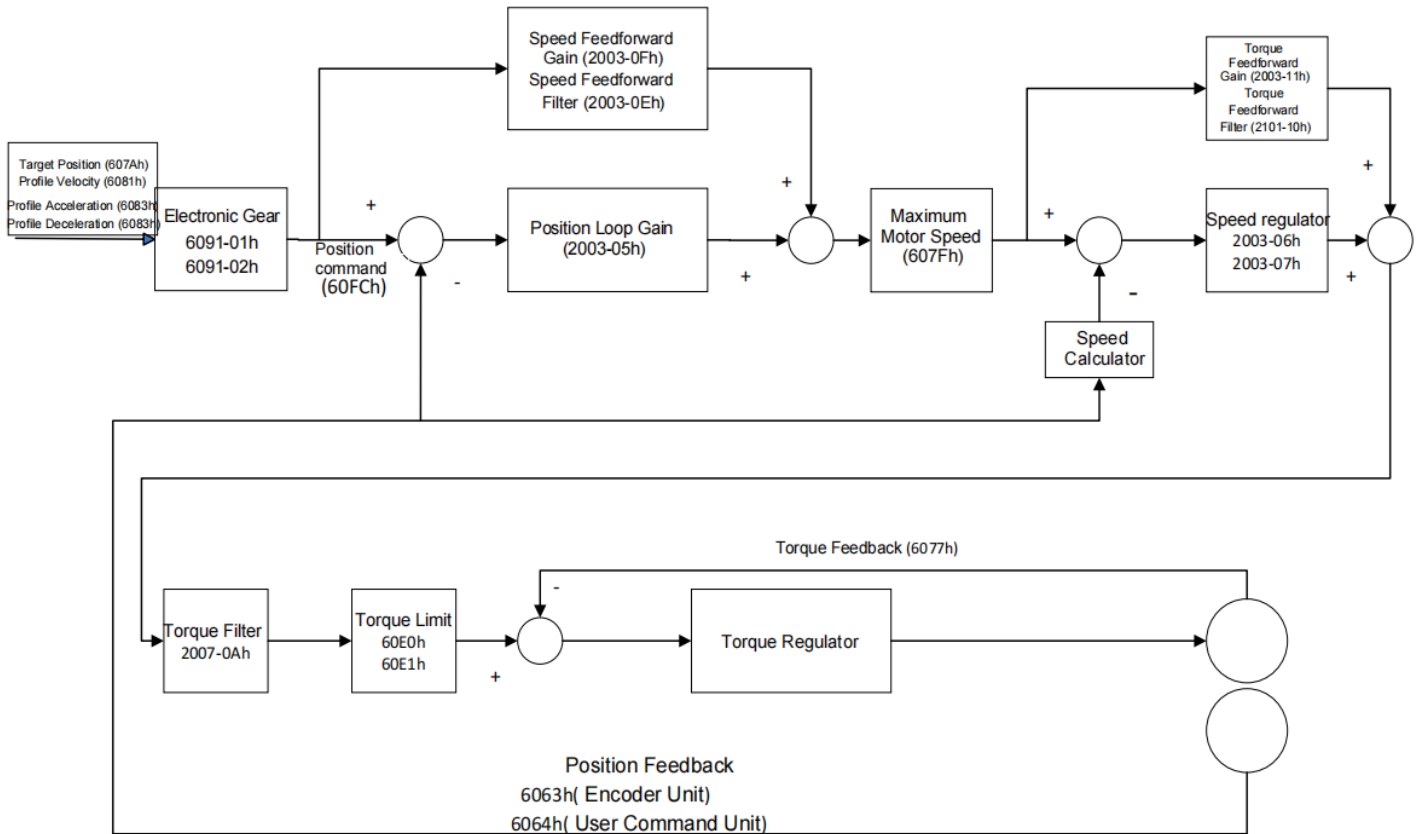
Code	Name	Set range	unit	value	Effective Mode	Set mode	Relevant Mode
P00-12	User password	0~65535	-	0	Effective immediately	Stop set	P
P00-14	Set password	0~65535	-	0	Effective immediately	Stop set	P

- Attention: If you forget your user password, you can contact the factory technical support

5 Control Mode Introduction

5.1 Profile Position Mode (PP)

In the Profile Position Mode, the driver controls the motor to perform two positioning methods: absolute position positioning and relative position positioning. The upper controller can set the target position, starting speed, stopping speed, and acceleration (deceleration). To enable the Profile Position Mode, set the object 6060H to 1. The control block diagram and input/output are shown in Figure 5-1 and Figure 5-2 respectively.



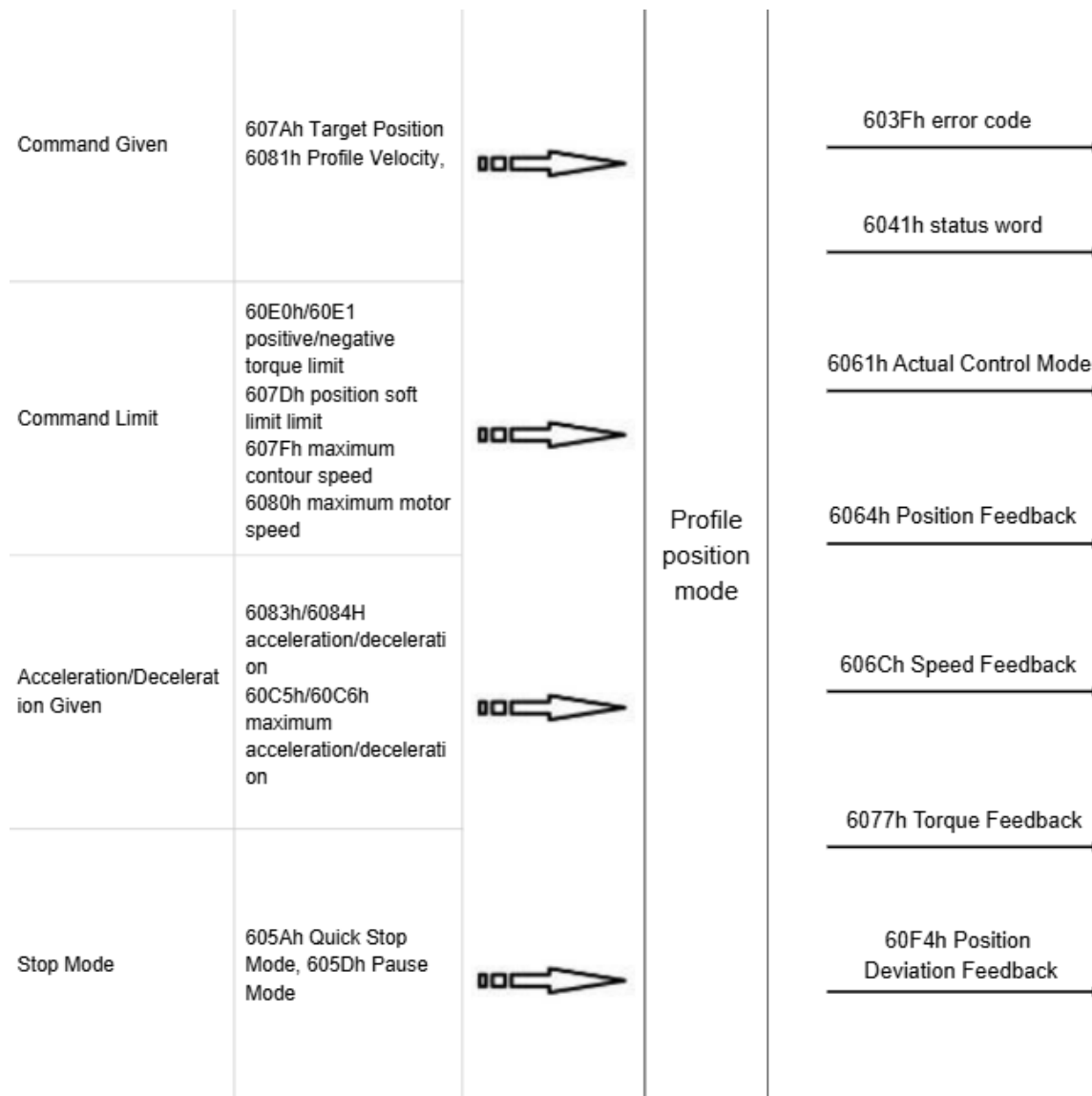


Figure 5-2 Profile Position Mode Input/Output

5.1.1 Control Word Setting of Profile Position Mode (60400010h)

When selecting the Profile Position Mode, the meaning of each bit of the control word (6040) is shown in Table 5-1. The ones highlighted in dark color are the dedicated control commands for the Profile Position Mode.

Table 5-1 Explanation of Control Word in Profile Position Mode

Bit	Name	Description
0	Switch	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4	Update position	Load the next set of position command parameters (including target position or

	command	position increment, starting speed, operating speed, acceleration/deceleration) when changing from 0 to 1
5	Immediate update	0: Execute the new command after the current position command is completed; 1: Abort the ongoing command and execute the latest position command
6	Position command type	0: Absolute value command; 1: Relative position command
7	Fault reset	Execute a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes; other control commands are invalid when this bit is 1
8	Pause	0: Invalid; 1: Valid. Stop executing commands when valid
9	PP mode reserved	None
10	Reserved	None
11~15	Manufacturer-defined	None

When bit 5 of the 6040h control word is 0, if the positioning data is changed during the action, the new command will be executed after the current position command is completed, as shown in the following figure:

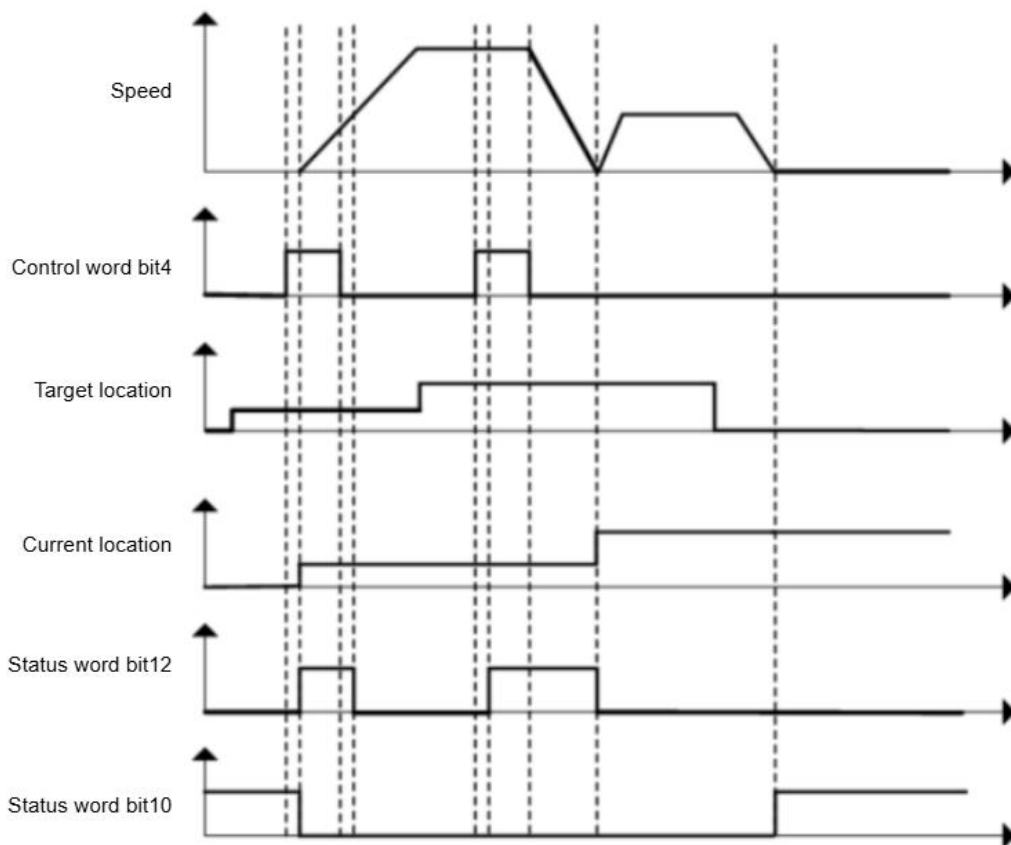


Figure 5-3 Diagram of Command and Status Update in Profile Position Mode 1

When bit 5 of the 6040h control word is 1, if the positioning data is changed during the action, the ongoing command will be aborted and the latest command will be executed immediately, as shown in the following figure:

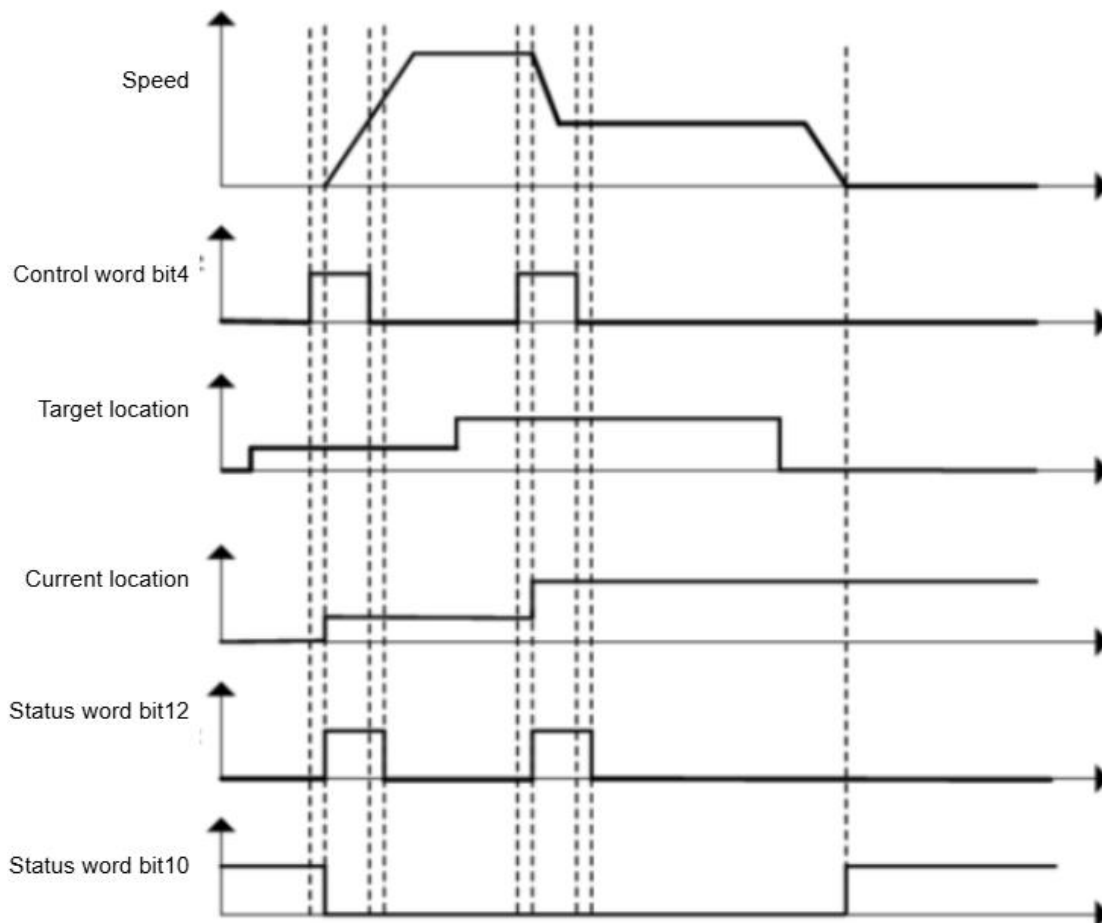


Figure 5-4 Diagram of Command and Status Update in Profile Position Mode 2

5.1.2 Status Word Definition of Profile Position Mode (60410010h)

When selecting the Profile Position Mode, the meaning of each bit of the status word (6041h) is shown in Table 5-2. The ones highlighted in dark color are the dedicated statuses for the Profile Position Mode.

Table 5-2 Explanation of Status Word in Profile Position Mode

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: Invalid; 1: Valid
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid

5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid
7	Warning	0: No warning; 1: Warning exists
8	Manufacturer-defined	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Position reached	When bit 8 (Pause) of 60400010h = 0: 0: Position not reached; 1: Position reached; When bit 8 (Pause) of 60400010h = 1: 0: Decelerating; 1: Speed is 0
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	New position command received status	0: Position command can be updated; 1: Position command cannot be updated
13	Position deviation error	0: Position deviation value is within the set range (6065h); 1: Position deviation value exceeds the set range (6065h)
14	Manufacturer-defined	None
15	Homing completed	0: Invalid; 1: Homing completed. For the absolute value system, after setting the 2nd bit from the right of the hexadecimal value of P09.14 to 2, the value of bit15 will be stored (power-off retention) after successful homing; set P20.06 to 7 to clear the stored value

5.1.3 Relevant Parameters of Profile Position Mode

Table 5-3 lists the dictionary objects involved in the Profile Position Mode.

Table 5-3 Relevant Parameters of Profile Position Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error Code	ro	unsigned16	0
6040h	-	Control Word	rw	unsigned16	0
6041h	-	Status Word	ro	unsigned16	0
6060h	-	Control Mode	rw	integer8	0
6061h	-	Control Mode Display	ro	integer8	0
6062h	-	User Position Command	ro	integer32	0
6063h	-	Motor Position Feedback	ro	integer32	0

6064h	-	User Position Feedback	ro	integer32	0
6065h	-	User Position Deviation Overrun Threshold	rw	unsigned32	1000000
6067h	-	Position Reached Threshold	rw	unsigned32	100
6068h	-	Position Reached Time	rw	unsigned16	1
606Bh	-	User Speed Command Value	ro	integer32	0
606Ch	-	User Actual Speed Feedback	ro	integer32	0
607Ah	-	Target Position Value	rw	integer32	0
607Ch	-	Home Offset	rw	integer32	0
607Dh	01h	Soft Limit: Minimum Position Limit	rw	integer32	-2147483648
607Dh	02h	Soft Limit: Maximum Position Limit	rw	integer32	2147483647
607Eh	-	Command Polarity	rw	unsigned8	0
6081h	-	Profile Velocity	rw	unsigned32	100
6083h	-	Profile Acceleration	rw	unsigned32	100
6084h	-	Profile Deceleration	rw	unsigned32	100
6093h	01h	Position Factor: Numerator	rw	unsigned32	131072
6093h	02h	Position Factor: Feed Constant	rw	unsigned32	10000
60F4h	-	User Position Deviation	ro	integer32	0
60FCh	-	Motor Position Command Feedback	ro	integer32	0

5.1.4 Application Example of Profile Position Mode

Set servo parameters:

Table 5-4 Servo Driver Parameter Configuration for Running Profile Position Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo Operation Mode

Connect the upper controller to the servo driver:

Table 5-5 Startup and Operation Process of Profile Position Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control Mode	1
607A0020h	Given Position	Set by User
60810020h	Given Velocity under Profile Position Loop	-3000~3000
60400010h Control Word	Enable	Any value → 6 → 7 → 15/47/79/111
60400010h Control Word	Fault Reset	Any value → 128 (Rising edge valid)
60400010h Control Word	Absolute Position Given (Non-immediate Update)	6 → 7 → 15 → 31
60400010h Control Word	Absolute Position Given (Immediate Update)	6 → 7 → 47 → 63
60400010h Control Word	Relative Position Given (Non-immediate Update)	6 → 7 → 79 → 95
60400010h Control Word	Relative Position Given (Immediate Update)	6 → 7 → 111 → 127
60830020h	Profile Acceleration	0~1000rpm Time: ms
60840020h	Profile Deceleration	1000~0rpm Time: ms

5.2 Profile Velocity Mode (PV)

In the Profile Velocity Mode, the upper controller can set the target velocity and acceleration (deceleration). To enable this mode, set the object 6060H to 3. The control block diagram and input/output are shown in Figure 5-5 and Figure 5-6 respectively.

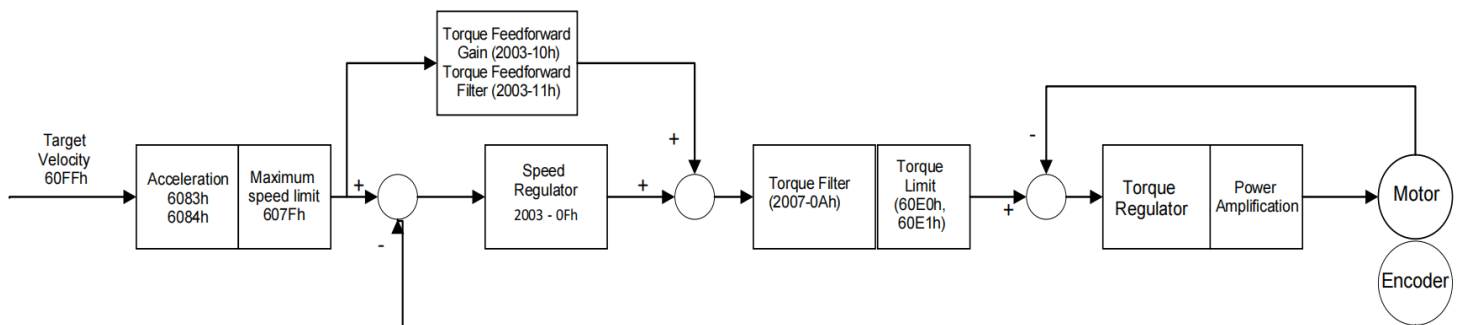


Figure 5-5 Profile Velocity Mode Control Block Diagram

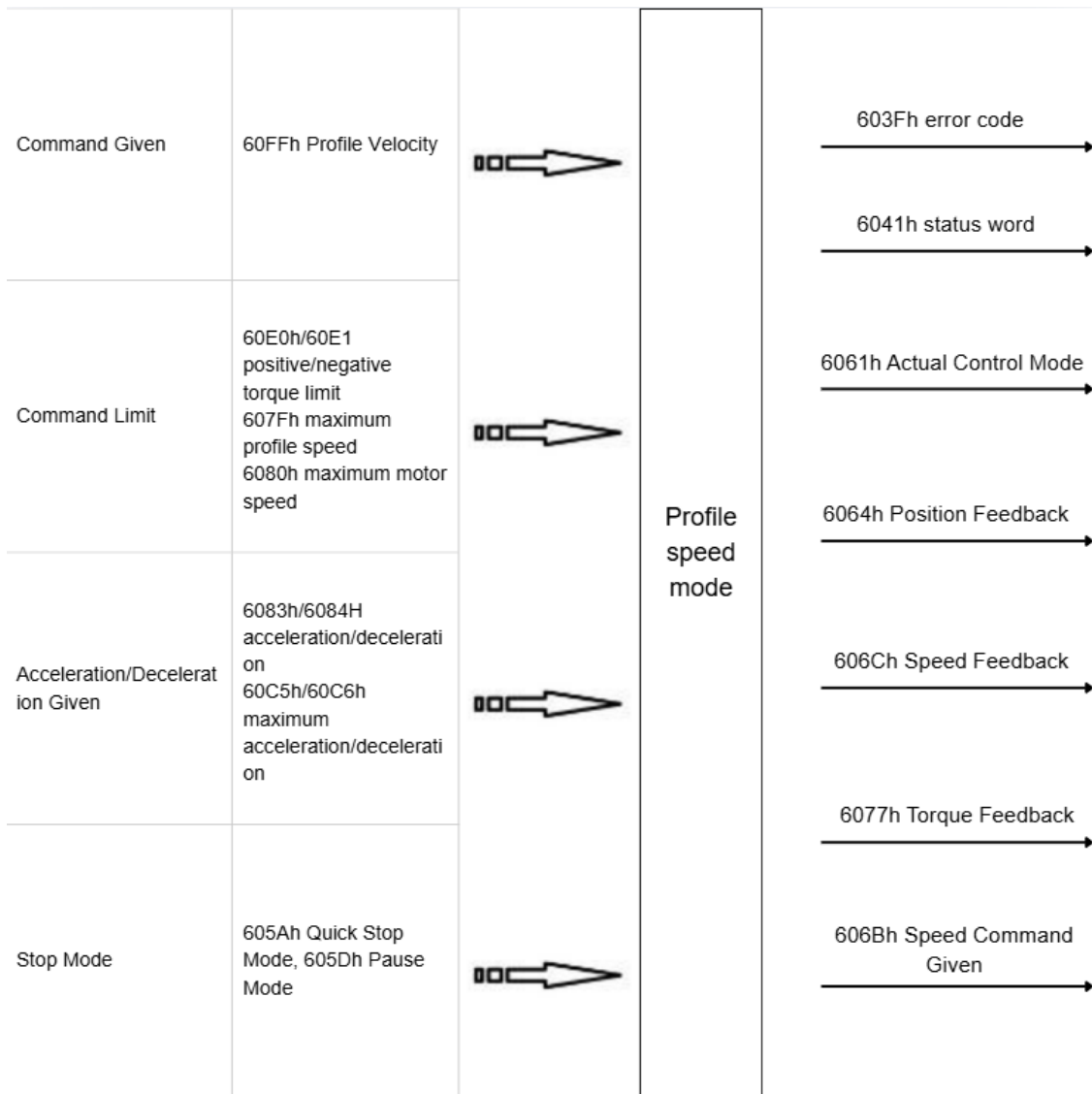


Figure 5-6 Profile Velocity Mode Input/Output

5.2.1 Control Word Setting of Profile Velocity Mode (60400010h)

When selecting the Profile Velocity Mode, the meaning of each bit of the control word (6040h) is shown in Table 5-6. The ones highlighted in dark color are the dedicated control commands for the Profile Velocity Mode.

Table 5-6 Explanation of Control Word in Profile Velocity Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo

4~6	PV mode reserved	None
7	Fault reset	Execute a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes; other control commands are invalid when this bit is 1
8	Pause	0: Invalid; 1: Valid. Execute commands when invalid; stop when valid
9	PV mode reserved	None
10	Reserved	None
11~15	Manufacturer-defined	None

5.2.2 Status Word Definition of Profile Velocity Mode (60410010h)

When selecting the Profile Velocity Mode, the meaning of each bit of the status word (6041h) is shown in Table 5-7.

Table 5-7 Explanation of Status Word in Profile Velocity Mode

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: Invalid; 1: Valid
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid
7	Warning	0: No warning; 1: Warning exists
8	Manufacturer-defined	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Speed reached	When bit 8 (Pause) of 60400010h = 0: 0: Speed not reached; 1: Speed reached; When bit 8 (Pause) of 60400010h = 1: 0: Decelerating; 1: Speed is 0
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	Zero speed status	0: Position command can be updated; 1: Position command cannot be updated
13	PV mode reserved	None

5.2.3 Relevant Parameters of Profile Velocity Mode

Table 5-8 lists the dictionary objects involved in the Profile Velocity Mode.

Table 5-8 Relevant Dictionary Objects of Profile Velocity Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error Code	ro	unsigned16	0
6040h	-	Control Word	rw	unsigned16	0
6041h	-	Status Word	ro	unsigned16	0
6060h	-	Control Mode	rw	integer8	0
6061h	-	Control Mode Display	ro	integer8	0
6063h	-	Motor Position Feedback	ro	integer32	0
6064h	-	User Position Feedback	ro	integer32	0
606Bh	-	User Speed Command Value	ro	integer32	0
606Ch	-	User Actual Speed Feedback	ro	integer32	0
606Dh	-	Speed Reached Threshold	rw	unsigned16	100
606Eh	-	Speed Reached Time	rw	unsigned16	1
606Fh	-	Zero Speed Threshold	rw	unsigned16	10
607Ch	-	Home Offset	rw	integer32	0
607Dh	01h	Soft Limit: Minimum Position Limit	rw	integer32	-2147483648
607Dh	02h	Soft Limit: Maximum Position Limit	rw	integer32	2147483647
607Eh	-	Command Polarity	rw	unsigned8	0
6083h	-	Profile Acceleration	rw	unsigned32	100
6084h	-	Profile Deceleration	rw	unsigned32	100
6094h	01h	Speed Encoder Factor: Numerator	rw	unsigned32	1
6094h	02h	Speed Encoder Factor: Denominator	rw	unsigned32	1
60C5h	-	Maximum Profile Acceleration	rw	unsigned32	200
60C6h	-	Maximum Profile Deceleration	rw	unsigned32	200
60B1h	-	Speed Offset	rw	unsigned32	0

60B2h	-	Torque Offset	rw	unsigned32	0
60FFh	-	Target Velocity	rw	integer32	0

5.2.4 Application Example of Profile Velocity Mode

Set servo parameters:

Table 5-9 Servo Driver Parameter Configuration for Running Profile Velocity Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo Operation Mode

Connect the upper controller to the servo driver:

Table 5-10 Startup and Operation Process of Profile Velocity Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control Mode	3
60FF0020h	Profile Velocity Given	-3000~3000
60400010h Control Word	Enable	Any value → 6 → 7 → 15
60400010h Control Word	Fault Reset	Any value → 128 (Rising edge valid)
60400010h Control Word	Motor Rotation	Issue speed command after enabling
60830020h	Profile Acceleration	Set by User
60840020h	Profile Deceleration	Set by User

5.3 Profile Torque Mode (PT)

In the Profile Torque Mode, the upper controller can set the target torque and torque command change rate (torque ramp). To enable this mode, set the object 6060H to 4. The control block diagram and input/output are shown in Figure 5-7 and Figure 5-8 respectively.

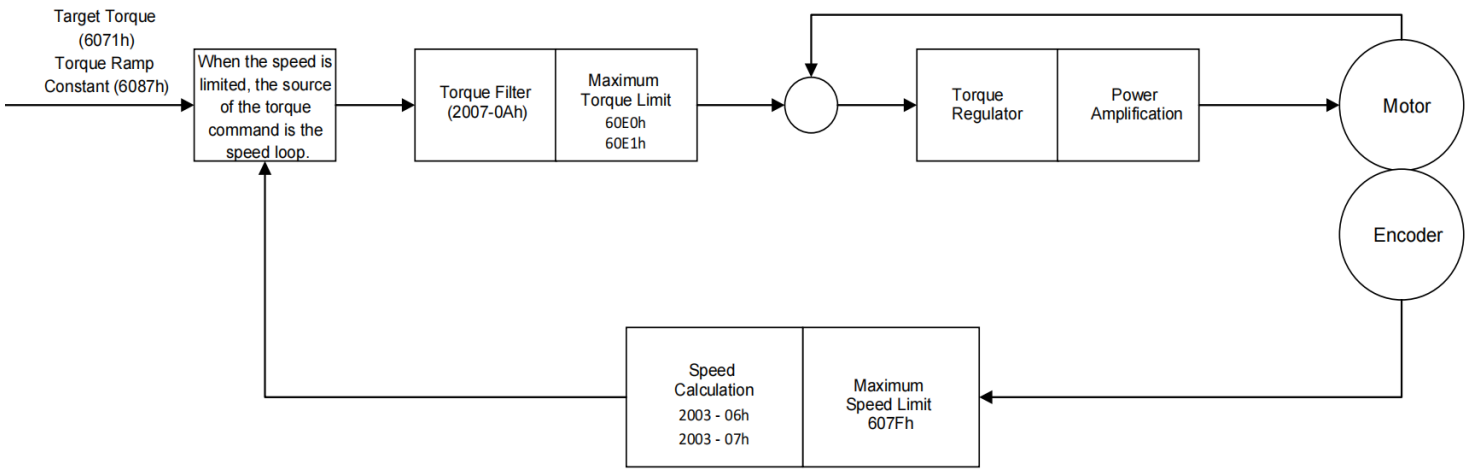


Figure 5-7 Profile Torque Mode Control Block Diagram

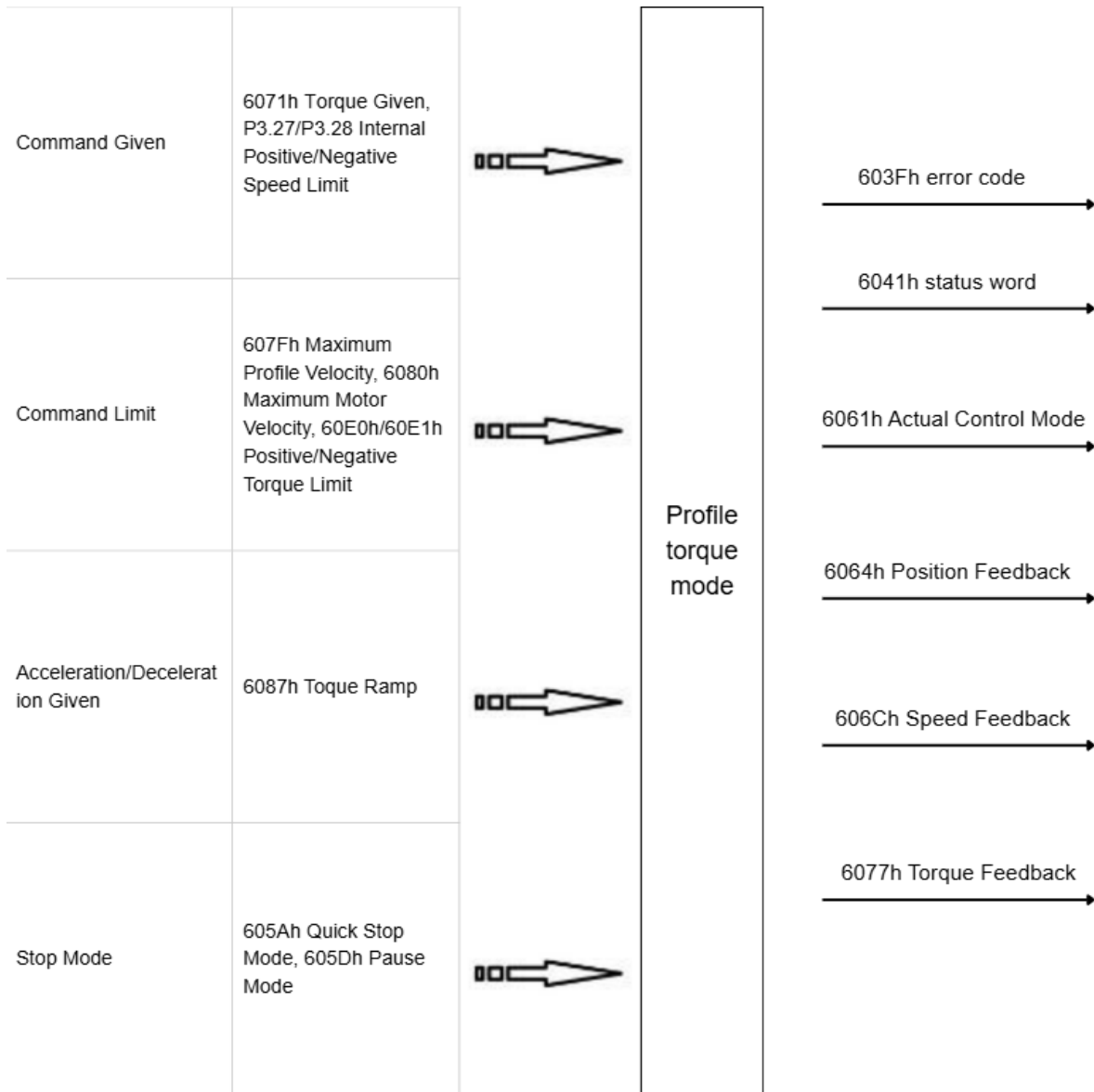


Figure 5-8 Profile Torque Mode Input/Output

5.3.1 Control Word Setting of Profile Torque Mode (60400010h)

When selecting the Profile Torque Mode, the meaning of each bit of the control word (6040h) is shown in Table 5-11.

Table 5-11 Explanation of Control Word in Profile Torque Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4~6	PT mode reserved	None
7	Fault reset	Execute a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes; other control commands are invalid when this bit is 1
8	Pause	0: Invalid; 1: Valid. Execute commands when invalid; stop when valid
9	PT mode reserved	None
10	Reserved	None
11~15	Manufacturer-defined	None

5.3.2 Status Word Definition of Profile Torque Mode (60410010h)

When selecting the Profile Torque Mode, the meaning of each bit of the status word (6041h) is shown in Table 5-12.

Table 5-12 Explanation of Status Word in Profile Torque Mode

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: Invalid; 1: Valid
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid

7	Warning	0: No warning; 1: Warning exists
8	Manufacturer-defined	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Torque reached	0: Torque not reached; 1: Torque reached
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12~13	PT mode reserved	None
14~15	Manufacturer-defined	None

5.3.3 Relevant Parameters of Profile Torque Mode

Table 5-13 lists the dictionary objects involved in the Profile Torque Mode.

Table 5-13 Relevant Dictionary Objects of Profile Torque Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error Code	ro	unsigned16	0
6040h	-	Control Word	rw	unsigned16	0
6041h	-	Status Word	ro	unsigned16	0
6060h	-	Control Mode	rw	integer8	0
6061h	-	Control Mode Display	ro	integer8	0
606Ch	-	User Actual Speed Feedback	ro	integer32	0
6071h	-	Torque Target Value	rw	Integer16	0
6074h	-	User Given Torque Value	ro	integer16	0
6077h	-	Actual Torque Feedback	ro	integer16	0
607Dh	01h	Soft Limit: Minimum Position Limit	rw	integer32	-2147483648
607Dh	02h	Soft Limit: Maximum Position Limit	rw	integer32	2147483647
6080h	-	Maximum Motor Speed	rw	unsigned32	4500
6087h	-	Torque Ramp	rw	unsigned32	0

5.3.4 Application Example of Profile Torque Mode

Set servo parameters:

Table 5-14 Servo Driver Parameter Configuration for Running Profile Torque Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo Operation Mode

Connect the upper controller to the servo driver:

Table 5-15 Startup and Operation Process of Profile Torque Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control Mode	4
60800020h	Maximum Speed Limit under Profile Torque Mode	Set by User
60710010h	Profile Torque Given	Set by User
60400010h	Control Enable	Any value → 6 → 7 → 15
	Word	
60400010h	Control Fault Reset	Any value → 128 (Rising edge valid)
	Word	
60400010h	Control Motor Rotation	Issue command after enabling
	Word	
60870020h	Torque Ramp	Set by User (Acceleration/Deceleration under Torque Mode)

5.4 Home Mode (HM)

According to the home switch signal, limit switch, and encoder Z signal, the CiA402 protocol defines 31 homing methods. To enable this mode, set the object 6060h to 6. The home mode control block diagram and input/output are shown in Figure 5-9 and Figure 5-10 respectively.

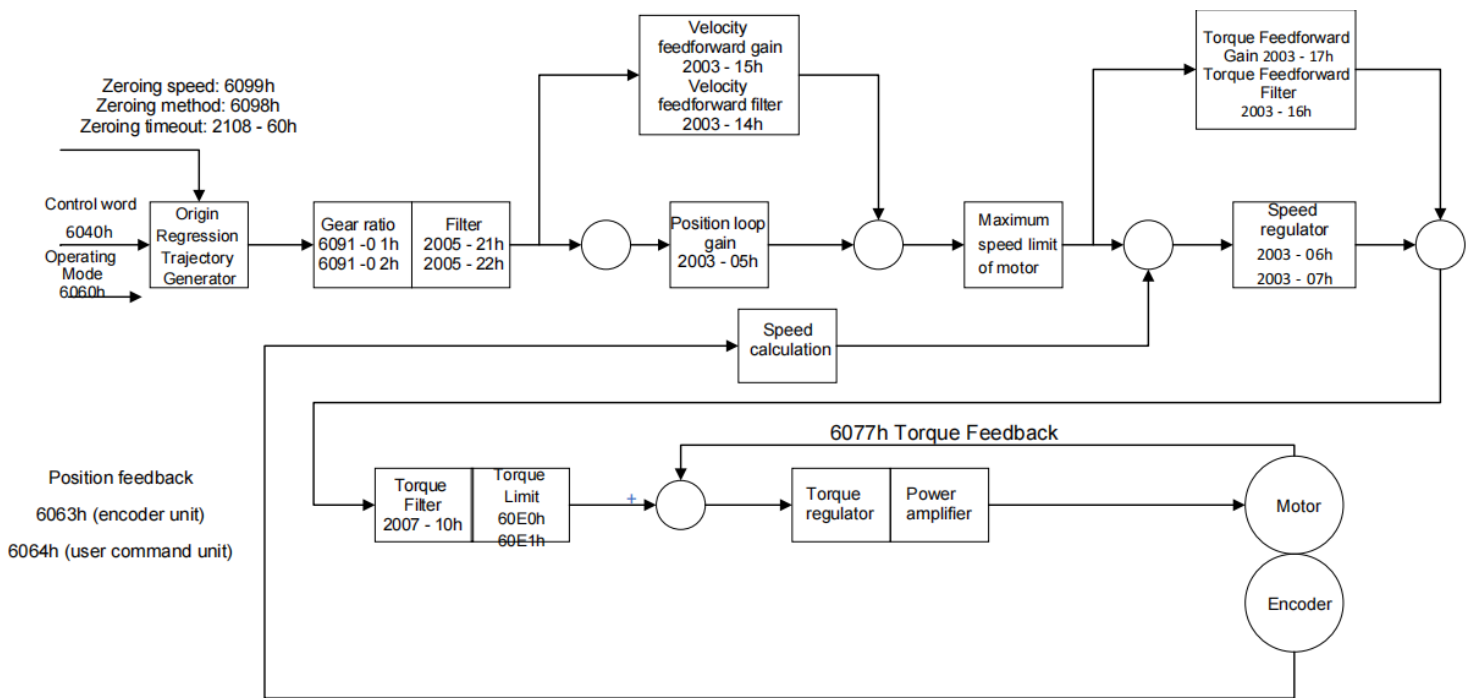


Figure 5-9 Homing Mode Control Block Diagram

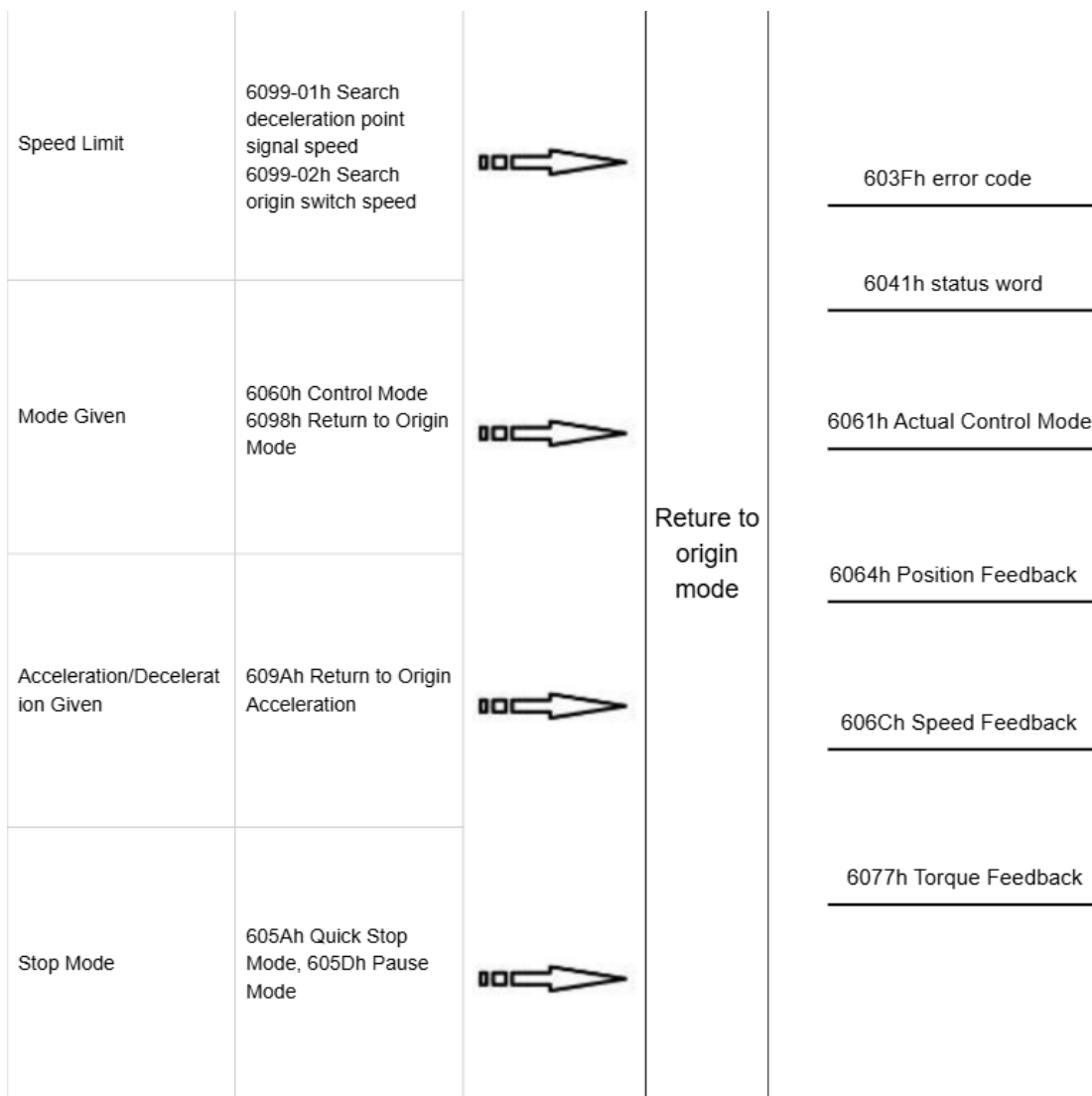


Figure 5-10 Homing Mode Input/Output Diagram

5.4.1 Control Word Setting in Home Mode (60400010h)

When selecting the Home Mode, the meaning of each bit of the control word (6040h) is shown in Table 5-16.

Table 5-16 Explanation of Control Word in Home Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4	Homing enable	0: Invalid; 1: Valid. Start the homing process when valid; must remain valid during the entire homing process; switch to invalid to stop the homing process
5~6	Home mode reserved	None
7	Fault reset	Execute a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes; other control commands are invalid when this bit is 1
8	Pause	0: Invalid; 1: Valid. Decelerate and stop the homing process when valid
9	Reserved	None
10	Reserved	None
11~15	Manufacturer-defined	None

5.4.2 Status Word Definition in Home Mode (60410010h)

When selecting the Home Mode, the meaning of each bit of the status word (6041h) is shown in Table 5-17.

Table 5-17 Explanation of Status Word in Home Mode

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: Invalid; 1: Valid
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid

7	Warning	0: No warning; 1: Warning exists
8	Manufacturer-defined	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Position reached	When bit8 (Pause) of 60400010h = 0: 0: Position not reached; 1: Position reached; When bit8 (Pause) of 60400010h = 1: 0: Decelerating; 1: Speed is 0
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	Homing completion output	0: Homing not completed; 1: Homing completed
13	Homing error	0: No error; 1: Homing error occurred
14	Manufacturer-defined	None
15	Homing completed	0: Invalid; 1: Homing completed

5.4.3 Relevant Parameters of Home Mode

Table 5-18 lists the dictionary objects involved in the Home Mode.

Table 5-18 Relevant Dictionary Objects of Home Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error Code	ro	unsigned16	0
6040h	-	Control Word	rw	unsigned16	0
6041h	-	Status Word	ro	unsigned16	0
6060h	-	Control Mode	rw	integer8	0
6061h	-	Control Mode Display	ro	integer8	0
6062h	-	User Position Command	ro	integer32	0
6063h	-	Motor Position Feedback	ro	integer32	0
6064h	-	User Position Feedback	ro	integer32	0
6065h	-	User Position Deviation Overrun Threshold	rw	unsigned32	1000000
6067h	-	Position Reached Threshold	rw	unsigned32	100
6068h	-	Position Reached Time	rw	unsigned16	1
606Bh	-	User Speed Command Value	ro	integer32	0

606Ch	-	User Actual Speed Feedback	ro	integer32	0
607Ch	-	Home Offset	rw	integer32	0
607Dh	01h	Soft Limit: Minimum Position Limit	rw	integer32	-2147483648
607Dh	02h	Soft Limit: Maximum Position Limit	rw	integer32	2147483647
6098h	-	Homing Mode	rw	integer8	0
6099h	01h	Speed for Searching Deceleration Point Signal in Homing Mode	rw	unsigned32	100
6099h	02h	Speed for Searching Home Switch Signal in Homing Mode	rw	unsigned32	10
609Ah	-	Homing Acceleration	rw	unsigned32	100

5.4.4 Application Example of Home Mode

Set servo parameters:

Table 5-19 Servo Driver Parameter Configuration for Running Home Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo Operation Mode

Connect the upper controller to the servo driver:

Table 5-20 Startup and Operation Process of Home Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control Mode	6
60980008h	Homing Mode	1~35
60400010h	Control Fault Reset	Any value → 128 (Rising edge valid)
	Word	
60400010h	Control Homing	6 → 7 → 15 → 31 (Homing enable BIT4 rising edge valid)
	Word	
60990120h	Speed for Searching Deceleration Point Signal in Homing Mode	0~3000 (Default: User Unit)
60990220h	Speed for Searching Home Switch Signal in Homing Mode	0~3000 (Default: User Unit)

5.4.5 Homing Mode Introduction

The CiA402 protocol internally defines 31 homing methods. In the mode introduction, HSW represents the home position sensor signal, NL represents the negative limit signal, and PL represents the positive limit signal. ON represents the valid state of the signal, and OFF represents the invalid state. OFF→ON represents the rising edge of the signal from the invalid state to the valid state, and ON→OFF represents the falling edge of the signal from the valid state to the invalid state. The following describes the operation trajectory and signal state changes of each homing mode respectively.

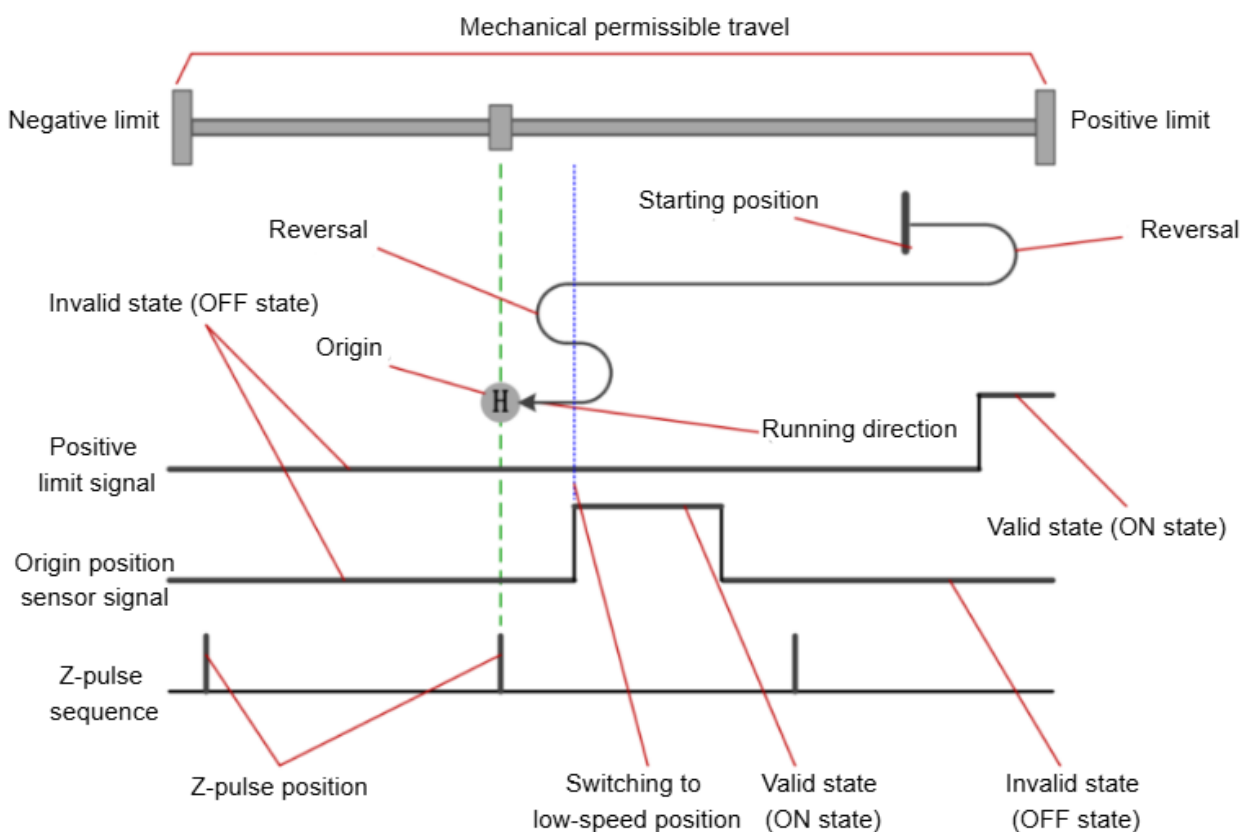


Figure 5-11 Explanation of Icons in Homing Mode Diagrams

Mode 1: 6098h = 1

Mechanical Home: Motor Z signal

Deceleration Point: Reverse Overtravel Switch (NOT)

If NL is invalid at startup, run at high speed towards the negative direction, decelerate and stop after encountering the OFF→ON state of NL, then switch to low speed and run towards the positive direction. When running at low speed towards the positive direction, after encountering the ON→OFF state of NL, continue to search for the

nearest Z pulse position towards the positive direction as the home position.

If NL is valid at startup, run at low speed towards the positive direction. After encountering the ON→OFF state of NL when running towards the positive direction, continue to search for the nearest Z pulse position towards the positive direction as the home position.

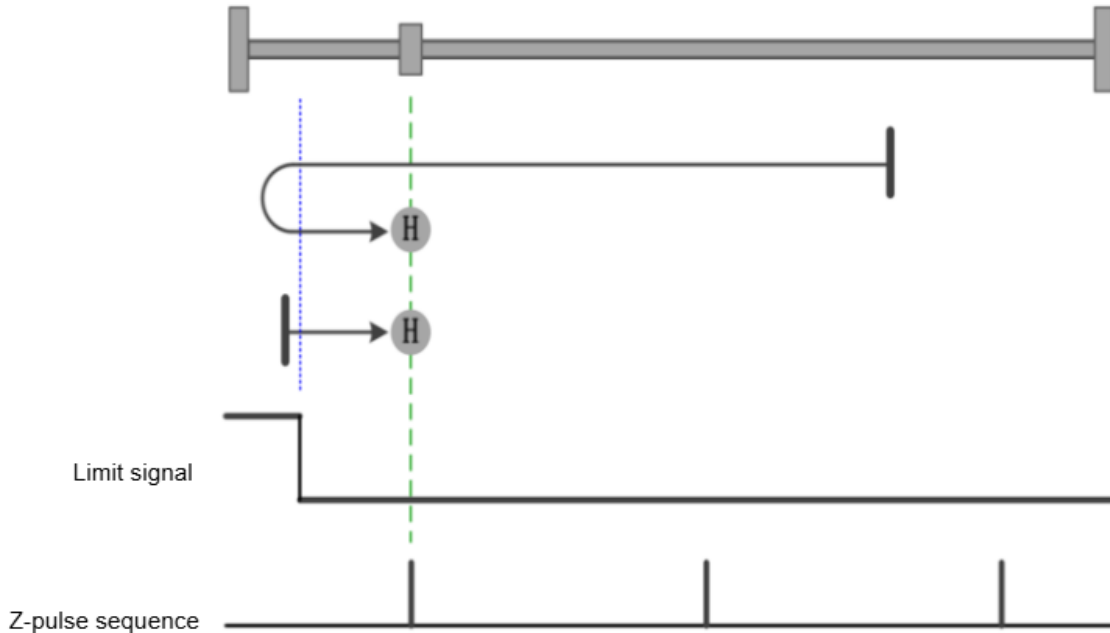


Figure 5-12 Trajectory and Signal State of Homing Mode 1

Mode 2: 6098h = 2

Home Position: Z signal

Deceleration Point: Positive Overtravel Switch (P-OT)

If PL is invalid at startup, run at high speed towards the positive direction, decelerate and stop after encountering the OFF→ON state of PL, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of PL, continue to search for the nearest Z pulse position towards the negative direction as the home position.

If PL is valid at startup, run at low speed towards the negative direction. After encountering the ON→OFF state of PL when running towards the negative direction, continue to search for the nearest Z pulse position towards the negative direction as the home position.

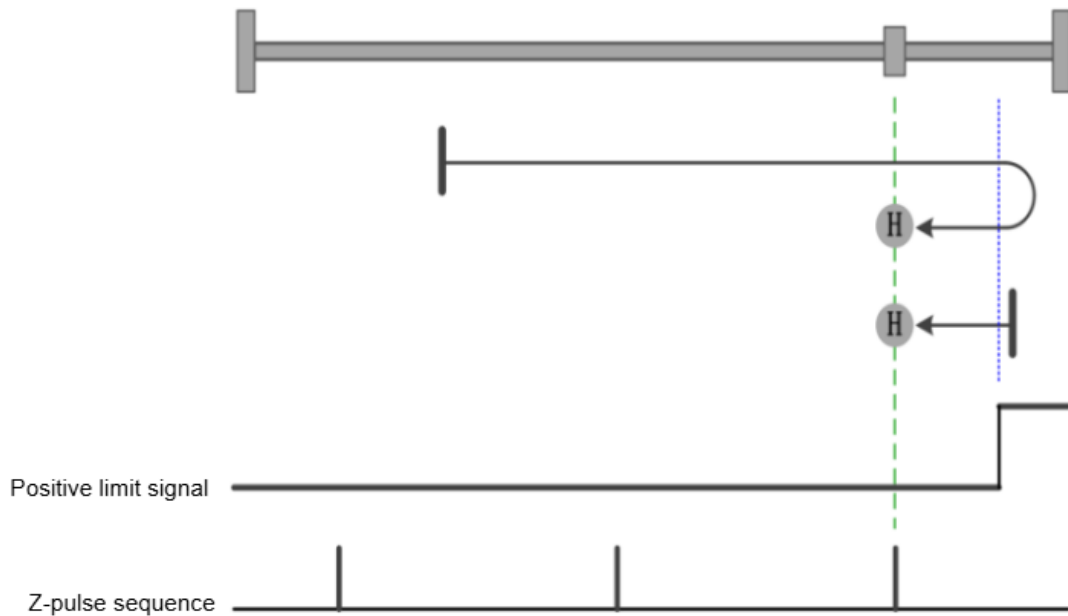


Figure 5-13 Trajectory and Signal State of Homing Mode 2

Mode 3: 6098h = 3

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed towards the positive direction. After encountering the OFF→ON state of HSW when running towards the positive direction, decelerate and stop, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

If HSW is valid at startup, run at high speed towards the negative direction. After encountering the ON→OFF state of HSW when running towards the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

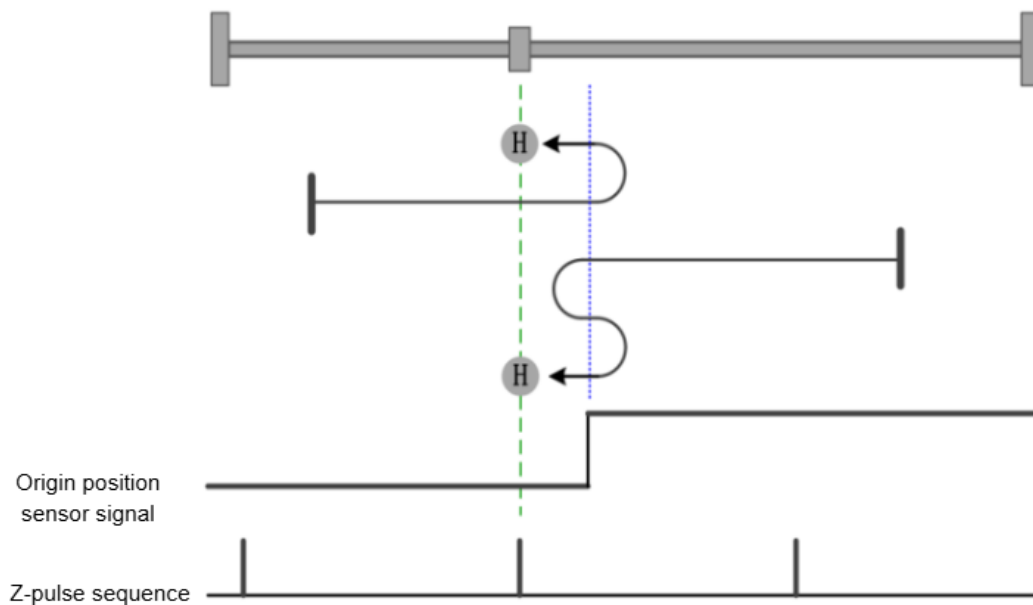


Figure 5-14 Trajectory and Signal State of Homing Mode 3

Mode 4: 6098h = 4

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed towards the positive direction. After encountering the OFF→ON state of HSW when running towards the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run towards the positive direction. When running at low speed towards the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position towards the positive direction as the home position.

If HSW is valid at startup, run at high speed towards the negative direction. After encountering the ON→OFF state of HSW when running towards the negative direction, decelerate and stop, then switch to low speed and run towards the positive direction. When running at low speed towards the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position towards the positive direction as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

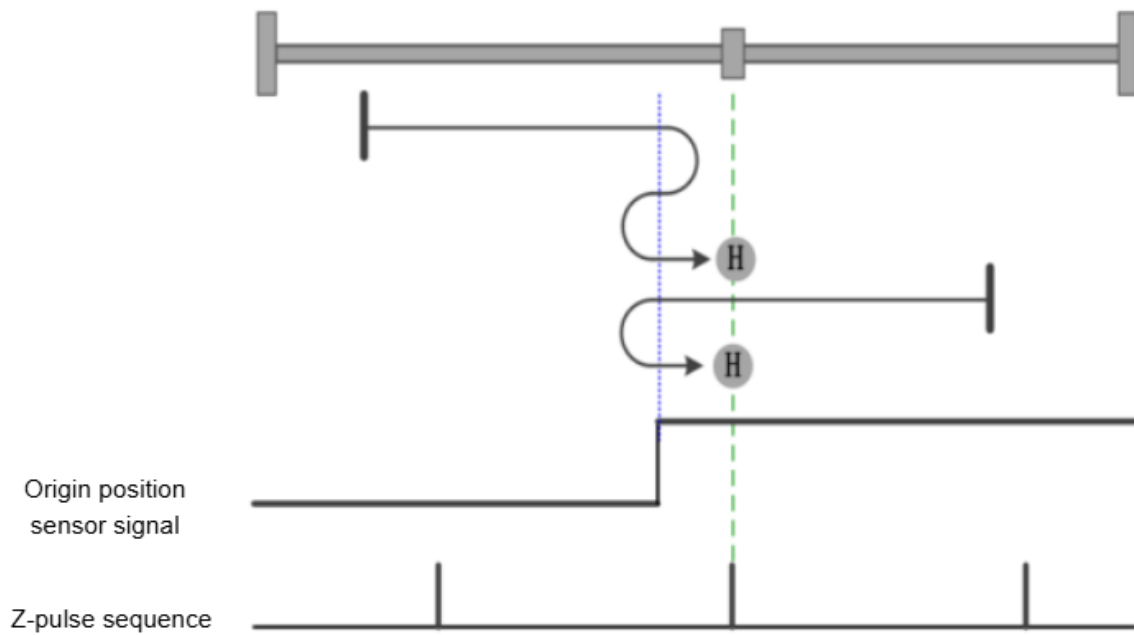


Figure 5-15 Trajectory and Signal State of Homing Mode 4

Mode 5: 6098h = 5

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed towards the negative direction. After encountering the OFF→ON state of HSW when running towards the negative direction, decelerate and stop, then switch to low speed and run towards the positive direction. When running at low speed towards the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the positive direction as the home position.

If HSW is valid at startup, run at high speed towards the positive direction. After encountering the ON→OFF state of HSW when running towards the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again, then switch to low speed and run towards the positive direction. When running at low speed towards the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the positive direction as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

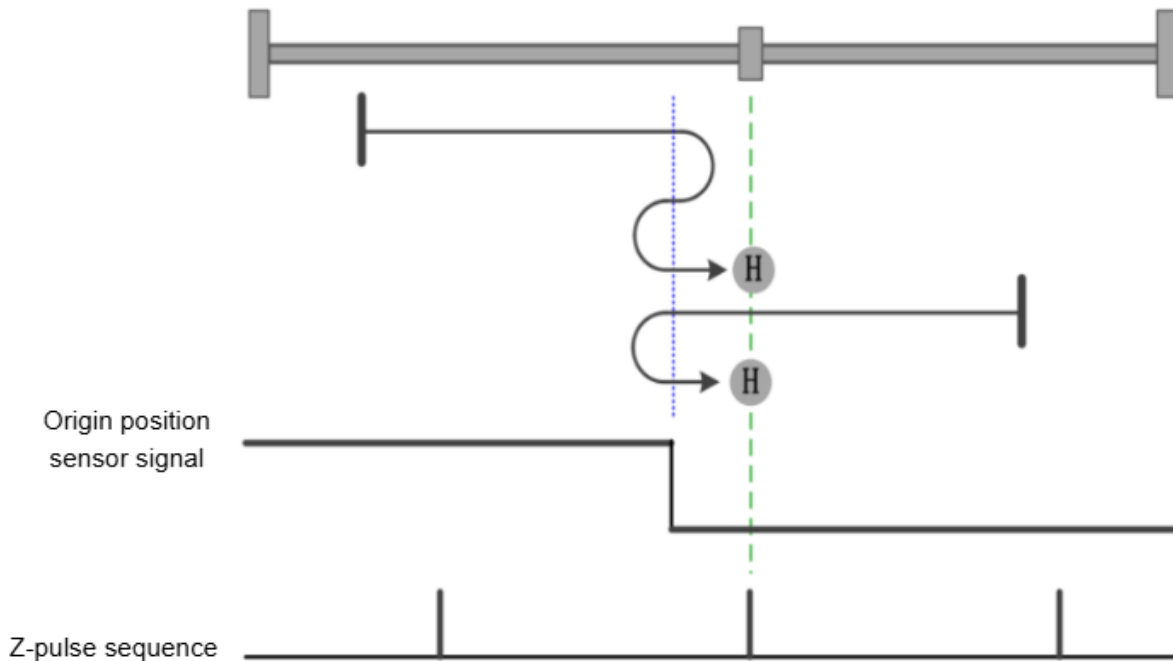


Figure 5-16 Trajectory and Signal State of Homing Mode 5

Mode 6: 6098h = 6

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed towards the negative direction. After encountering the OFF→ON state of HSW when running towards the negative direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

If HSW is valid at startup, run at high speed towards the positive direction. After encountering the ON→OFF state of HSW when running towards the positive direction, decelerate and stop, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

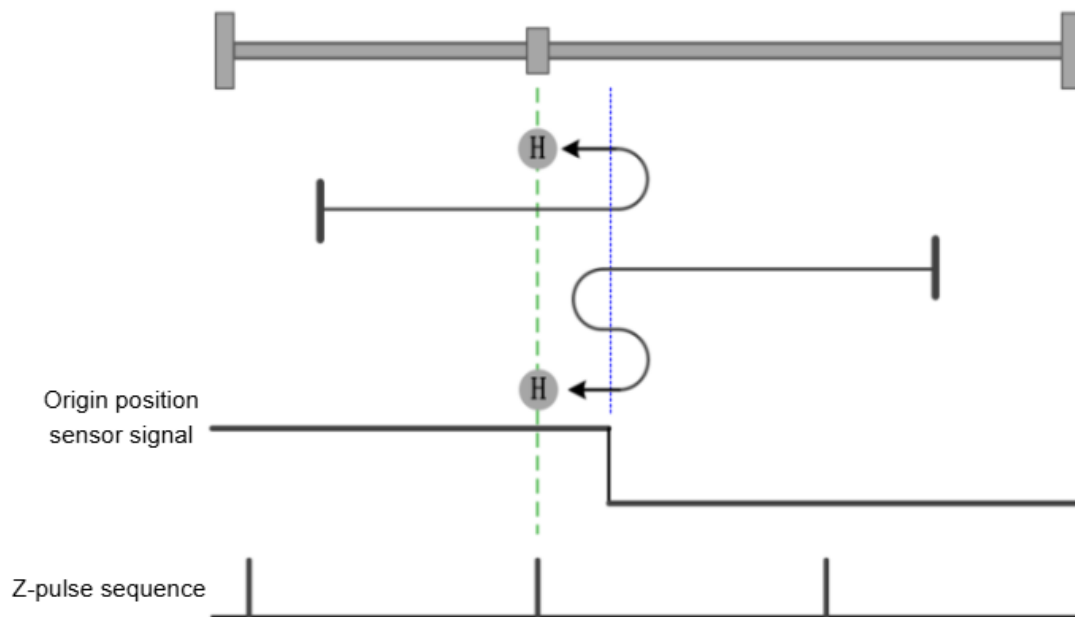


Figure 5-17 Trajectory and Signal State of Homing Mode 6

Mode 7: 6098h = 7

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed towards the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed towards the negative direction. When running towards the negative direction, after encountering the ON→OFF state of HSW, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed towards the positive direction. After encountering the OFF→ON state of HSW when running towards the positive direction, decelerate and stop, then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

If HSW is valid at startup, run at high speed towards the negative direction. After encountering the ON→OFF state of HSW when running towards the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter

the HSW invalid position interval on the other side), then switch to low speed and run towards the negative direction. When running at low speed towards the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position towards the negative direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running towards the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

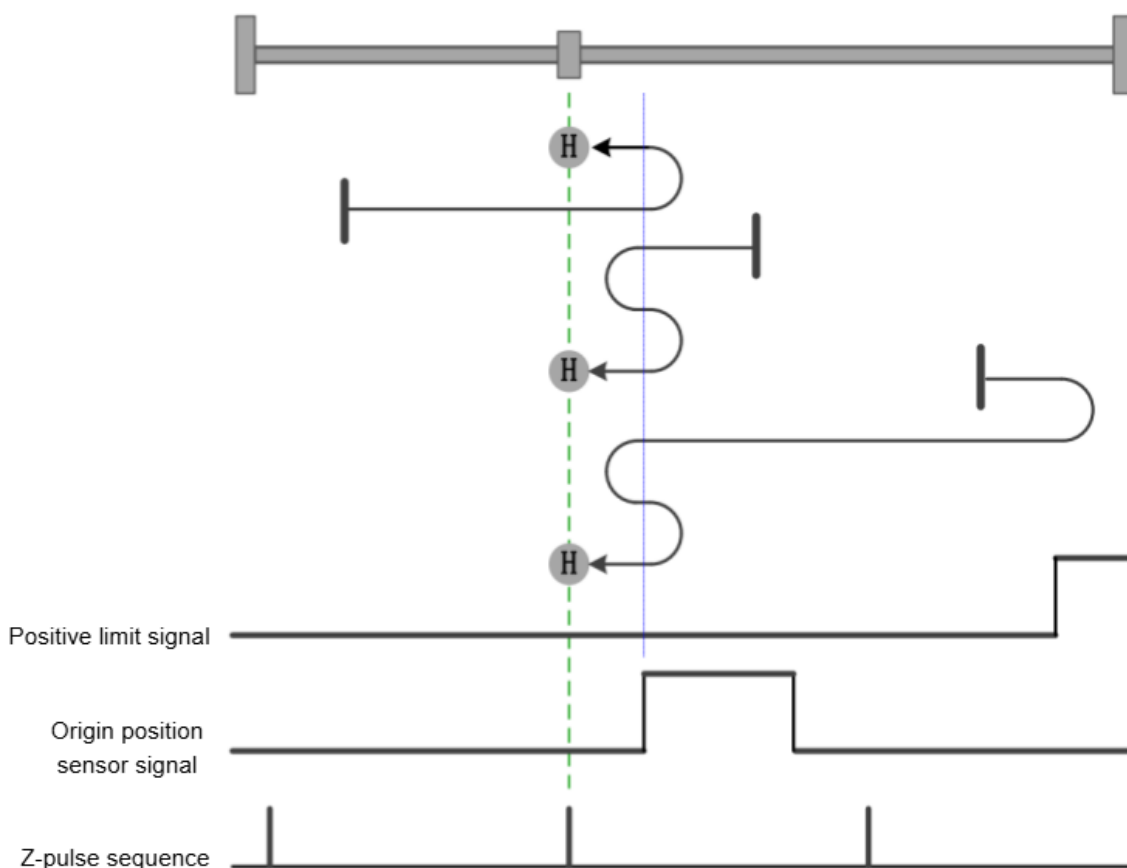


Figure 5-18 Trajectory and Signal State of Homing Mode 7

Mode 8: 6098h = 8

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the ON→OFF state of HSW, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

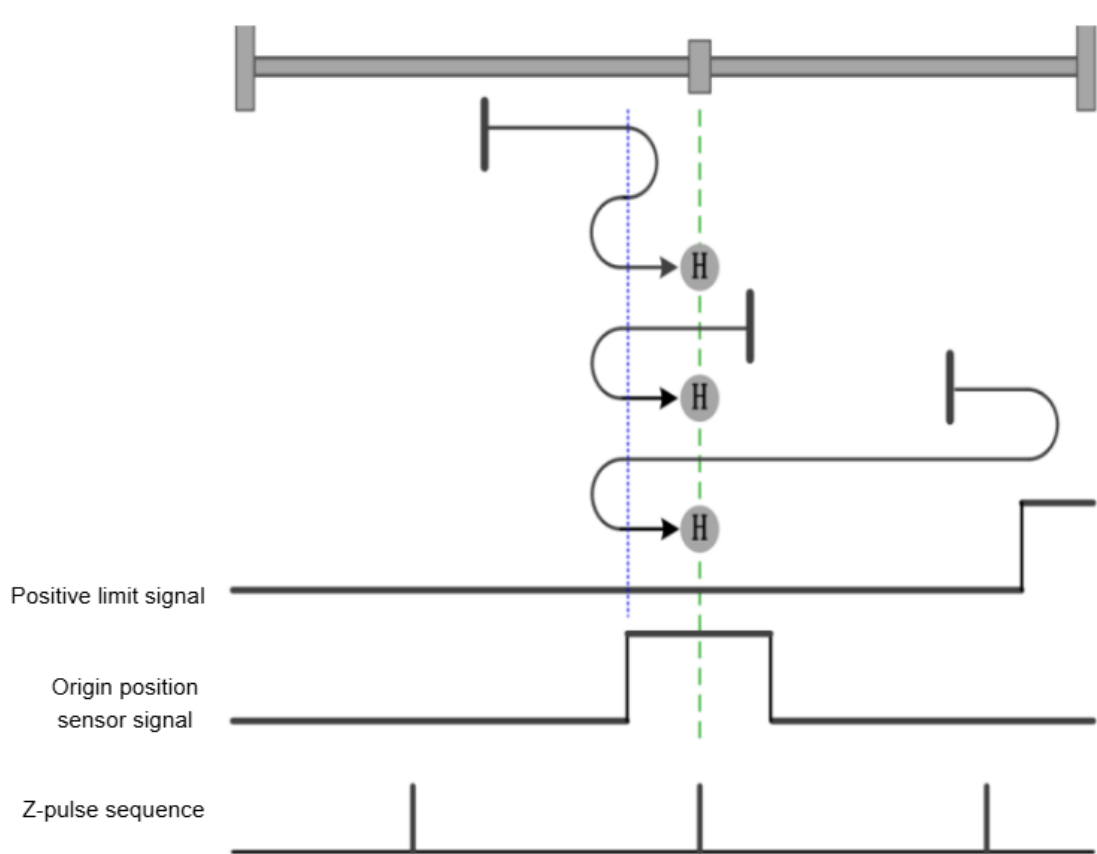


Figure 5-19 Trajectory and Signal State of Homing Mode 8

Mode 9: 6098h = 9

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the OFF→ON state of HSW, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

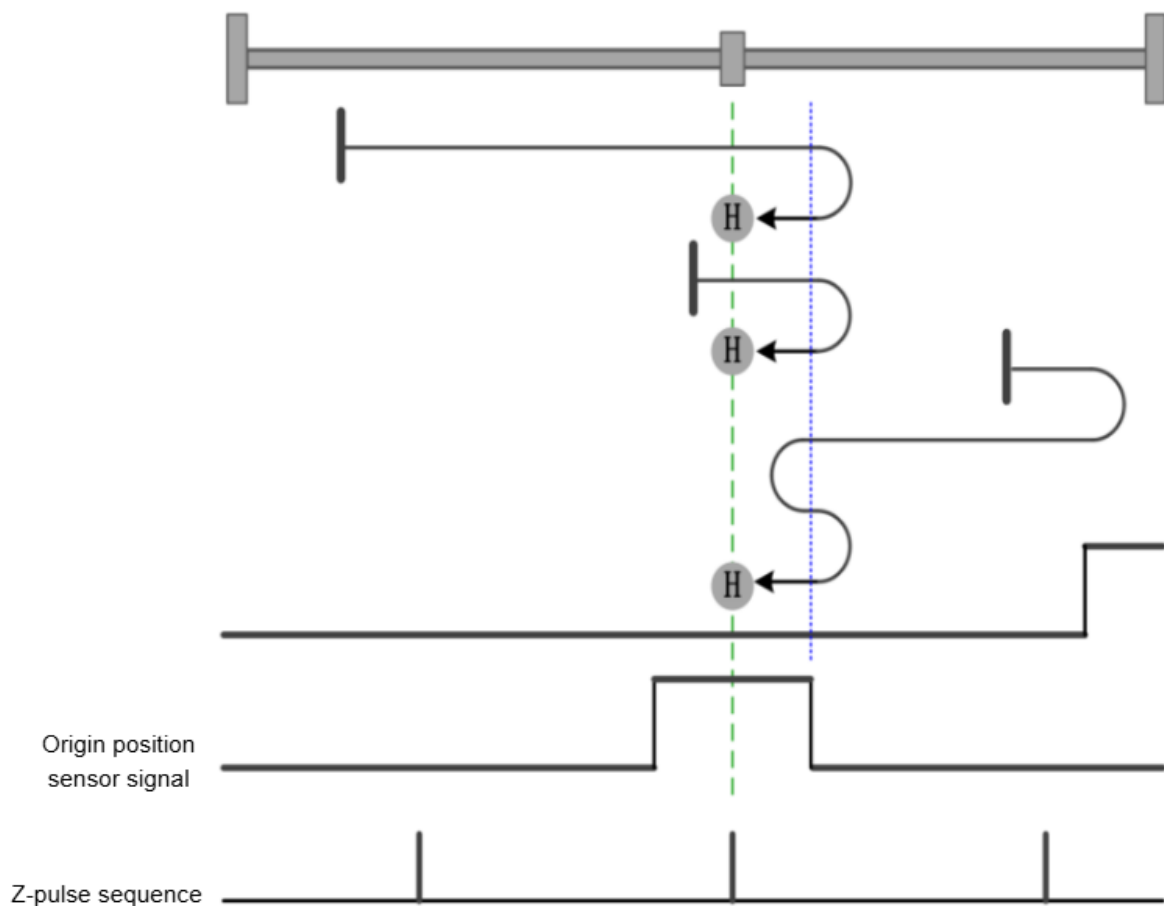


Figure 5-20 Trajectory and Signal State of Homing Mode 9

Mode 10: 6098h = 10

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the OFF→ON state of HSW, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive

direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

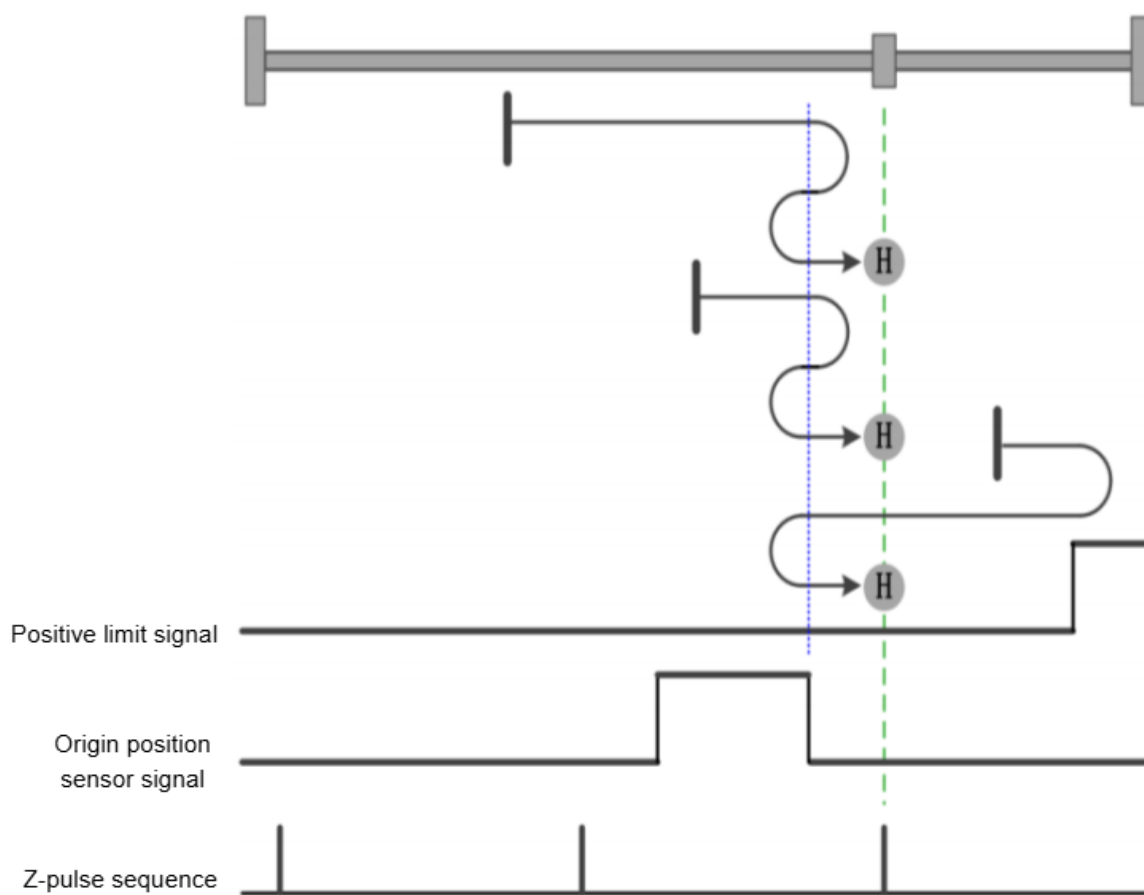


Figure 5-21 Trajectory and Signal State of Homing Mode 10

Mode 11: 6098h = 11

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward

the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

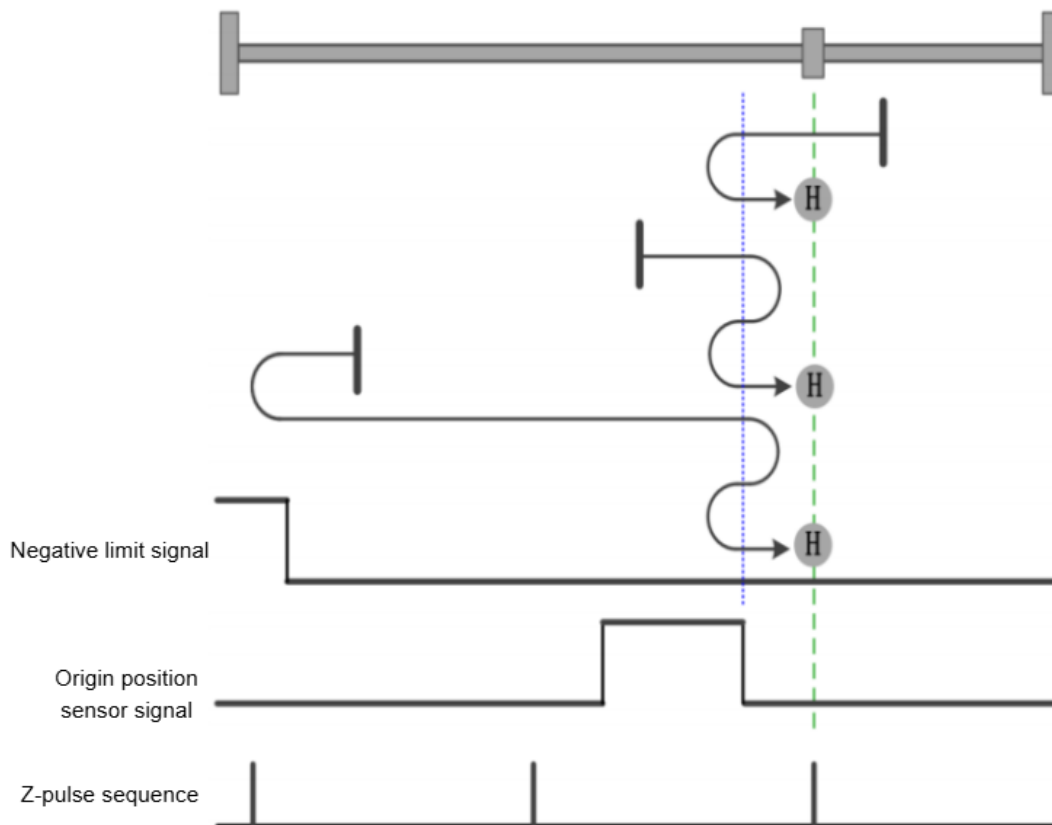


Figure 5-22 Trajectory and Signal State of Homing Mode 11

Mode 12: 6098h = 12

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state

of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

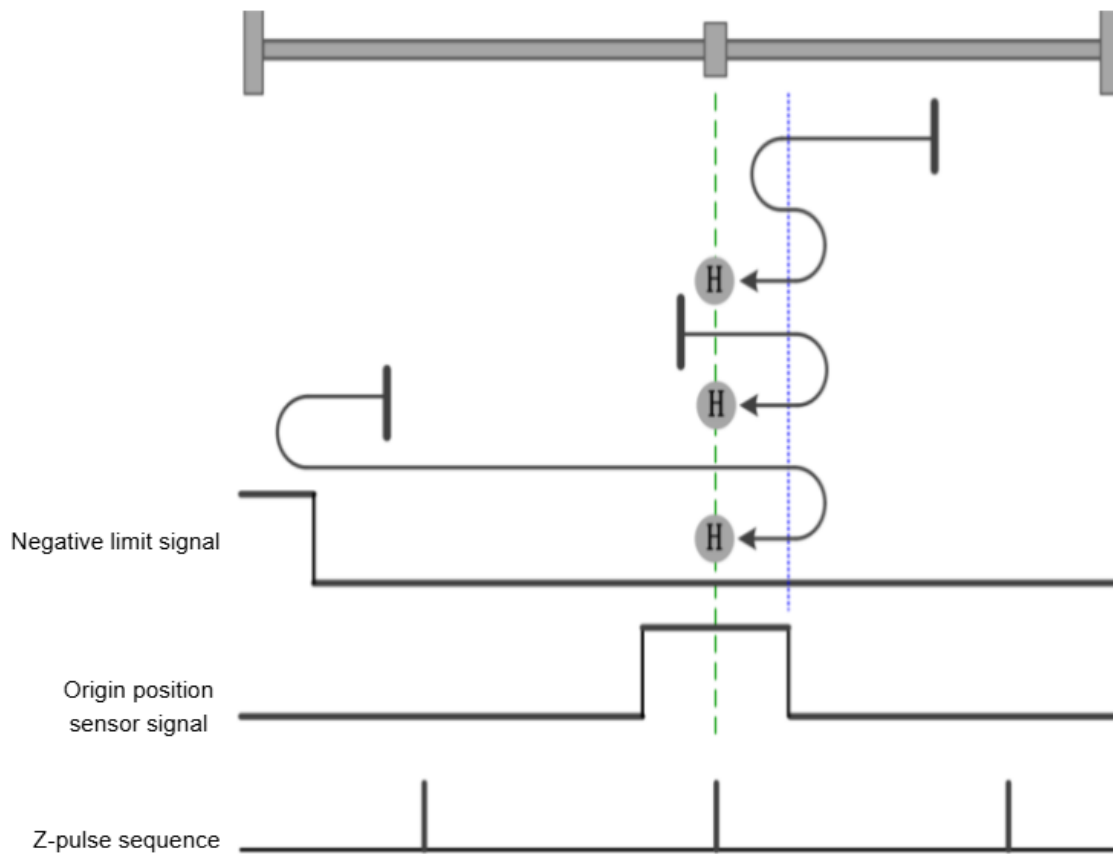


Figure 5-23 Trajectory and Signal State of Homing Mode 12

Mode 13: 6098h = 13

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, after encountering the OFF→ON state of HSW, continue to search for the nearest Z pulse position toward the positive direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

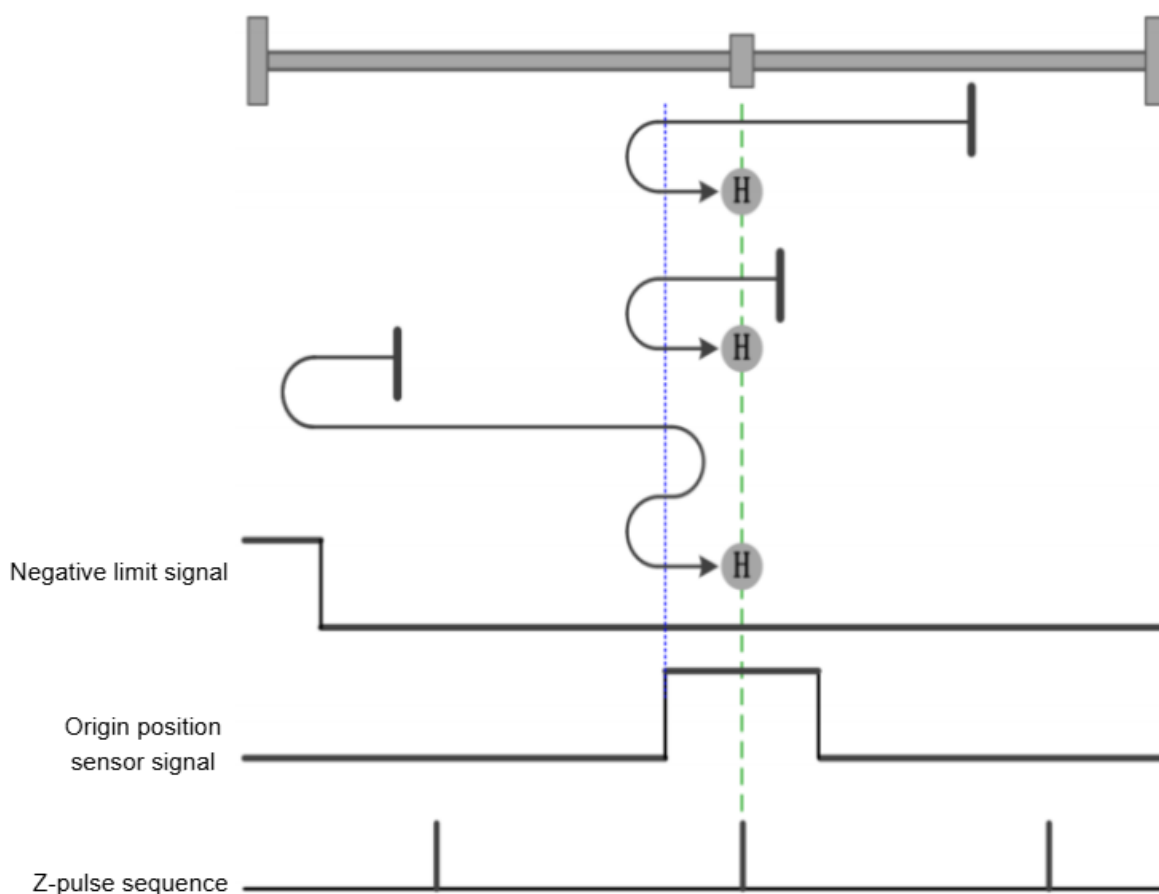


Figure 5-24 Trajectory and Signal State of Homing Mode 13

Mode 14: 6098h = 14

Home Position: Z signal

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, after encountering the ON→OFF state of HSW, continue to search for the nearest Z pulse position toward the negative direction as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

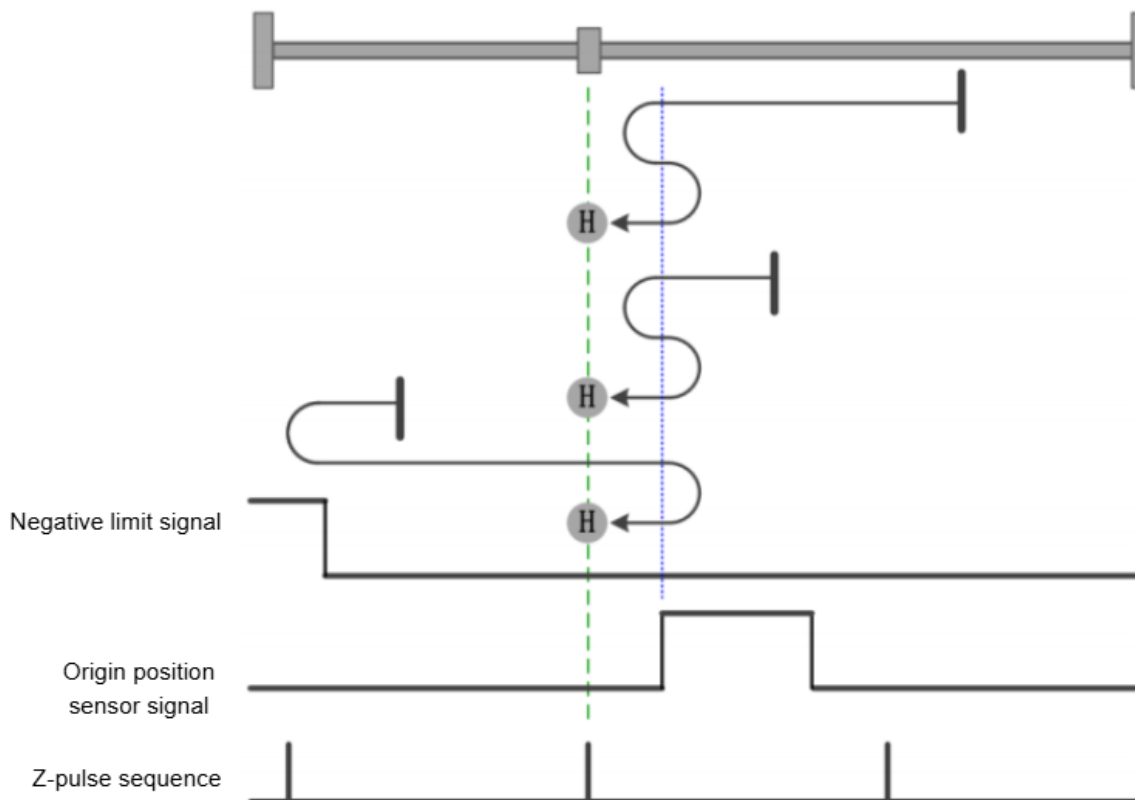


Figure 5-25 Trajectory and Signal State of Homing Mode 14

Mode 15: 6098h = 15 (Reserved)

Mode 16: 6098h = 16 (Reserved)

Mode 17: 6098h = 17

Home Position: Reverse Overtravel Switch

Deceleration Point: Reverse Overtravel Switch

If NL is invalid at startup, run at high speed toward the negative direction, decelerate and stop after encountering the OFF→ON state of NL, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of NL, and take the stop position as the home position.

If NL is valid at startup, run at low speed toward the positive direction. When running toward the positive direction, decelerate and stop when encountering the ON→OFF state of NL, and take the stop position as the home position.

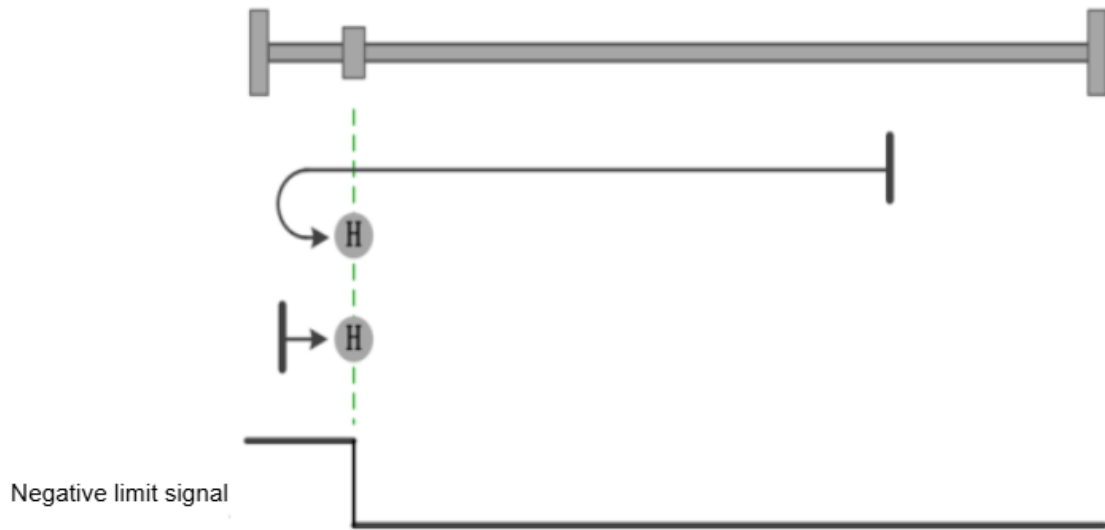


Figure 5-26 Trajectory and Signal State of Homing Mode 17

Mode 18: 6098h = 18

Home Position: Positive Overtravel Switch

Deceleration Point: Positive Overtravel Switch

If PL is invalid at startup, run at high speed toward the positive direction, decelerate and stop after encountering the OFF→ON state of PL, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of PL, and take the stop position as the home position.

If PL is valid at startup, run at low speed toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of PL, and take the stop position as the home position.

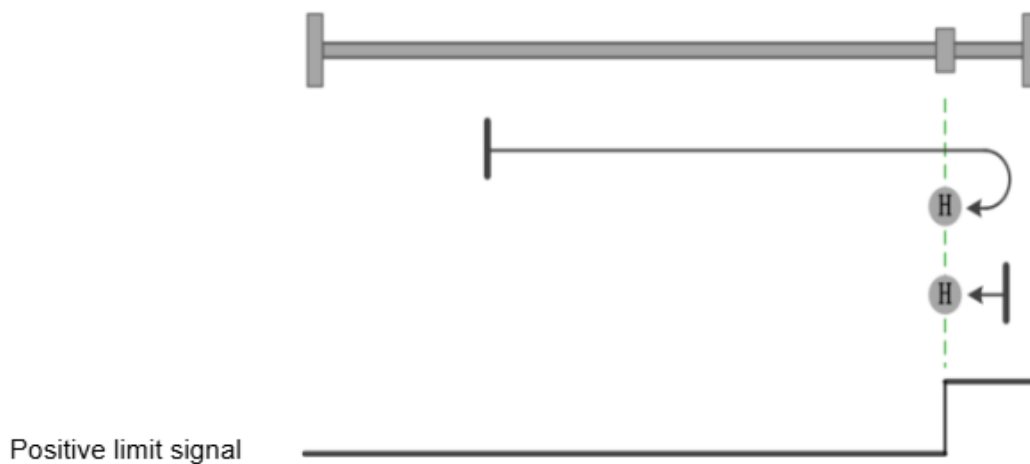


Figure 5-27 Trajectory and Signal State of Homing Mode 18

Mode 19: 6098h = 19

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

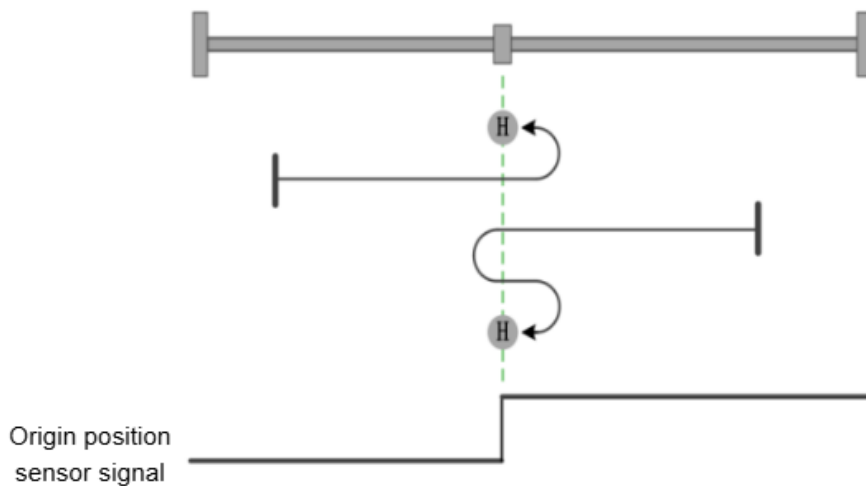


Figure 5-28 Trajectory and Signal State of Homing Mode 19

Mode 20: 6098h = 20

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

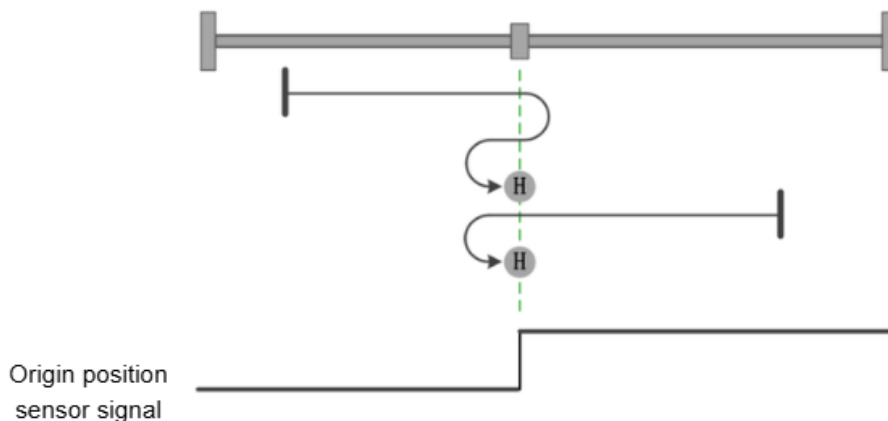


Figure 5-29 Trajectory and Signal State of Homing Mode 20

Mode 21: 6098h = 21

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed toward the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

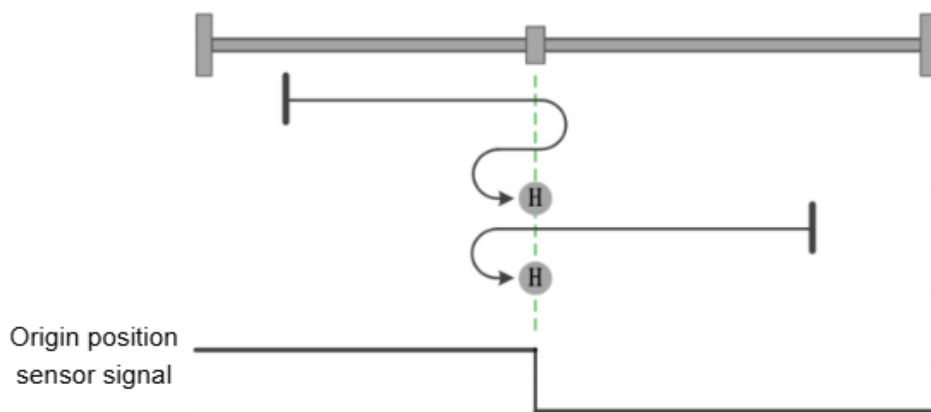


Figure 5-30 Trajectory and Signal State of Homing Mode 21

Mode 22: 6098h = 22

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup, run at high speed toward the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, if either NL or PL is in the ON state, the homing process will be stopped and an alarm will be issued.

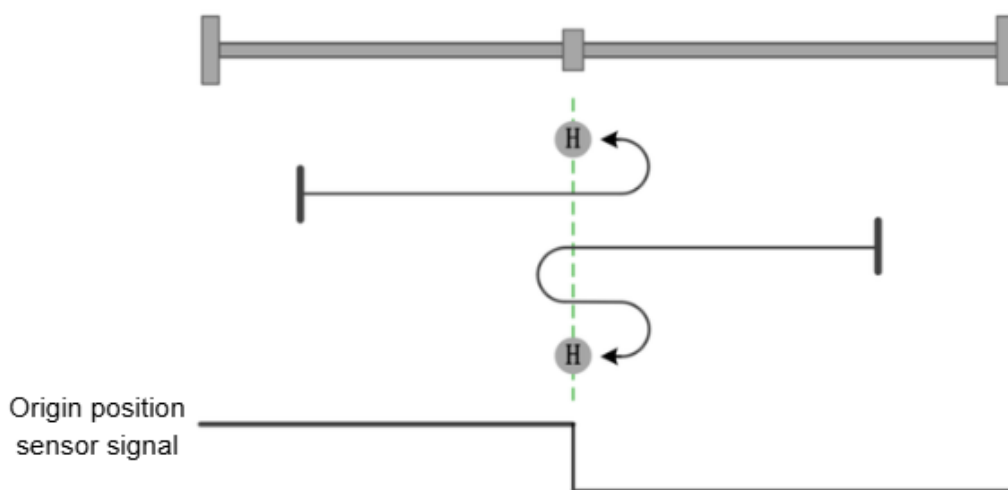


Figure 5-31 Trajectory and Signal State of Homing Mode 22

Mode 23: 6098h = 23

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the ON→OFF state of HSW, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

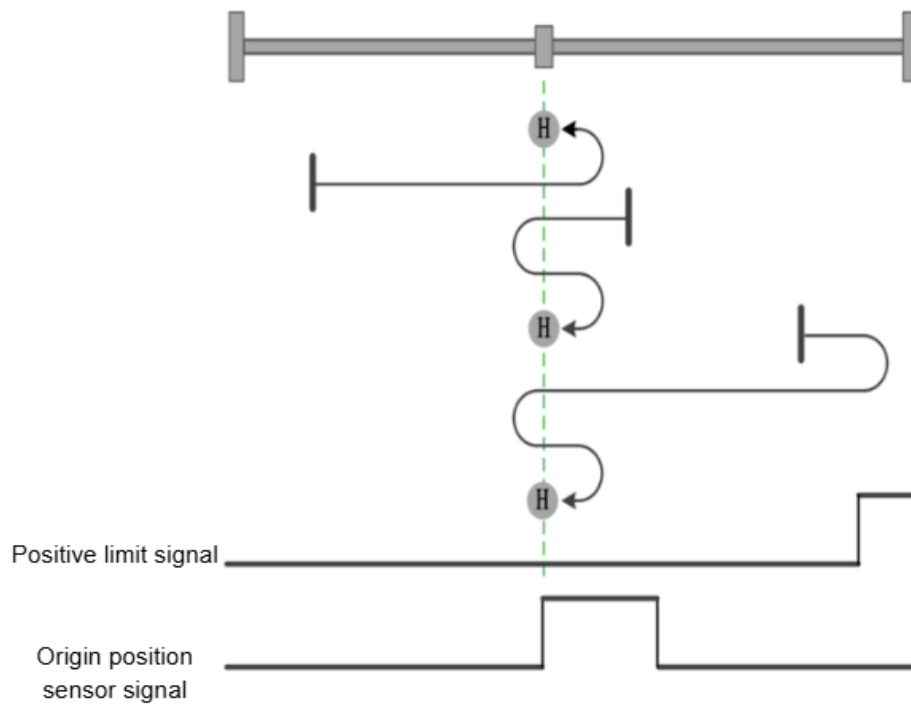


Figure 5-32 Trajectory and Signal State of Homing Mode 23

Mode 24: 6098h = 24

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the ON→OFF state of HSW, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when

encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

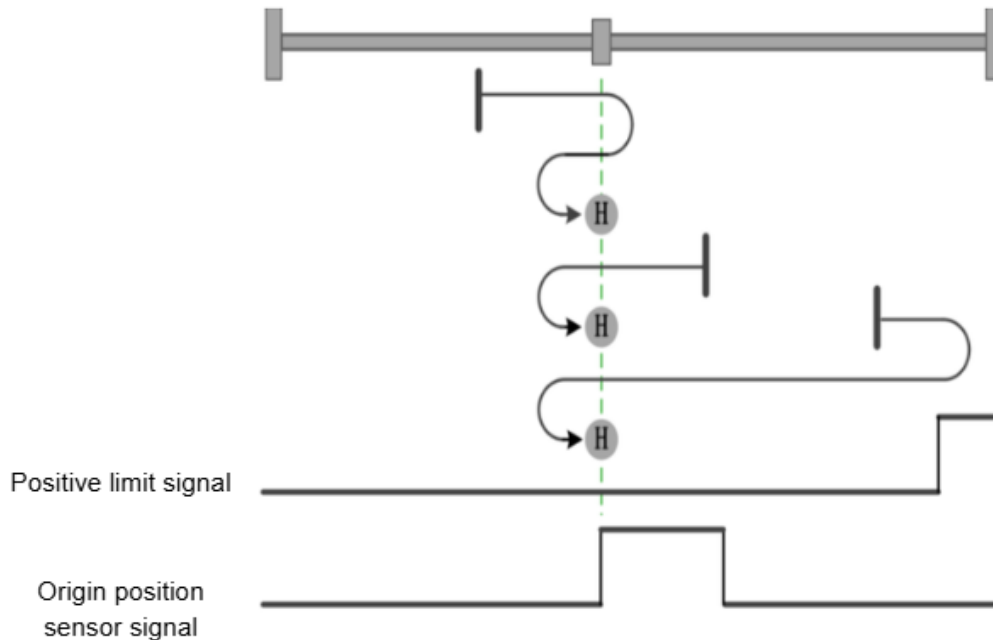


Figure 5-33 Trajectory and Signal State of Homing Mode 24

Mode 25: 6098h = 25

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the OFF→ON state of HSW, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

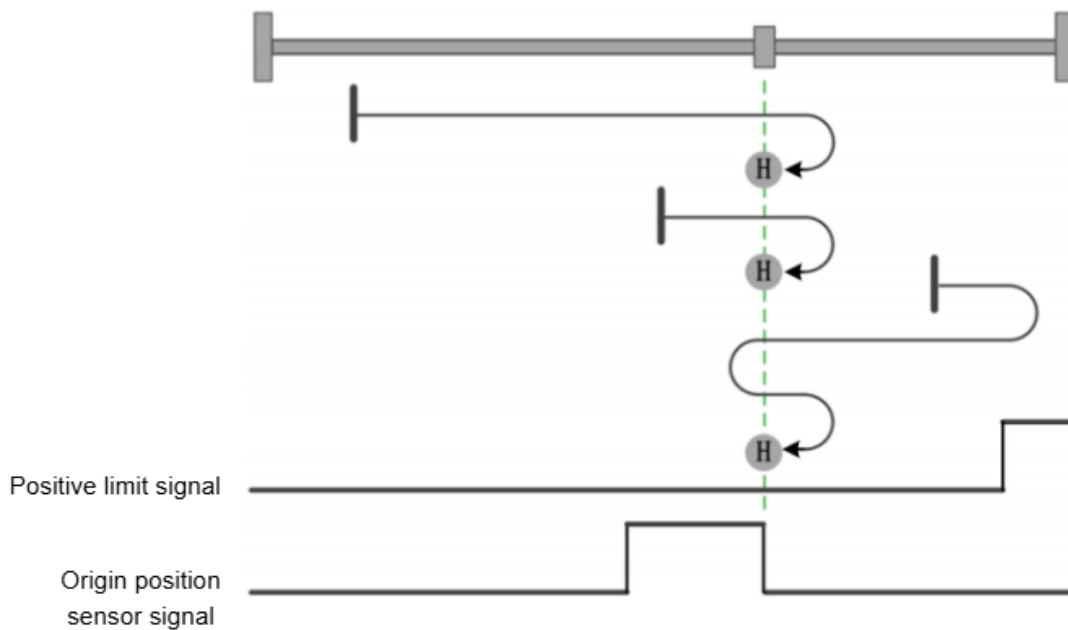


Figure 5-34 Trajectory and Signal State of Homing Mode 25

Mode 26: 6098h = 26

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the positive direction, decelerate and stop when encountering the ON state of PL, then run at high speed toward the negative direction. When running toward the negative direction, after encountering the OFF→ON state of HSW, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop

again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

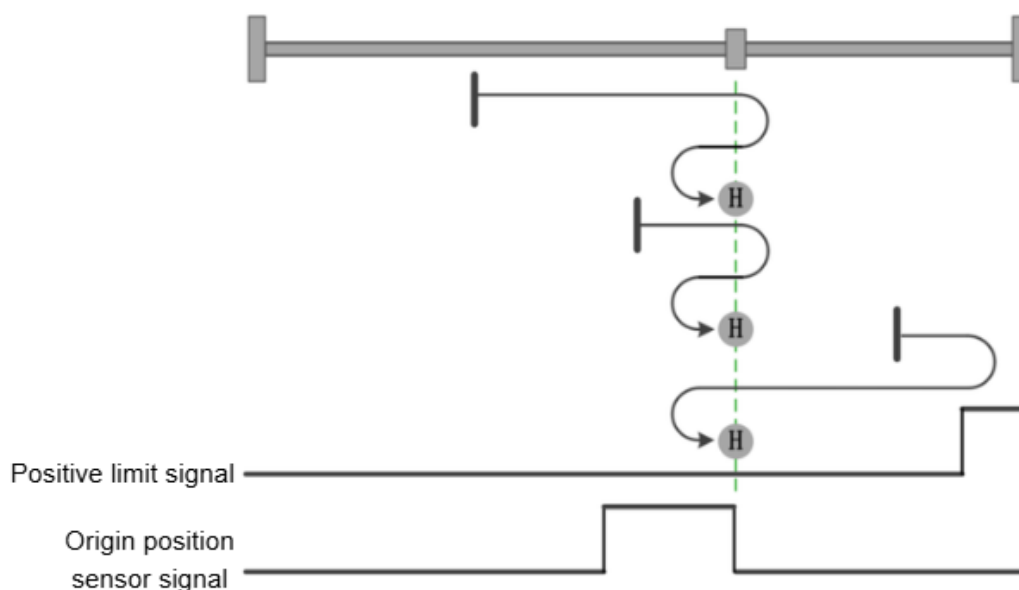


Figure 5-35 Trajectory and Signal State of Homing Mode 26

Mode 27: 6098h = 27

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed

toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

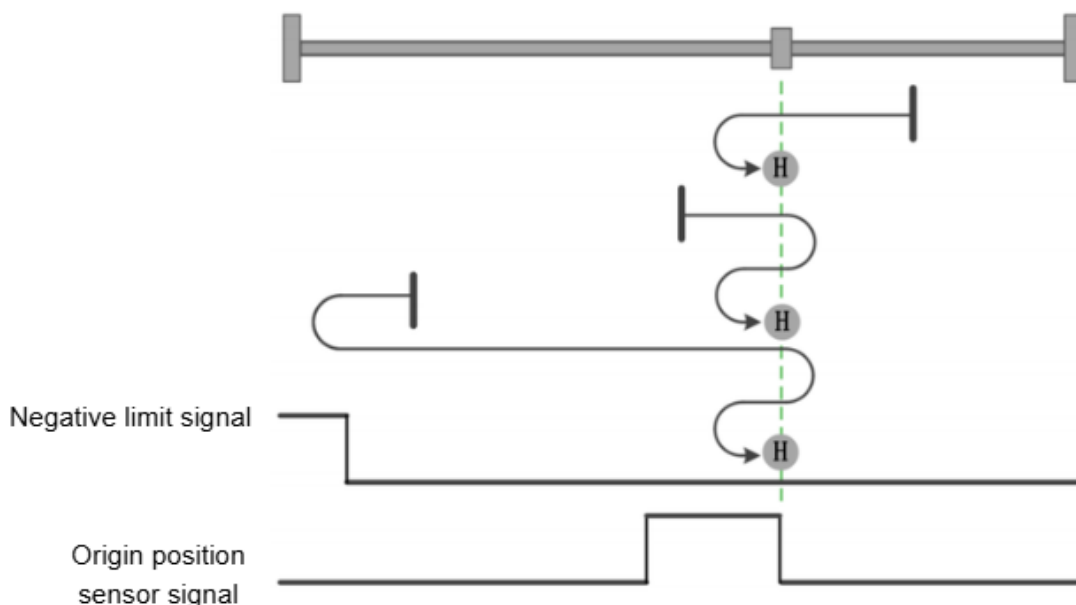


Figure 5-36 Trajectory and Signal State of Homing Mode 27

Mode 28: 6098h = 28

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the OFF→ON state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the positive direction. After encountering the ON→OFF state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

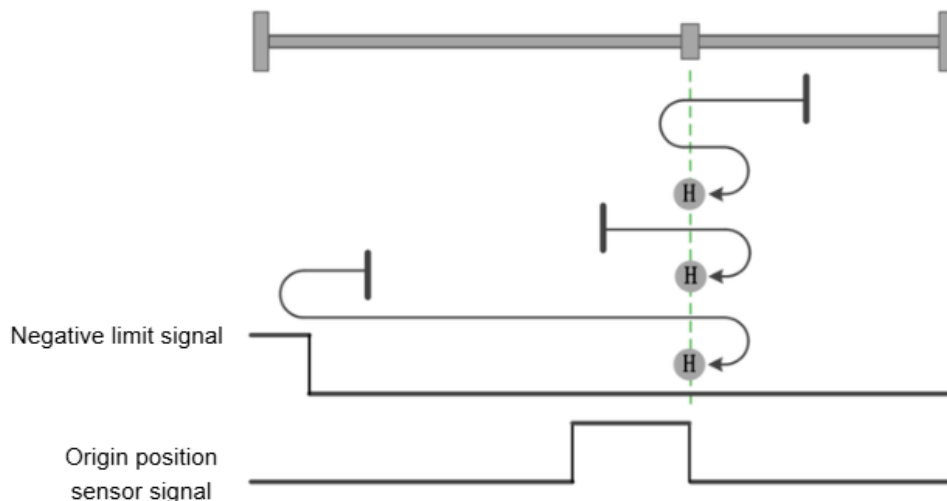


Figure 5-37 Trajectory and Signal State of Homing Mode 28

Mode 29: 6098h = 29

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then quickly retreat to the position where HSW is invalid and decelerate to stop again, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then switch to low speed and run toward the positive direction. When running at low speed toward the positive direction, decelerate and stop when encountering the OFF→ON state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

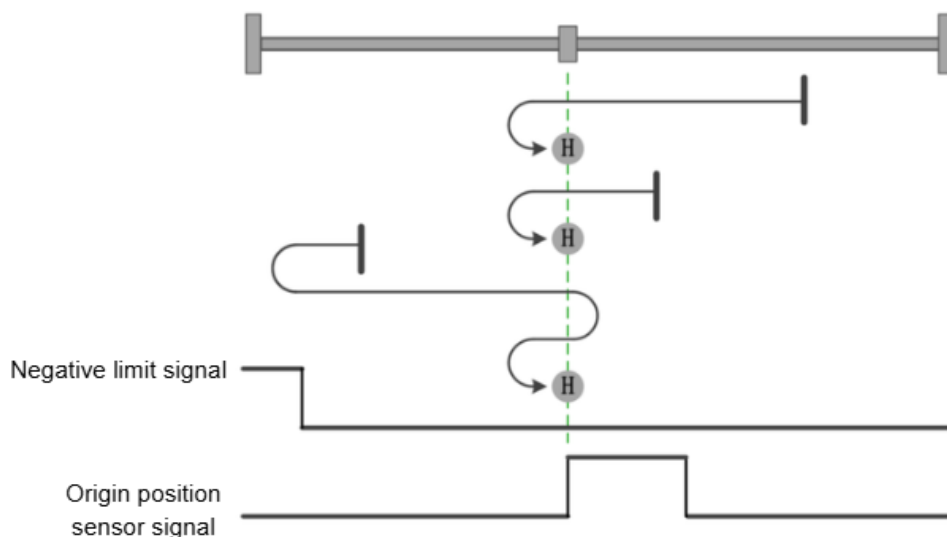


Figure 5-38 Trajectory and Signal State of Homing Mode 29

Mode 30: 6098h = 30

Home Position: Home Switch (HSW)

Deceleration Point: Home Switch (HSW)

If HSW is invalid at startup and located on the positive side of the home position sensor, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is invalid at startup and located on the negative side of the home position sensor, run at high speed toward the negative direction, decelerate and stop when encountering the ON state of NL, then run at high speed toward the positive direction. After encountering the OFF→ON state of HSW when running toward the positive direction, decelerate and stop, then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

If HSW is valid at startup, run at high speed toward the negative direction. After encountering the ON→OFF state of HSW when running toward the negative direction, decelerate and stop, then quickly retreat to the position where HSW is valid and decelerate to stop again (if the valid interval of HSW is very narrow, it may enter the HSW invalid position interval on the other side), then switch to low speed and run toward the negative direction. When running at low speed toward the negative direction, decelerate and stop when encountering the ON→OFF state of HSW, and take the stop position as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

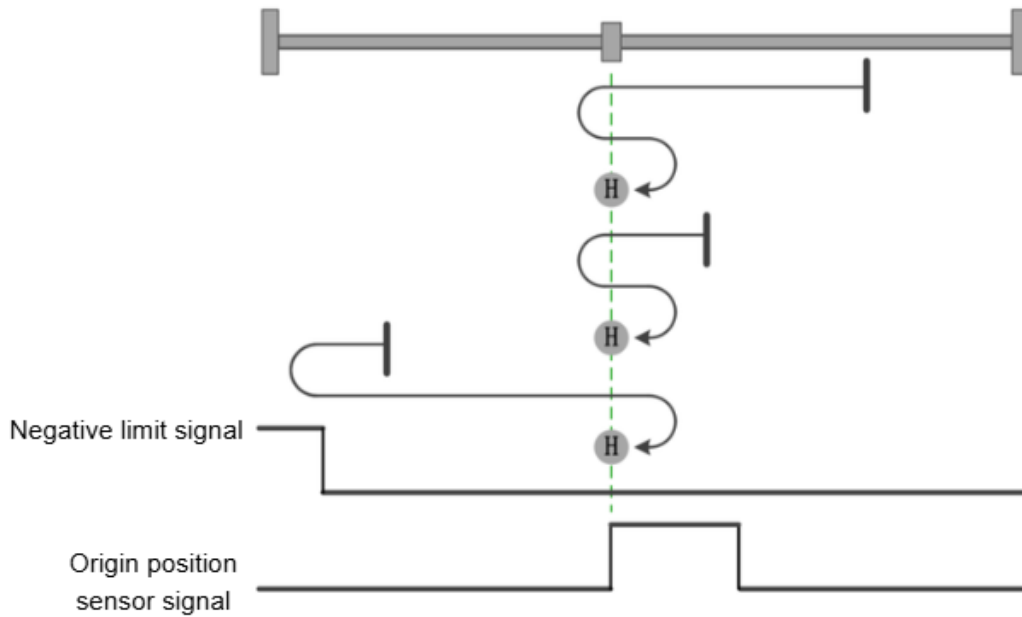


Figure 5-39 Trajectory and Signal State of Homing Mode 30

Mode 31: 6098h = 31 (Reserved)

Mode 32: 6098h = 32 (Reserved)

Mode 33: 6098h = 33

Home Position: Z signal

Deceleration Point: None

At startup, run at low speed toward the negative direction to search for the nearest Z pulse position as the home position. If encountering the ON state of NL before finding the Z pulse when running toward the negative direction, decelerate and stop, then run toward the positive direction to search for the nearest Z pulse position as the home position.

In this mode, it will automatically reverse when encountering the ON state of NL for the first time when running toward the negative direction; if encountering the ON state of PL or the ON state of NL again, the homing process will be stopped and an alarm will be issued.

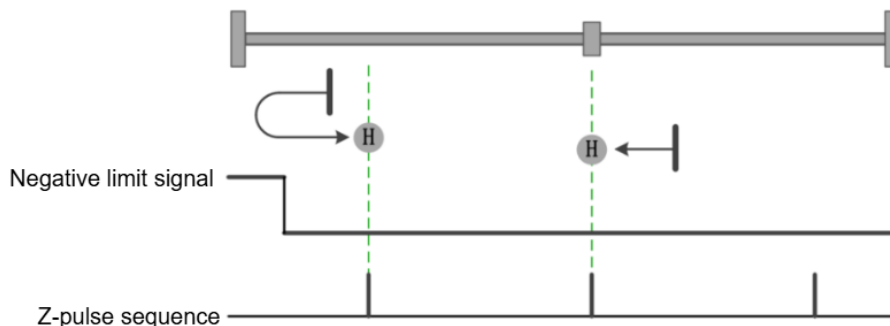


Figure 5-40 Trajectory and Signal State of Homing Mode 33

Mode 34: 6098h = 34

Home Position: Z signal

Deceleration Point: None

At startup, run at low speed toward the positive direction to search for the nearest Z pulse position as the home position. If encountering the ON state of PL before finding the Z pulse when running toward the positive direction, decelerate and stop, then run toward the negative direction to search for the nearest Z pulse position as the home position.

In this mode, it will automatically reverse when encountering the ON state of PL for the first time when running toward the positive direction; if encountering the ON state of NL or the ON state of PL again, the homing process will be stopped and an alarm will be issued.

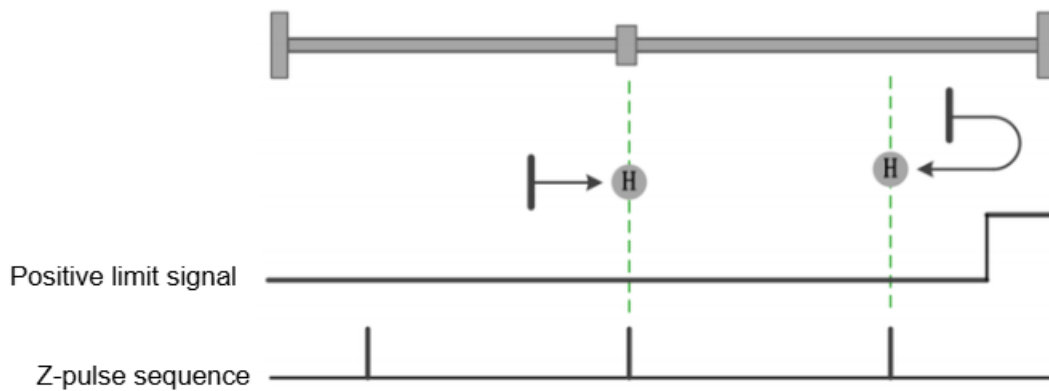


Figure 5-41 Trajectory and Signal State of Homing Mode 34

Mode 35: 6098h = 35

Home Position: Current Position

Deceleration Point: None

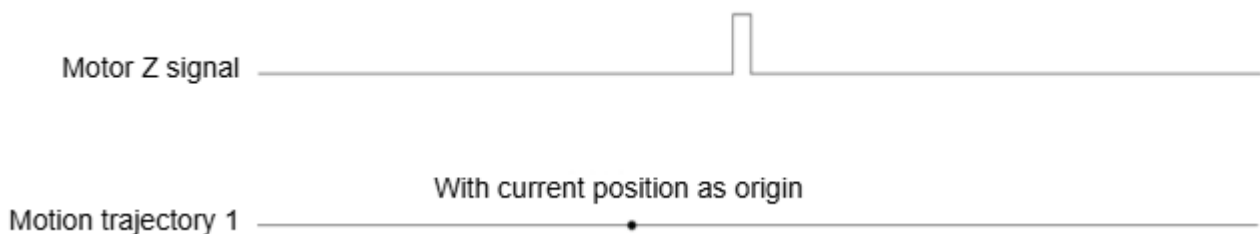


Figure 5-42 Trajectory and Signal State of Homing Mode 35

Take the current position as the mechanical home position. After triggering homing (6040h control word: 0x0F), the position feedback 6064h will be set as the home offset 607Ch after homing is completed.

When 60E6h = 1 (relative homing): After homing is completed, the position feedback 6064h will superimpose the position offset 607Ch on the original basis.

5.5 Cyclic Synchronous Position Mode (CSP)

In Cyclic Synchronous Position Mode, the upper controller sends the target position to the servo driver in real time via a bus at fixed cyclic intervals. The servo driver executes the position control according to the received target position. To enable this mode, set object 6060h to 8. The control block diagram and input/output are shown in Figure 5-43 and Figure 5-44 respectively.

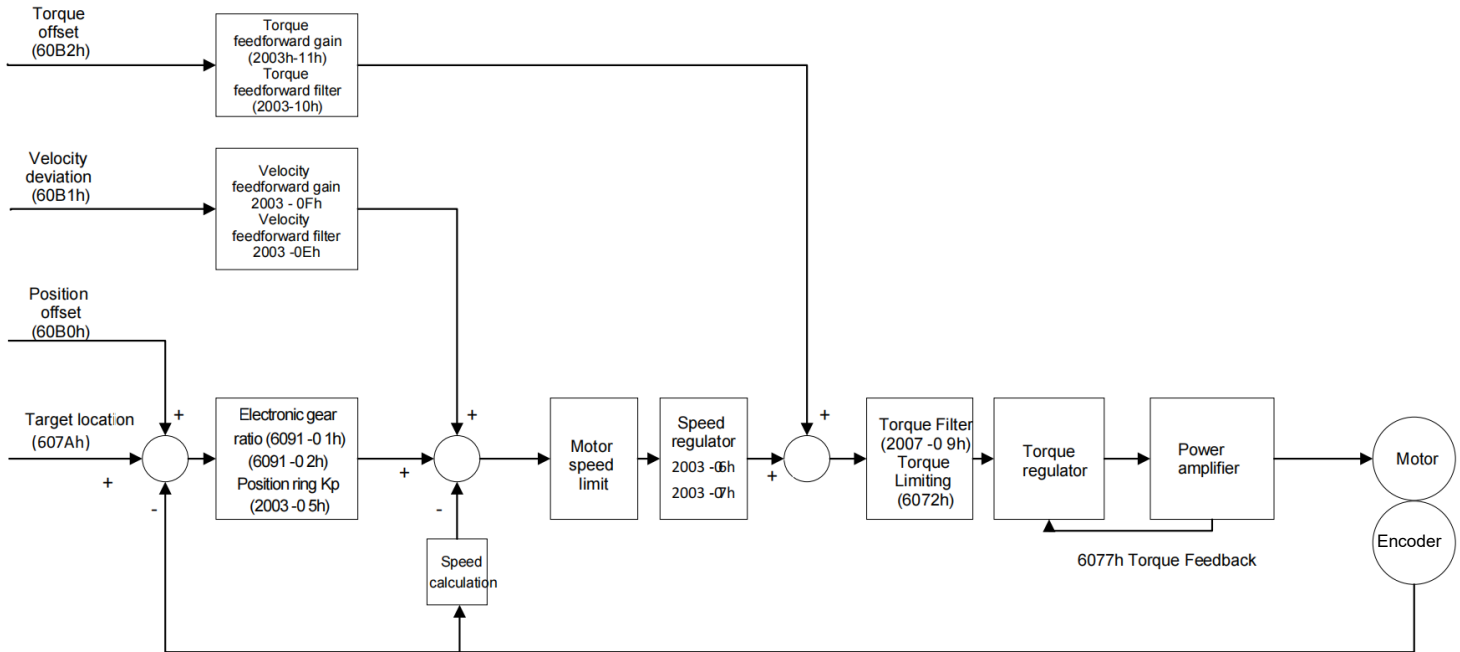


Figure 5-43 Cyclic Synchronous Position Mode Control Block Diagram

- Note:
1. When switching from other modes to CSP mode, wait 20ms before updating the position;
 2. Before enabling CSP mode, please set 607Ah (position command value) to follow 6064h (position feedback value); otherwise, please set the maximum speed limit value P0607 (2006-8h).

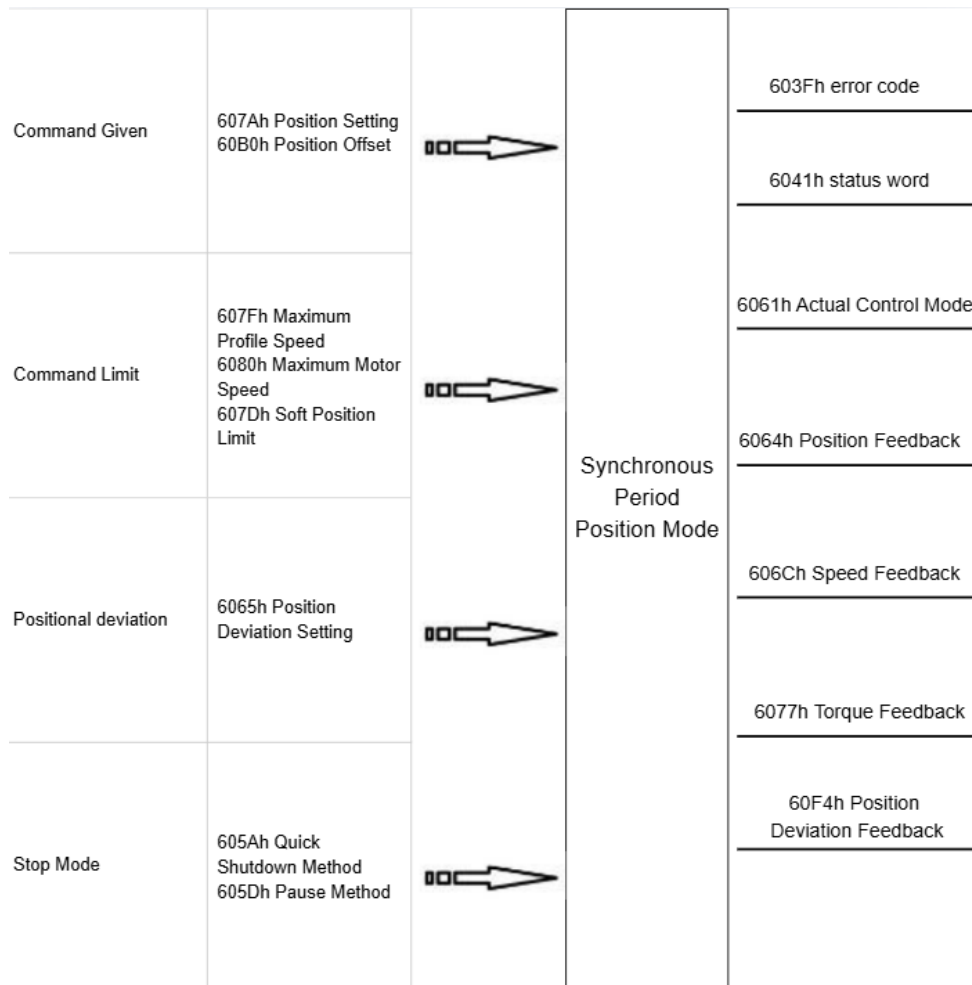


Figure 5-44 Cyclic Synchronous Position Mode Input/Output Diagram

5.5.1 Control Word Setting of Cyclic Synchronous Position Mode (60400010h)

When the cyclic synchronous position mode is selected, the meaning of each bit of the control word (6040h) is as shown in Table 5-21.

Table 5-21 Explanation of Control Word in Cyclic Synchronous Position Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4~6	Reserved for CSP mode	None
7	Fault reset	Executes a fault reset when changing from 0 to 1; for multiple resets, generate

		multiple 0→1 changes. When this bit is 1, other control commands are invalid
8	Pause	0: Invalid; 1: Valid. Stops executing commands when valid
9	Reserved for CSP mode	None
10	Reserved	None
11~15	Customized by the manufacturer	None

5.5.2 Status Word Definition of Cyclic Synchronous Position Mode (60400010h)

When the cyclic synchronous position mode is selected, the meaning of each bit of the status word (6041h) is as shown in the figure.

Table 5-22 Setting of Cyclic Synchronous Position Status Word

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: No fault; 1: Faulty
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid
7	Warning	0: No warning; 1: Warning exists
8	Customized by the manufacturer	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Position reached	When 60400010h bit8 (Pause) = 0: 0: Position not reached; 1: Position reached; When 60400010h bit8 (Pause) = 1: 0: Decelerating; 1: Speed is 0
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	Whether to follow the target position	0: Not following the target position; 1: Following the target position

13	Following position error alarm	0: No position deviation alarm; 1: Position deviation alarm occurred
14	Customized by the manufacturer	None
15	Homing completed	0: Invalid; 1: Homing completed

5.5.3 Dictionary Objects Related to Cyclic Synchronous Position Mode

Table 5-23 Dictionary Objects Related to Cyclic Synchronous Position Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error code	ro	unsigned16	0
6040h	-	Control word	rw	unsigned16	0
6041h	-	Status word	ro	unsigned16	0
6060h	-	Control mode	rw	integer8	0
6061h	-	Control mode display	ro	integer8	0
6062h	-	User position command	ro	integer32	0
6063h	-	Motor position feedback	ro	integer32	0
6064h	-	User position feedback	ro	integer32	0
6065h	-	User position deviation over-limit threshold	rw	unsigned32	1000000
6067h	-	Position arrival threshold	rw	unsigned32	100
6068h	-	Position arrival time	rw	unsigned16	1
606Bh	-	User speed command value	ro	integer32	0
606Ch	-	User actual speed feedback	ro	integer32	0
607Ah	-	Target position	rw	integer32	0
607Ch	-	Origin offset	rw	integer32	0
607Dh	01h	Soft limit: Minimum position limit	rw	integer32	-2147483648
607Dh	02h	Soft limit: Maximum position limit	rw	integer32	2147483647
60B0h	-	Position offset	rw	integer32	0
60B1h	-	Speed offset	rw	integer32	0
60B2h	-	Torque offset	rw	integer32	0

60F4h	-	User position deviation	ro	integer32	0
60FCh	-	Motor position command feedback	ro	integer32	0

5.5.4 Simple Application Example of Cyclic Synchronous Position Mode

Set servo parameters

Table 5-24 Configuration of Servo Drive Parameters When Running Cyclic Synchronous Position Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo operation mode

Connect the upper controller to the servo drive, among which:

Table 5-25 Startup and Operation Process of Profile Speed Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control mode	8
60400010h Control word	Enable	Any value → 6 → 7 → 15 or MC_Power
60400010h Control word	Fault reset	Any value → 128 (Rising edge valid)
60400010h Control word	Axis error reset	Given by the upper computer or PLC command MC_Reset
607A0020h	Given position	Planned and given by the upper computer (including acceleration/deceleration, mainly including the following)
-	Analog speed control	Given by the upper computer, PLC command MC_MoveVelocity
-	Relative position given	Given by the upper computer, PLC command MC_MoveRelative
-	Incremental position given	Given by the upper computer, PLC command MC_MoveAdditive
-	Absolute position given	Given by the upper computer, PLC command MC_MoveAbsolute
-	Axis deceleration stop	Given by the upper computer, PLC command MC_Stop
-	Synchronization cycle time	Set by the upper computer (DC-Sync)

5.6 Cyclic Synchronous Velocity Mode (CSV)

In the cyclic synchronous velocity mode, the upper controller is responsible for planning the acceleration/deceleration to reach the target speed, and provides the target speed in each synchronization cycle.

The servo drive then operates following the target speed. To enable the cyclic synchronous velocity mode, set the object 6060H to 9.

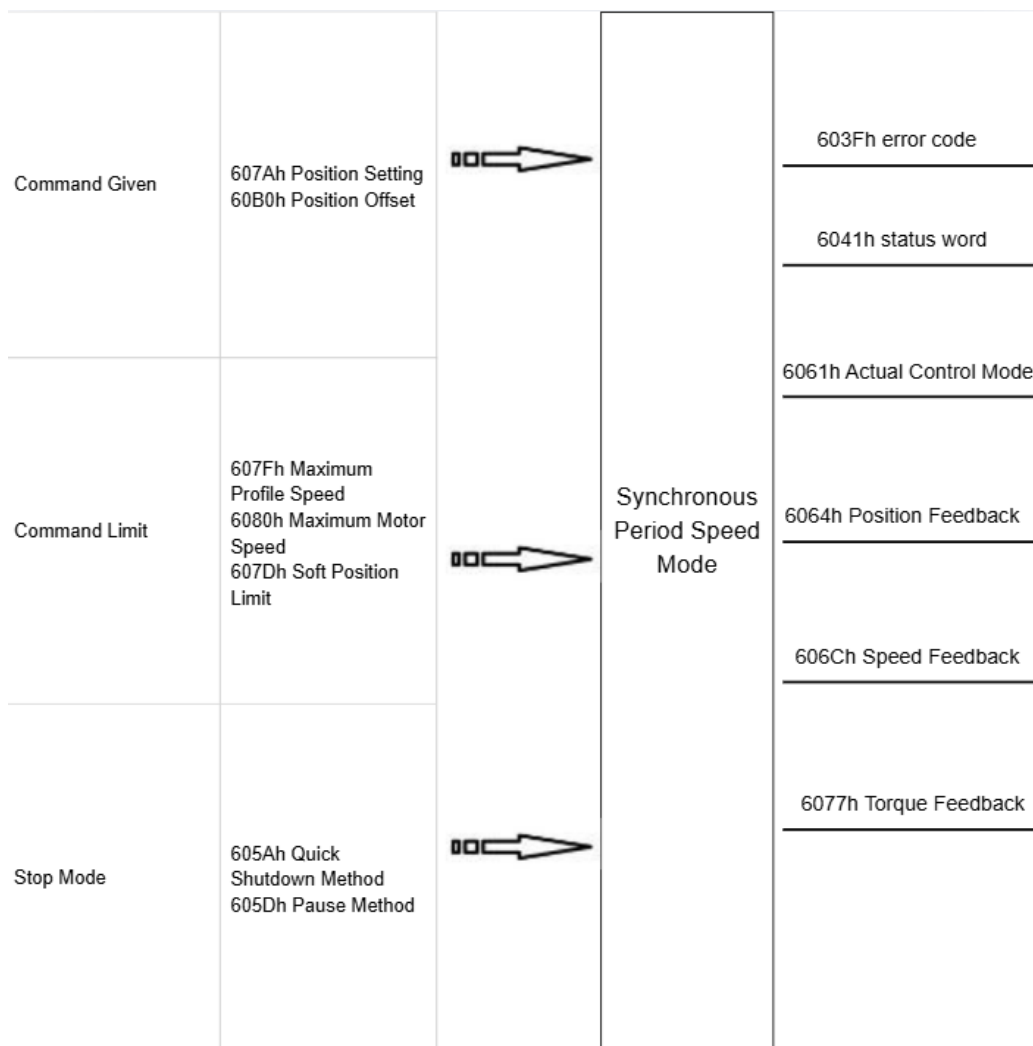
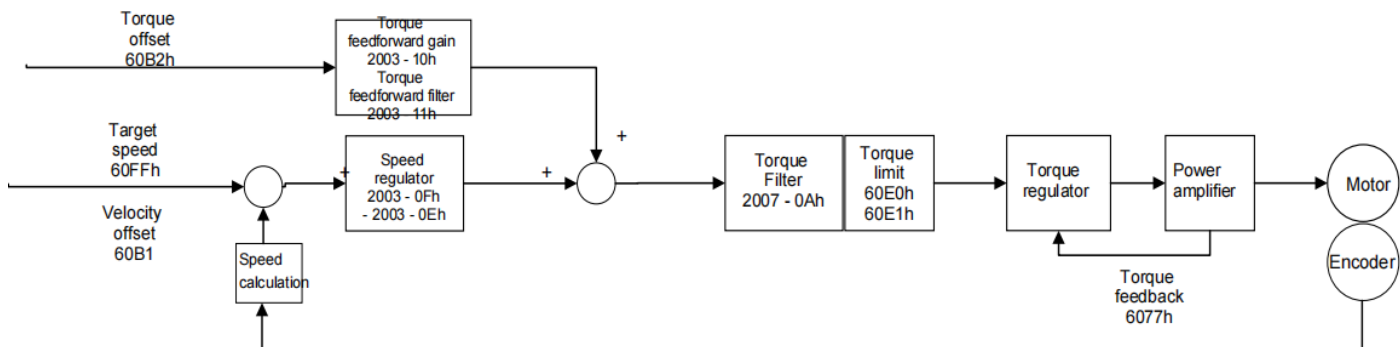


Figure 5-46 Input/Output of Cyclic Synchronous Velocity Mode

5.6.1 Control Word Setting of Cyclic Synchronous Velocity Mode (60400010h)

When the cyclic synchronous position mode is selected, the meaning of each bit of the control word (6040h) is as shown in Table 5-26.

Table 5-26 Description of Control Word in Cyclic Synchronous Velocity Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4~6	Reserved for CSV mode	None
7	Fault reset	Executes a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes. When this bit is 1, other control commands are invalid
8	Pause	0: Invalid; 1: Valid. Stops executing commands when valid
9	Reserved for CSV mode	None
10	Reserved	None
11~15	Customized by the manufacturer	None

5.6.2 Status Word Definition of Cyclic Synchronous Velocity Mode (60410010h)

Table 5-27 Description of Status Word in Cyclic Synchronous Velocity Mode

\	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: No fault; 1: Faulty
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid
7	Warning	0: No warning; 1: Warning exists
8	Customized by the manufacturer	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Reserved for CSV mode	None

11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	Whether to follow the target speed	0: Not following the target speed; 1: Following the target speed
13	Reserved for CSV mode	None
14~15	Customized by the manufacturer	None

5.6.3 Dictionary Objects Related to Cyclic Synchronous Velocity Mode

Table 5-28 Description of Status Word in Cyclic Synchronous Velocity Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error code	ro	unsigned16	0
6040h	-	Control word	rw	unsigned16	0
6041h	-	Status word	ro	unsigned16	0
6060h	-	Control mode	rw	integer8	0
6061h	-	Control mode display	ro	integer8	0
6063h	-	Motor position feedback	ro	integer32	-
6064h	-	User position feedback	ro	integer32	0
606Bh	-	User speed command value	ro	integer32	-
606Ch	-	User actual speed feedback	ro	integer32	0
606Dh	-	Speed arrival threshold	rw	unsigned16	100
606Eh	-	Speed arrival time	rw	unsigned16	1
606Fh	-	Zero speed threshold	rw	unsigned16	10
607Ch	-	Origin offset	rw	integer32	0
607Dh	01h	Soft limit: Minimum position limit	rw	integer32	-2147483648
607Dh	02h	Soft limit: Maximum position limit	rw	integer32	2147483648
607Eh	-	Command polarity	rw	unsigned8	0
6083h	-	Profile acceleration	rw	unsigned32	100
6084h	-	Profile deceleration	rw	unsigned32	100
6094h	01h	Speed encoder factor: Numerator	rw	unsigned32	1
6094h	02h	Speed encoder factor: Denominator	rw	unsigned32	1
60C5h	-	Maximum profile acceleration	rw	unsigned32	60000

60C6h	-	Maximum profile deceleration	rw	unsigned32	60000
60B1h	-	Speed offset	rw	unsigned32	0
60B2h	-	Torque offset	rw	unsigned32	0
60FFh	-	Target speed	rw	integer32	0

5.6.4 Simple Application Example of Cyclic Synchronous Velocity Mode

Set servo parameters

Table 5-29 Configuration of Servo Drive Parameters When Running Profile Speed Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo operation mode

Connect the upper controller to the servo drive, among which:

Table 5-30 Startup and Operation Process of Profile Speed Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control mode	9
60400010h Control word	Enable	Any value → 6 → 7 → 15
60400010h Control word	Fault reset	Any value → 128 (Rising edge valid)
60400010h Control word	Axis error reset	Given by the upper computer, PLC command MC_Reset
-	Synchronization cycle time (DC-Sync)	Set by the upper computer

5.7 Cyclic Synchronous Torque Mode (CST)

In the cyclic synchronous torque mode, the upper controller is responsible for planning the torque ramp rate to reach the target torque, and provides the target torque in each synchronization cycle. The servo drive then operates following the target torque. To enable the cyclic synchronous torque mode, set the object 6060H to 10.

This mode is applicable to EtherCAT. The control block diagram and input/output are shown in the figures.

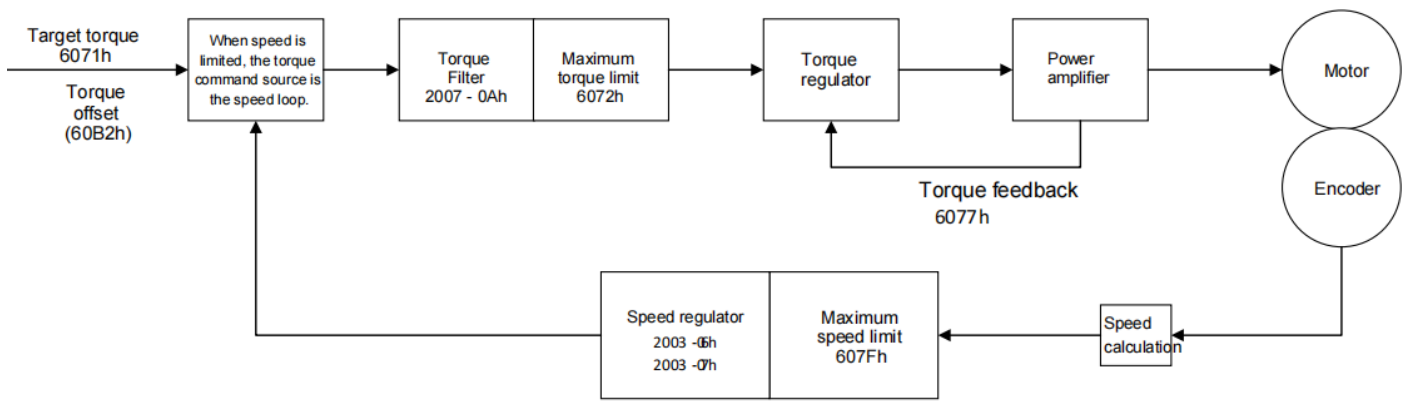


Figure 5-47 Control Block Diagram of Cyclic Synchronous Torque Mode

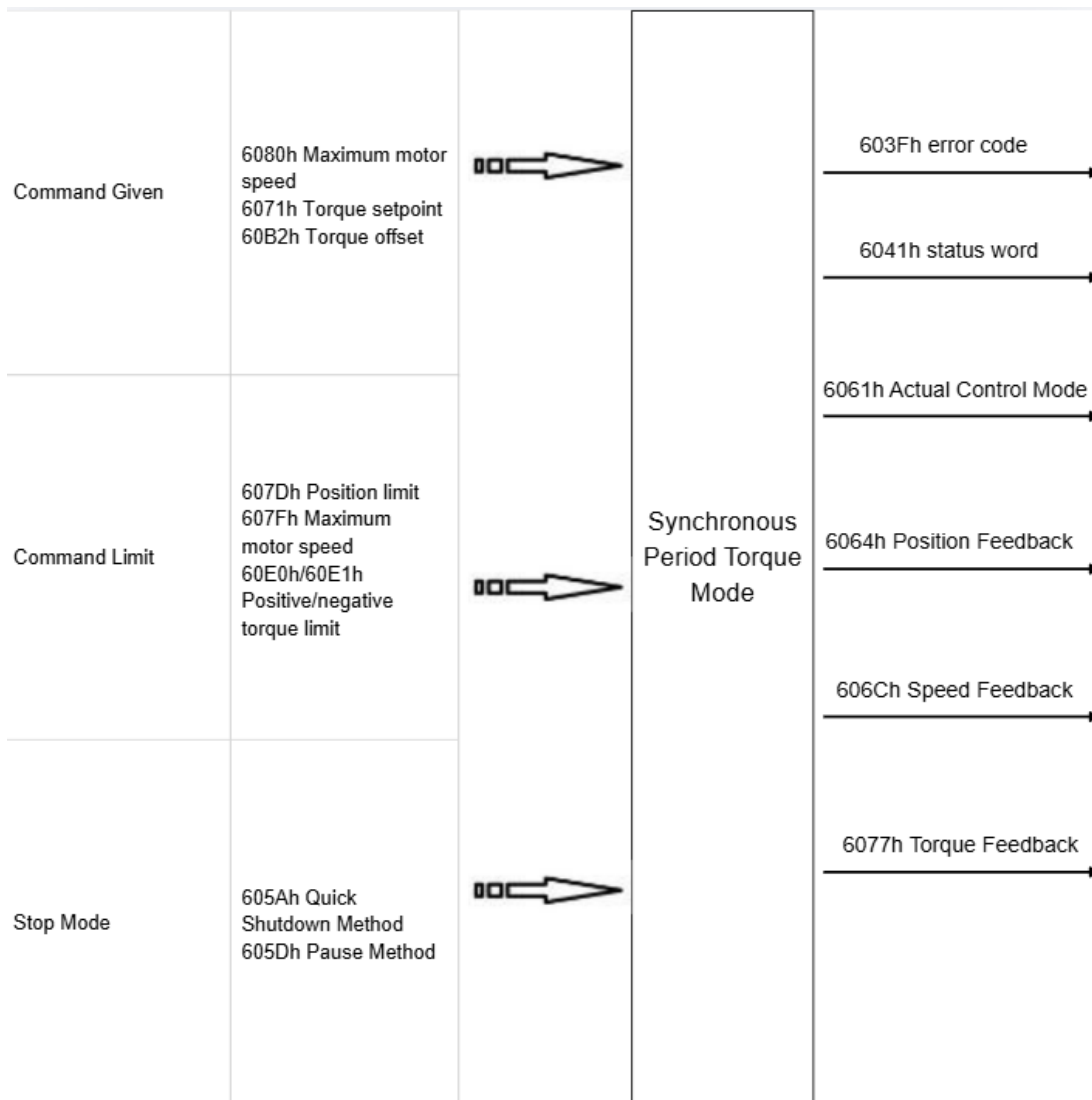


Figure 5-48 Input/Output of Cyclic Synchronous Torque Mode

5.7.1 Control Word Setting of Cyclic Synchronous Torque Mode (60400010h)

Table 5-31 Description of Control Word in Cyclic Synchronous Torque Mode

Bit	Name	Description
0	Switch on	Must be set to 1 when enabling the servo
1	Enable voltage	Must be set to 1 when enabling the servo
2	Quick stop	Must be set to 1 when enabling the servo; set to 0 for quick stop
3	Operation enable	Must be set to 1 when enabling the servo
4~6	Reserved for CST mode	None
7	Fault reset	Executes a fault reset when changing from 0 to 1; for multiple resets, generate multiple 0→1 changes. When this bit is 1, other control commands are invalid
8	Pause	0: Invalid; 1: Valid. Stops executing commands when valid
9	Reserved for CST mode	None
10	Reserved	None
11~15	Customized by the manufacturer	None

5.7.2 Status Word Definition of Cyclic Synchronous Torque Mode (60410010h)

When the cyclic synchronous torque mode is selected, the meaning of each bit of the status word (6041h) is as shown in Table 5-39. The statuses marked with dark background are dedicated to the cyclic synchronous torque mode.

Table 5-32 Description of Status Word in Cyclic Synchronous Torque Mode

Bit	Name	Description
0	Ready to switch on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
1	Switched on	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
2	Operation enabled	0: Invalid; 1: Valid. Indicates that the servo is enabled when valid
3	Servo fault	0: No fault; 1: Faulty
4	Voltage enabled	0: Invalid; 1: Valid. Indicates that the servo can be enabled when valid
5	Quick stop	0: Quick stop valid; 1: Quick stop invalid
6	Switch on disabled	0: Invalid; 1: Valid. Indicates that the servo cannot be enabled when valid
7	Warning	0: No warning; 1: Warning exists

8	Customized by the manufacturer	None
9	Remote control	0: Invalid; 1: Valid. Indicates that the control word has taken effect when valid
10	Reserved	None
11	Internal soft limit status	0: Not reaching the soft limit; 1: Reaching the soft limit
12	Whether to follow the target torque	0: Not following the target torque; 1: Following the target torque
13	Reserved for CST mode	None
14~15	Customized by the manufacturer	None

5.7.3 Dictionary Objects Related to Cyclic Synchronous Torque Mode

Table 5-33 Dictionary Objects Related to Cyclic Synchronous Torque Mode

Index	Sub-index	Name	Access Type	Data Type	Default Value
603Fh	-	Error code	ro	unsigned16	0
6040h	-	Control word	rw	unsigned16	0
6041h	-	Status word	ro	unsigned16	0
6060h	-	Control mode	rw	integer8	0
6061h	-	Control mode display	ro	integer8	0
606Ch	-	User actual speed feedback	ro	integer32	0
6071h	-	Torque target value	rw	integer16	0
6074h	-	User given torque value	rw	integer16	0
6077h	-	Actual torque feedback	ro	integer16	0
607Dh	01h	Soft limit: Minimum position limit	rw	integer32	-2147483648
607Dh	02h	Soft limit: Maximum position limit	rw	integer32	2147483648
607Fh	-	Maximum profile speed	rw	unsigned32	4500
6087h	-	Torque ramp time	rw	unsigned32	0

5.7.4 Simple Application Example of Cyclic Synchronous Torque Mode

Set servo parameters

Table 5-29 Configuration of Servo Drive Parameters When Running Cyclic Synchronous Torque Mode

Parameter Address	Setting Value	Description
P00.00 (2000-01h)	8	Servo operation mode

Connect the upper controller to the servo drive, among which:

Table 5-30 Startup and Operation Process of Profile Speed Mode

Address	Name	Value Setting (Decimal Value)
60600008h	Control mode	10
60710010h, 607F0020h	Torque/speed given	User-given PLC command MC_TorqueControl
	Enable	Any value → 6 → 7 → 15 / MC_Power
60400010h Control word	Fault reset	Any value → 128 (Rising edge valid)
	Axis error reset	Given by the upper computer, PLC command MC_Reset
-	Synchronization cycle time (DC-Sync)	Set by the upper computer

6 Adjustment and Usage Instructions

6.1 Absolute Value System Description

6.1.1 Overview of Absolute Value System

The absolute value encoder not only detects the position of the motor within one rotation, but also counts the number of rotations of the motor. The single rotation resolution is 8388608 (23 bits)/131072 (17 bits), and it can store 16 bit multi rotation data. The use of absolute value encoders can be divided into absolute position linear mode and absolute position rotation mode, which can be used in position, speed, and torque control modes. When the driver is powered off, the encoder backs up the data through the battery, and after power on, the driver calculates the mechanical absolute position through the absolute position of the encoder, without the need for repeated mechanical origin reset operations.

User setting P00-03 (absolute position detection selection). When the battery is first connected, AI.045 (encoder battery fault) occurs, and an absolute encoder reset operation needs to be performed through F-004.

Note: When modifying C-002 (motor rotation direction definition) or performing absolute encoder reset (F-004), the absolute position of the encoder will undergo a sudden change, resulting in a change in the mechanical absolute position reference. Therefore, mechanical origin reset operation is required. When using the internal origin reset function of the drive, the mechanical absolute position and encoder absolute position deviation will be automatically calculated and stored in the drive EEPROM after the origin reset is completed.

6.1.2 Relevant function code settings

1) Absolute value system settings

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P00-03	Absolute position detection selection	0- Incremental Position Mode 1- Absolute position linear mode 2- Absolute Position Rotation Mode	-	0	power on again	Stop set	ALL

Select absolute position mode through P00-03.

Note: In absolute position mode, the system automatically detects whether the motor mode is an absolute value encoder motor. If not, AI.039 (absolute position mode product matching fault) will occur.

2) Encoder feedback data

The absolute value encoder provides feedback on the number of rotations and the position within one rotation, Incremental position mode no feedback number of rotations.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P13-34	Encoder multi turn position	-	r	0	-	display	ALL
P13-32	Encoder single turn position		Encoder unit	0	-	display	ALL
P13-48	Encoder position low 32 bits		Encoder unit	0	-	display	ALL
P13-50	Encoder position high 32 bits		Encoder unit	0	-	display	ALL

The absolute value encoder rotation data P13-34 is an unsigned number with a range of 0-65535, assuming the encoder resolution Rev.

The range of position P13-32 within one circle of the absolute value encoder is 0~Rev.

The absolute position of the absolute value encoder $P13-50 * 2^{32} + P13-48$ is calculated based on the feedback data P13-34, P13-32, and Rev.

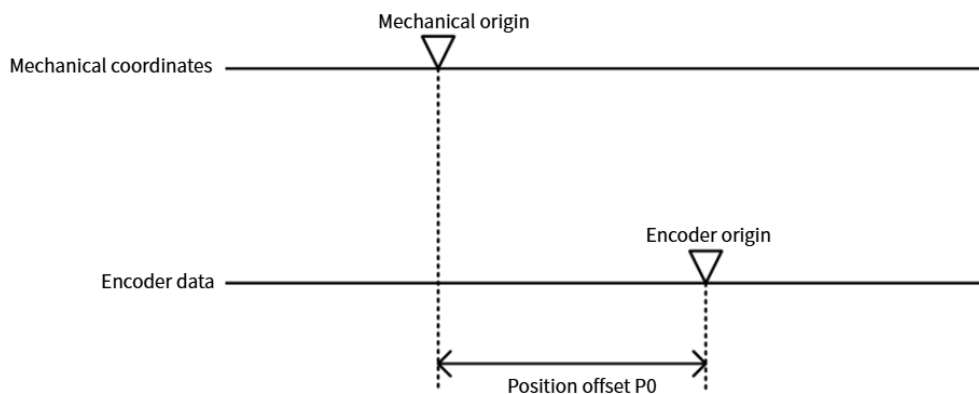
When $P13-34 < 32768$, $P13-50 * 2^{32} + P13-48 = P13-34 * Rev + P13-32$

When $P13-34 \geq 32768$, $P13-50 * 2^{32} + P13-48 = (P13-34 - 65536) * Rev + P13-32$

3) Absolute value position linear mode

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P05-56	Absolute position linear mode position offset (low 32 bits)	-2147483648~2147483647	unit	0	Effective immediately	Stop set	ALL
P05-58	Absolute position linear mode position offset (high 32 bits)	-2147483648~2147483647	unit	0	Effective immediately	Stop set	ALL
P05-36	Absolute position count value		unit	0		display	PST
P13-38	Mechanical absolute position (low 32 bits)		unit	0	-	display	ALL
P13-40	Mechanical absolute position (high 32 bits)		unit	0	-	display	ALL

In absolute value linear mode, the mechanical position can be recorded by absolute value encoder when power off. After the user performs the origin regression function, the driver will record the point as the mechanical origin, and record the offset between original point of the encoder and mechanical original point.



$$P_M = P_E - P_O$$

Symbol	Description
P_M	Mechanical absolute position $P13-40 \times 2^{32} + P13-38$
P_E	Absolute position of encoder $P13-50 \times 2^{32} + P13-48$
P_O	Linear position offset $P05-58 \times 2^{32} + P05-56$

In absolute value linear mode, the multi turns data range of encoder is -32768~32767. If the number of forward turns is more than 32767 or the number of reverse turns is less than -32768, AL.044 (encoder multi turn counter overflow) fault will occur. This fault can be canceled by setting P0B-17.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P0B-17	Encoder multi turn overflow fault prohibited	0- Allow faults 1- Shielding fault	-	0	Effective immediately	Stop set	ALL

4) Absolute value position rotation mode

The number of encoder pulses corresponding to one rotation can be set through P05-61/62 or P05-64/66, both of which can represent the number of encoder pulses corresponding to one rotation, with P05-64/66 having higher priority.

Assuming the encoder resolution R_E , the number of encoder pulses corresponding to one rotation R_M , when

$$P05-64/66 \neq 0, R_M = P5-66 * 2^{32} + P5-64, \text{ when } P05-64/66=0, R_M = R_E \times \frac{P5-61}{P5-62}$$

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P05-61	Multi turn absolute position mode 2 mechanical gear ratio molecule	1~65535	-	1	Power on again	Stop set	ALL
P05-62	Multi turn absolute position mode 2 mechanical gear ratio denominator	1~65535	-	1	Power on again	Stop set	ALL
P05-64	Multi turn absolute position mode 2 has a mechanical position upper limit value that is 32 bits lower	0~4294967295	-	0	Power on again	Stop set	ALL
P05-66	Multi turn absolute position mode 2 has a mechanical position upper limit value that is 32 bits higher	0~4294967295	-	0	Power on again	Stop set	ALL

The parameters related to location are defined in the following table

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P13-38	Mechanical absolute position (low 32 bits)		Encoder unit	0	-	display	ALL
P13-40	Mechanical absolute position (high 32 bits)		Encoder unit	0	-	display	ALL
P13-44	Rotating load single turn position (low 32 bits)		Encoder unit	0	-	display	ALL
P13-46	Rotating load single turn position (high 32 bits)		Encoder unit	0	-	display	ALL

P13-42	Rotating load single turn position		Command unit	0	-	display	ALL
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- The relationship between the load single turn position command unit (P13-42) and the encoder unit (P13-44/46) is:

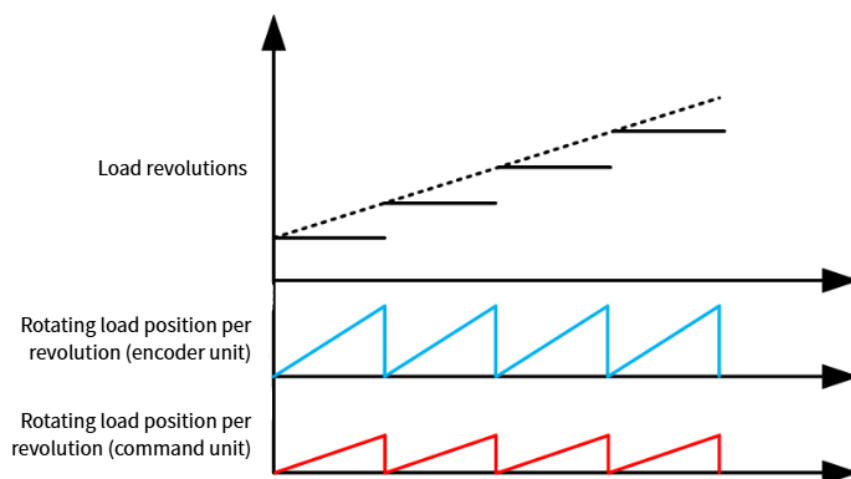
$$P13 - 42 = (P13 - 46 \times 2^{32} + P13 - 44) / \text{Electronic gear ratio}$$

Note that the electronic gear ratio here is the position loop electronic gear ratio (P05-02/P05-04), not the mechanical gear ratio.

- The relationship between the mechanical absolute position (P13-38/40) and the rotational load single turn position (P13-44/46) is:

$$P13 - 40 \times 2^{32} + P13 - 38 = \text{Number of load revolutions} \times \text{Number of pulses per load revolution} + P13 - 46 \times 2^{32} + P13 - 44$$

- The relationship between the number of load cycles and the position of a single load cycle is shown in the following figure. For every forward rotation of the load, the number of load cycles is increased by 1.



5) Absolute encoder reset operation

The reset operation of the encoder through F-004

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
F-004	Absolute encoder reset operation	0- No operation 1- Absolute encoder alarm reset 2- Absolute encoder reset	-	0	Effective immediately	Stop set	ALL

6.2 Trial operation

6.2.1 Inspection and Precautions Before Trial Operation

To ensure safety and proper trial operation, please check and confirm the following items in advance.

- Status of servo motor

Check and confirm the following items, and if any problems are found, please handle them properly before trial

operation.

- ① Are the settings, wiring, and connections correct.
- ② Are there any loose fasteners.
- ③ When it comes to servo motors with oil seals, whether the oil seal part is damaged and whether oil has

been applied.

- ④ When using a servo motor with a holding brake, has the brake been released beforehand.

- Status of servo driver

- ① Are the settings, wiring, and connections correct.
- ② Is the power supply voltage to the servo unit normal
- ③ Is there no warning or alarm on the drive status display interface.

- Installation

- ① Install the servo motor and servo unit according to the installation conditions.
- ② The servo motor may overturn during rotation, so please be sure to fix it on the machine.
- ③ Please make sure to keep the servo motor in an unloaded state.

6.3 Adjustment

Adjustment refers to optimizing responsiveness by adjusting the servo gain of the servo unit.

The servo gain is set through a combination of multiple parameters (speed loop gain, position loop gain, filter, inertia ratio, etc.), which will affect each other. Therefore, when setting, the balance between the set values of each parameter must be considered.

The factory setting for servo gain is a basic setting. Please use various adjustment functions based on the user's mechanical condition to further improve responsiveness.

6.3.1 Safety precautions during adjustment

When making adjustments, please set the servo unit protection function as shown in the following items under appropriate conditions.

- (1) Set over travel

Please set the over travel. For detailed information, please refer to the relevant chapters.

- (2) Setting of torque limit

The torque limiting function is to calculate the required torque for mechanical operation and limit the output torque to ensure it does not exceed that value. In the event of mechanical interference or collision, the impact can be

reduced. If the torque is set below the required value for operation, overshoot or vibration may occur. Please refer to the relevant chapters for details.

(3) Set the alarm value for excessive position deviation

The alarm for excessive position deviation is an effective protection function when using servo units for position control.

When the motor action does not match the command, setting an appropriate position deviation alarm value can detect abnormal situations and stop the motor from running.

6.3.2 Basic Process of Adjustment

The figure below is a flowchart of the basic adjustment steps. Please make appropriate adjustments based on the status and operating conditions of the machine being used.

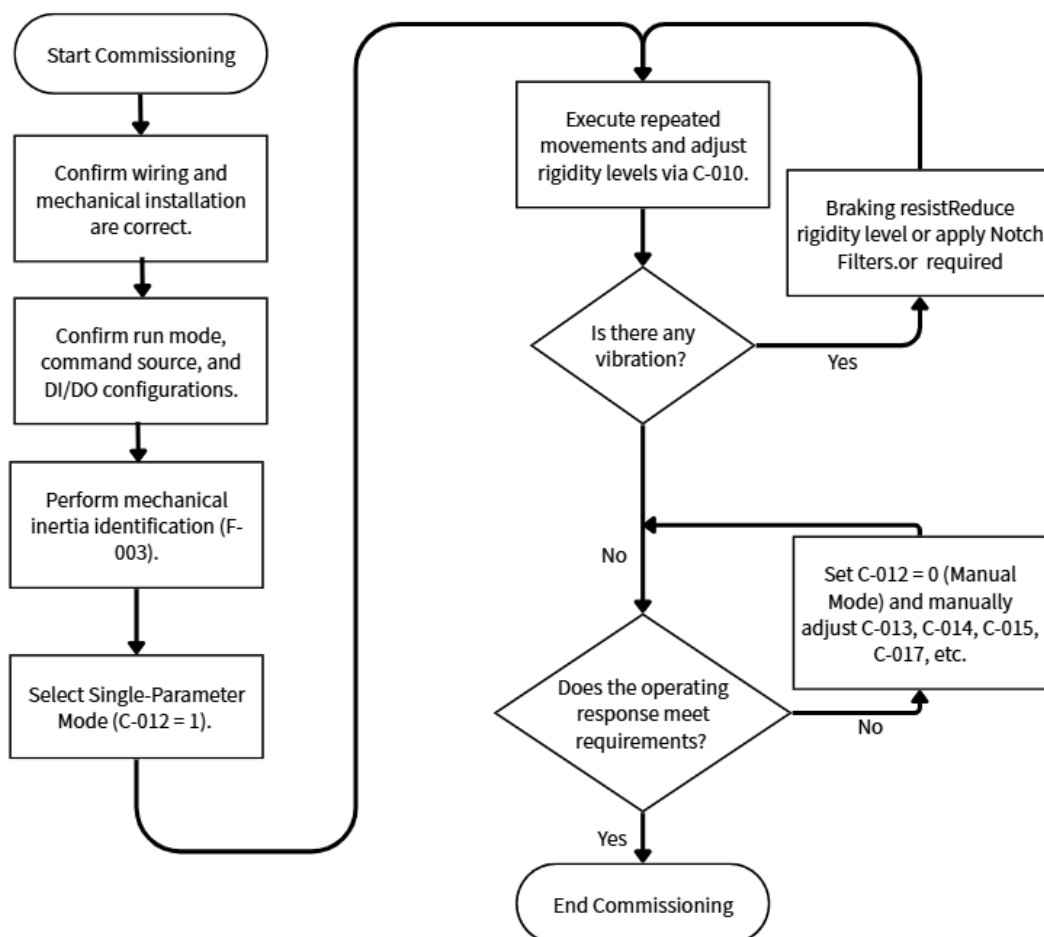


Figure 5-8 debug relevant methods

Firstly, check the wiring and installation correctly, and after setting the relevant basic functional parameters, adjust the inertia identification, single parameter adjustment, and vibration suppression performance.

Accurately setting the inertia ratio is the foundation of debugging. After obtaining the correct load inertia ratio through inertia identification, first set single parameter adjustment (see relevant chapters for details). If the effect is not good, then manually adjust the gain (see relevant chapters for details). Mechanical resonance can be suppressed by setting appropriate notch filters (see relevant chapters for details).

6.3.3 Safety precautions during adjustment

When making adjustments, please set the servo unit protection functions shown in the following items under appropriate conditions.

(1) Setting overtravel

Please set the overtravel. For details, please refer to the relevant section.

(2) Setting torque limit

The torque limit function calculates the torque required for mechanical operation and limits the output torque so that it does not exceed this value. It can reduce the impact when mechanical interference or collision occurs. If the torque is set lower than the value required for operation, overshoot or vibration may occur. For details, please refer to the relevant section.

(3) Setting the position deviation alarm value

The position deviation alarm is an effective protection function when using the servo unit for position control. When the motor action does not match the command, by setting an appropriate position deviation alarm value, the abnormality can be detected and the motor can be stopped.

6.3.4 single parameter adjustment

Single parameter adjustment refers to adjusting the rigidity level of the servo through a single parameter (C-010), and the servo driver will automatically generate a set of matching gain parameters to meet the requirements of stability, accuracy, and speed.

Before starting single parameter adjustment, it is necessary to identify the load inertia or obtain relevant load parameters through manual calculation.

The range of values for the rigidity level (C-010) is between 0-31. Level 0 corresponds to the weakest rigidity and the smallest gain; Level 31 corresponds to the strongest rigidity and maximum gain. Based on different types of loads, the following experience can be used as a reference:

Level 5-8, some complex transmission machinery.

Level 9-14, systems with low rigidity such as belt drive and cantilever structure.

Level 15-20, systems with high rigidity such as ball screws, gear racks, and direct drive systems

Relevant function code as below:

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
C-012	Self tuning mode selection	0- Manual adjustment of gain mode 1- Single parameter adjustment mode 2- Single parameter adjustment mode (emphasizing position response)	-	1	Effective immediately	Run set	ALL
C-010	Rigid grade selection	0~31	-	12	Effective immediately	Run set	ALL

6.3.5 Manual Adjustment Function

When single parameter adjustment still cannot meet the operational response requirements, the self-tuning mode (C-012) can be set to 0 to obtain better response through manual adjustment.

When manually adjusting the servo gain, please adjust each servo gain one by one based on understanding the composition and characteristics of the servo unit. In most cases, if a parameter undergoes significant changes, other parameters must be adjusted again. In order to confirm the response characteristics, it is necessary to prepare for observing the output waveform of the analog monitor using measuring instruments.

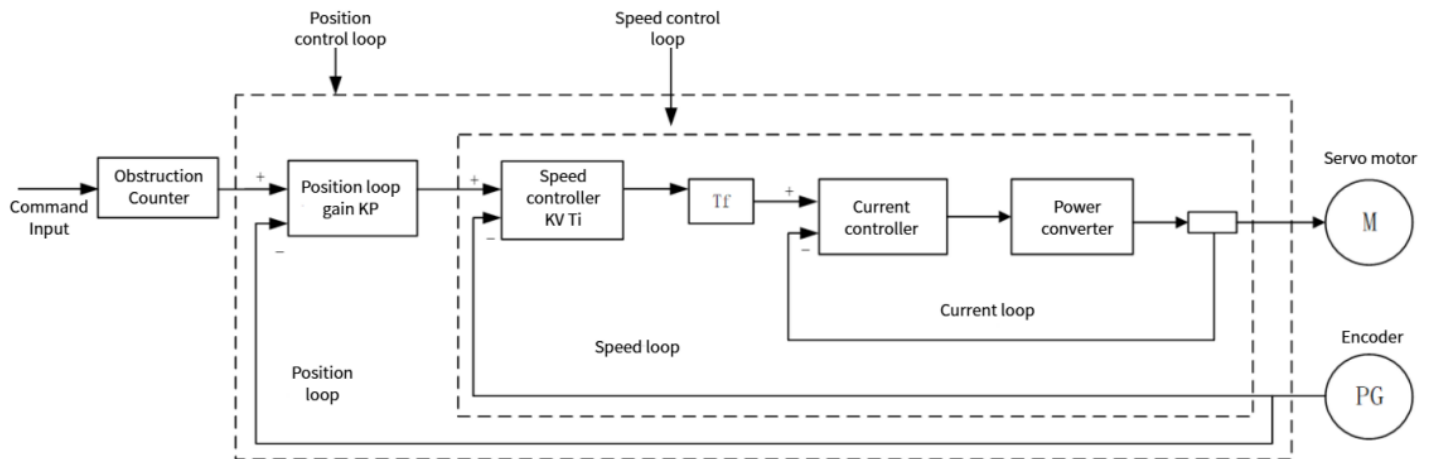


Figure 5.10 Manually adjust the control diagram

The servo unit consists of three feedback loops (position loop, velocity loop, current loop), and the more inner the loop, the more it needs to improve its responsiveness. If this principle is not followed, it will result in decreased responsiveness or vibration.

Due to the current loop ensuring sufficient responsiveness, users do not need to make adjustments.

The general method for manual adjustment is as follows:

Code	Data name	Debug principal
C-015	Position loop gain	The default value is 40.0Hz Adjust according to the positioning time The larger the value, the shorter the positioning time, but if it is too high, it can cause vibration
C-013	Speed loop gain	The default value is 25.0Hz Within the range where the mechanical system does not vibrate, the larger the set value, the more stable and responsive the servo system is When abnormal noise or vibration occurs, reduce it
C-014	Speed loop integral time constant	The default value is 31.83ms When the value is adjusted, the positioning time becomes faster, and if it is too small, vibration will occur When the value is large, it may cause the pulse deviation , not able reduced to zero
C-017	Torque command filtering time constant	The default value is 790us Try changing this value when vibration occurs The smaller the value, the more responsive control can be achieved
P03-14	Speed feed forward gain	The default value is 0.0% Increasing the feed forward gain can reduce real-time position deviation. When the input command is uneven, increasing the feed forward filtering time constant P03.13 can improve it When vibration occurs, try reducing this value

6.3.6 Feed forward gain

Speed feed forward can be applied to position control mode and fully closed-loop function. The use of speed feed forward function can improve speed command response and reduce position deviation at fixed speeds

Operation steps for speed feed forward function :

- a) Set the source of speed feed forward signal

Set P3-12 (speed feed forward control selection) to a non-zero value, the speed feed forward function will take effect, and the corresponding signal source will be selected ;

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P03-12	Selection of position feed forward control	0- No speed feed forward 1- Internal speed feed forward	-	1	Effective immediately	Stop set	P

- b) Set speed feed forward parameters :

Including speed feed forward gain (P3-14) and speed feed forward filtering time constant (P3-13).

Code	Name	Adjust description
P3-13	Speed feed forward filtering time constant	

P3-14	speed feed forward gain	Parameter function: Increasing P3-14 can improve response, but may result in speed overshoot during acceleration and deceleration; Increasing P3-13 can suppress noise caused by uneven position commands, while reducing P3-13 can reduce speed overshoot during acceleration and deceleration.
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6.3.7 Mechanical vibration suppression

Mechanical systems have a certain resonance frequency. When the servo gain is increased, resonance may occur near the mechanical resonance frequency, causing the gain to be unable to continue to increase.

Suppressing mechanical resonance can be achieved through the following two ways:

1) Torque command filter (C-017)

By setting a filtering time constant, the torque is attenuated in the high-frequency range above the cutoff frequency, thereby achieving the goal of suppressing mechanical resonance

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
C-017	Torque command filtering time constant	0~3000	10us	79	Effective immediately	Run set	PST

2) Notch filter

The torque command filter is a digital band stop filter, with four sets of series notch filters available for selection.

The first and second notch filters are manual notch filters, and the parameters are manually set by the user. The 3rd and 4th notch filters are adaptive filters, and their mode is controlled by P0E.00. You can choose whether to enable the 3rd (P0E-00=1) or enable both the 3rd and 4th (P0E-00=2) filters at the same time. When the adaptive filter mode is enabled, the filter parameters are set by the driver. If the (P0E-00=0) adaptive filter is not enabled, the filter parameters can be manually set.

Relevant code:

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P0E-00	Adaptive notch filter mode selection	0- No action 1- Enable 1 adaptive filter (Group 3) to automatically update filter parameters 2- Enable 2 adaptive filters (groups 3 and 4) to automatically update filter parameters 3- Only detect resonance frequency, do not update filter parameters 4- Reset adaptive filter parameters	-	0	Effective immediately	Run set	PS
P0E-01	Frequency of notch filter 1	50~4000	Hz	4000	Effective immediately	Run set	PS
P0E-02	Width level of notch filter 1	0~20	-	2	Effective immediately	Run set	PS
P0E-03	Attenuation level of notch filter 1	0~99	-	0	Effective immediately	Run set	PS
P0E-04	Frequency of notch filter 2	50~4000	Hz	4000	Effective	Run	PS

						immediately	set	
P0E-05	Width level of notch filter 2	0~20	-	2	Effective immediately	Run set	PS	
P0E-06	Attenuation level of notch filter 2	0~99	-	0	Effective immediately	Run set	PS	
P0E-07	Adaptive notch filter 1 frequency	50~4000	Hz	4000	Effective immediately	Run set	PS	
P0E-08	Adaptive notch filter 1 width level	0~20	-	2	Effective immediately	Run set	PS	
P0E-09	Adaptive notch filter 1 attenuation level	0~99	-	0	Effective immediately	Run set	PS	
P0E-10	Adaptive notch filter 2 frequency	50~4000	Hz	4000	Effective immediately	Run set	PS	
P0E-11	Adaptive notch filter 2 width level	0~20	-	2	Effective immediately	Run set	PS	
P0E-12	Adaptive notch filter 2 attenuation level	0~99	-	0	Effective immediately	Run set	PS	
P0E-13	Identification results of resonance frequency	-	Hz	-	-	display	PS	

6.4 Driver matching instructions for the other brand motors

6.4.1 Parameter settings before combination use

When using R8 servo driver to match motors from other manufacturers, the following steps should be followed to set it up:

1. Customize motor parameter settings and enter developer mode

First, set the P00-01 parameter to 65535 and P00-14 parameter to 3605 before restarting the servo

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P00-01	Motor mode	0~65535	-	0	Stop restart	Stop set	Ordinary user

2. Modify the following relevant parameters according to the specifications of the motor, and save the selected parameters:

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P10-04	Single cycle pulse count of motor	1~1073741824	p	1	Stop restart	Stop set	Factory mode
P10-06	Rated voltage	0-220V 1-380V	--	0	Stop restart	Stop set	Factory mode
P10-07	Rated power	0~65535	10W	75	Stop restart	Stop set	Factory mode
P10-08	Rated current	0~65535	0.01A	470	Stop restart	Stop set	Factory mode
P10-09	Rated torque	0~65535	0.01Nm	239	Stop restart	Stop set	Factory mode

P10-10	Rated speed	0~65535	rpm	3000	Stop restart	Stop set	Factory mode
P10-11	Maximum torque	0~65535	0.01Nm	716	Stop restart	Stop set	Factory mode
P10-12	Maximum speed	0~65535	rpm	6000	Stop restart	Stop set	Factory mode
P10-16	Moment of inertia	0~65535	kg.mm ²	130	Stop restart	Stop set	Factory mode
P10-17	Polar logarithms	0~65535	--	4	Stop restart	Stop set	Factory mode
P10-18	Phase resistance	0~65535	mΩ	500	Stop restart	Stop set	Factory mode
P10-19	Q-axis inductance	0~65535	mH	327	Stop restart	Stop set	Factory mode
P10-20	D-axis inductance	0~65535	mH	387	Stop restart	Stop set	Factory mode
P10-21	Coefficient of back EMF	0~65535	0.01mV/rpm	3330	Stop restart	Stop set	Factory mode
P10-22	Z signal corresponds to electrical angle	0~3600	0.1°	1800	Stop restart	Stop set	Factory mode

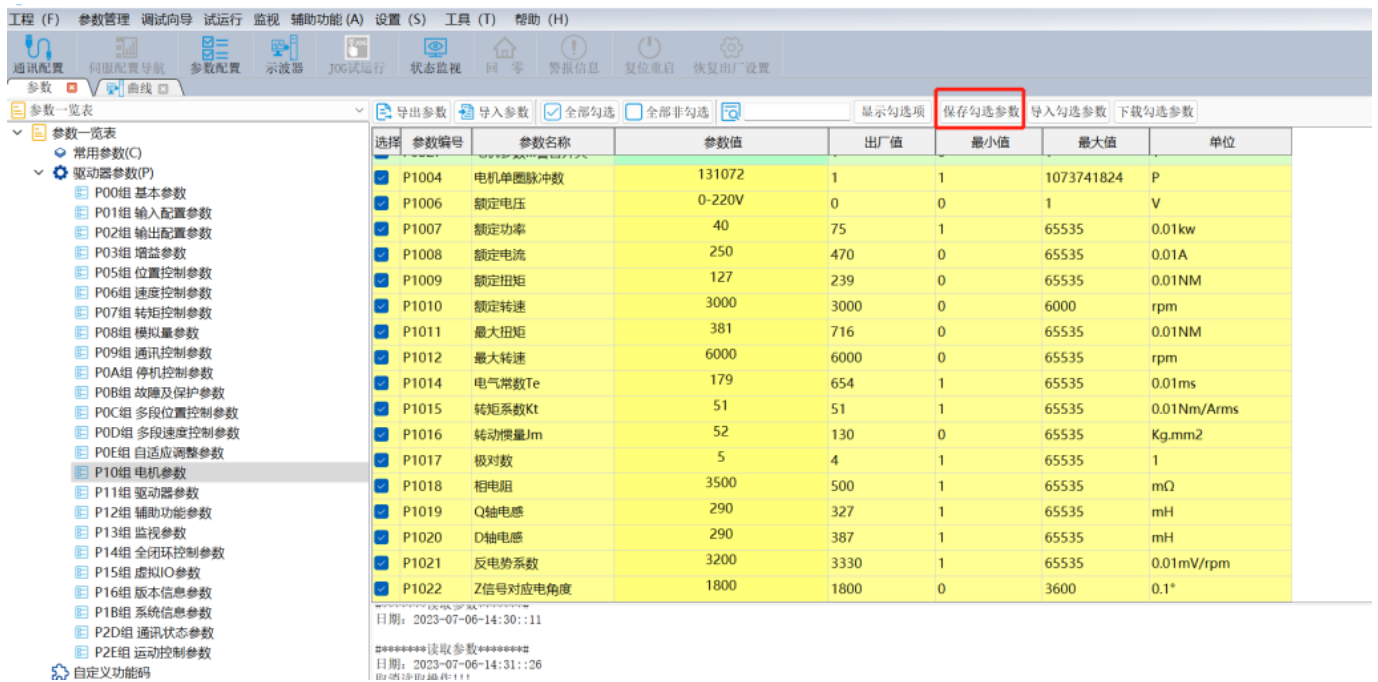


Figure 5.16 After selecting parameters, save and check the selected parameters

3. Import parameter files using the upper computer

Using the SamKoon servo software, write the motor parameters from step two into the servo, restart the servo, and re read the servo parameters to confirm successful parameter writing.

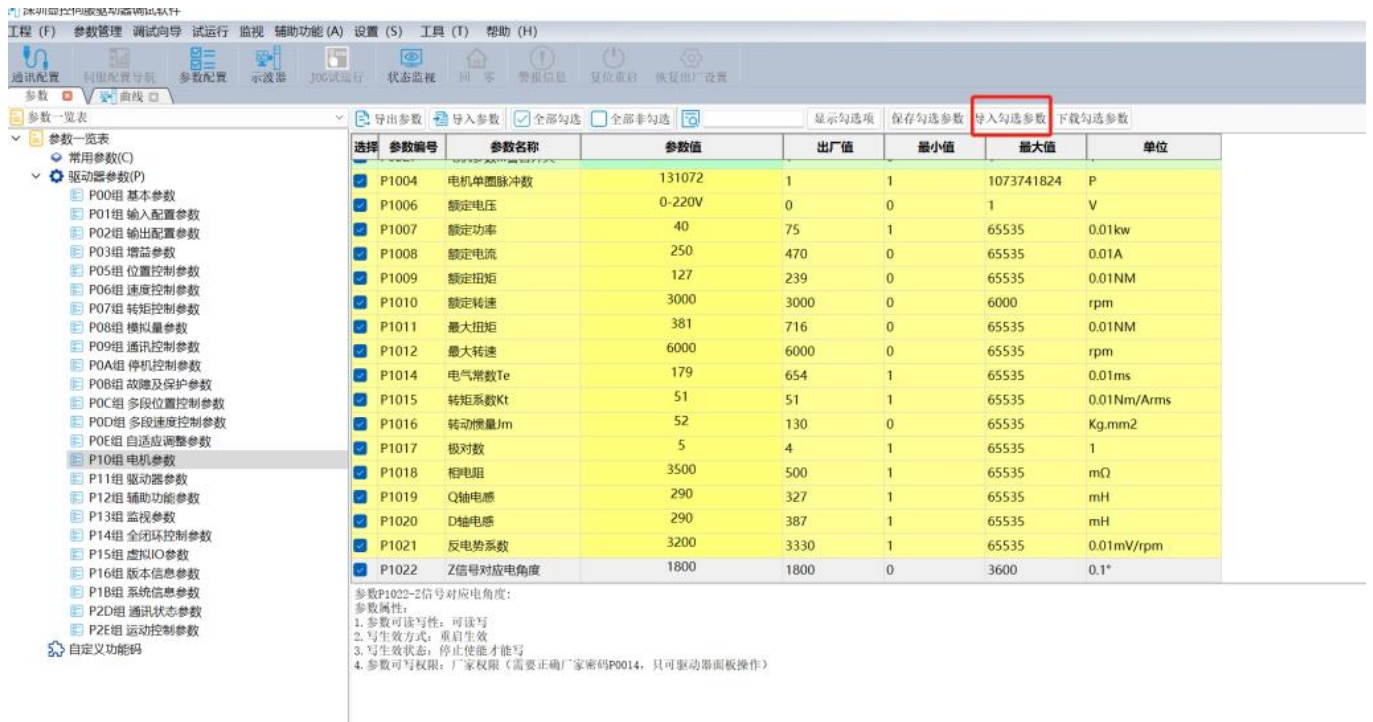


Figure 5.17 After saving the parameters, download and select the parameters

6.4.2 Motor encoder phase reset operation

1. Set P00-14 to 3605 and P20-00 to 3 to lock the motor shaft

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P00-14	Factory password	0~65535	--	0	Effective immediately	Set anytime	Ordinary user
P20-00	Motor mode set	3-Motor shaft lock		0	Effective immediately	Set anytime	Ordinary user

2. After locking the motor shaft, check the P20-06 lock shaft voltage percentage and turn the motor shaft. If it can be turned, increase the value of P20.06 and lock the motor shaft.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P20-06	Lock shaft current intensity	0~100	--	30	Effective immediately	Set anytime	Ordinary user

3. Read the value of P13-31, calculate the difference between P13-31 and P10-22, and write the difference into P10-22.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
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P13-31	Electrical angle	0~3600	0.1°	0	Read only	Read only	Ordinary user
P10-22	Z signal corresponds to electrical angle	0~3600	0.1°	1800	Stop restart	Stop set	Factory mode

4. Set P20-00 to 0 to unlock the shaft and enter JOG mode to test if it can operate normally.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P20-00	Motor mode set	3-Motor shaft locking		0	Effective immediately	Stop set	Ordinary user

6.5 Brake setting

Brake is a mechanism that prevents the servo motor shaft from moving when the servo drive is not in operation, keeping the motor locked in position and prevent moving due to their own weight or external forces.

6.5.1 Brake wiring

Servo motors are commonly used as electromagnetic brake systems. Generally, the electromagnetic brake power supply have no polarity, and users need to prepare a 24V power supply. The standard connection example of brake signal BK and the brake power supply wiring is shown in the following figure :

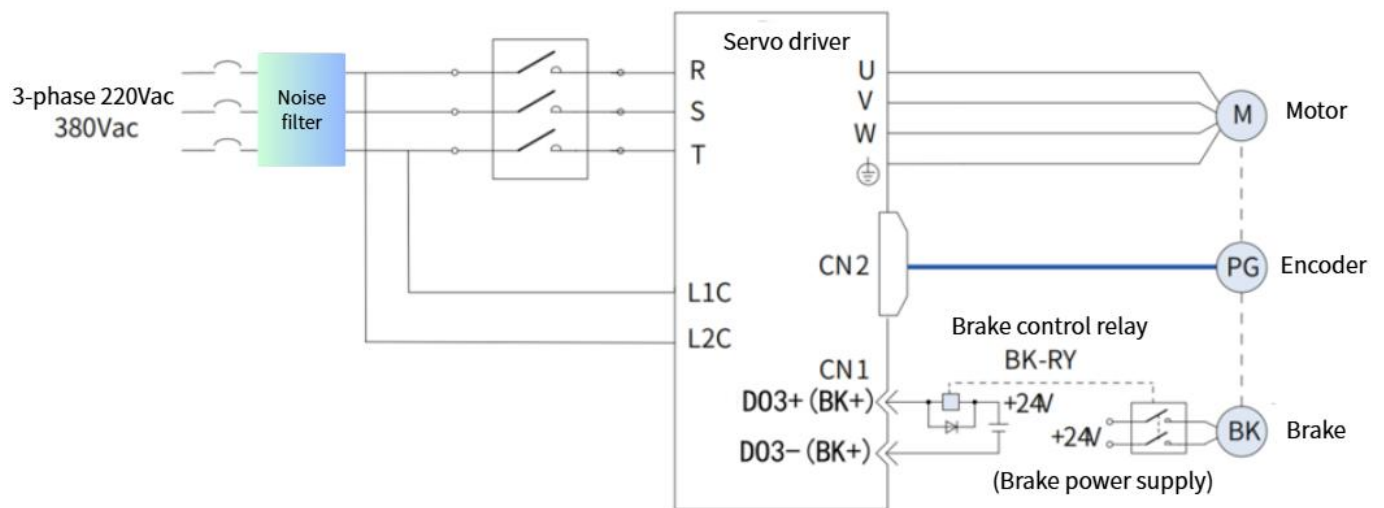


Figure 5.18 brake wiring diagram

The brake signal line +24V enters from DO3+, DO3- connected to relay pin 14. Relay pin 13 is connected to -24V, so that complete the control circuit. Brake cable "+" terminal end connect 8, "-" terminal end connect 5. During normal use, 14 and 12 short circuited, 13 and 9 short circuited, so that provide power for the brake.

Precautions for brake wiring:

The length of the motor brake cable needs to fully consider the voltage drop caused by cable resistance, and the brake operation needs to ensure that the input voltage is at least 21.6V.

It is best not to share the power supply with other electrical appliances to prevent voltage or current drops caused by the operation of other electrical appliances, which may ultimately lead to brake misoperation.

Recommend using cables of 0.5mm² or larger.

6.5.2 Brake software settings

For servo motors with brakes, one DO terminal of the servo driver must be configured as the brake output, and the effective logic of the DO terminal must be determined.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P02-02	DO3 terminal function selection	10-brake	--	1	Effective immediately	Set anytime	Ordinary user

6.5.3 Brake problem

The common problems with the brake of servo motors during the running or stop process include the following:

(1) Servo power on process

When the power on, the servo motor will first be powered on and then the brake will be opened. Generally, there will be a phenomenon of the Z-axis load falling down. If the servo is in position mode, the Z-axis will return to its initial position before falling. If the servo operation mode is not in position mode, the Z-axis load will remain in the stop position, which is a normal phenomenon.

To reduce the drop distance, the rigidity level P03-01 can be appropriately increased or the PE-60 torque gravity compensation value can be set after confirming the Z-axis weight.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P03-01	Rigidity level	0~31	--	12	Effective immediately	Set anytime	Ordinary user
P0E-60	Gravity compensation value	-1000~1000	‰	0	Effective immediately	Set anytime	Ordinary user

(2) Servo power-off process

When the servo drive is powered off normally and there is no alarm, the servo will continue to enable for a period of time, waiting for the brake to close before disconnecting the enable. Due to the tens of milliseconds required for the intermediate relay action, the Z-axis load may drop a certain distance downwards influence by high-speed operation or static related parameter settings. To reduce the distance of falling or avoid falling, optimization can be achieved by setting P00-15 = 1, increasing the rigidity level P03-01 appropriately, increasing PA-11, and decreasing PA-12.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P00-15	Fast power outage, discharge failure	0-Enable power-off and fast power outage function 1-disable Power-off and fast power outage function		0	Effective immediately	Set anytime	Ordinary user
P03-01	Rigid level	0~31	--	12	Effective immediately	Set anytime	Ordinary user
P0A-11	Brake safety speed	0~3000	rpm	30	Effective immediately	Set anytime	Ordinary user
P0A-12	The longest waiting time for the brake to close after the servo is power off	1~1000	ms	500	Effective immediately	Set anytime	Ordinary user

(3) Fault shutdown process

If one type of fault occurs during the operation of the servo, it is possible that the high Z-axis load speed may cause the brake to not close in time, resulting in accidents where the load collides with the equipment. To avoid collisions, optimization can be achieved by increasing PA-11 and decreasing PA-12 parameters.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P0A-11	Brake safety speed	0~3000	rpm	30	Effective immediately	Set anytime	Ordinary user
P0A-12	The longest waiting time for the brake to close after the servo is turned off	1~1000	ms	500	Effective immediately	Set anytime	Ordinary user

If the second type of fault occurs during the operation of the servo, In addition to modifying the parameters of PA-11 and PA-12, optimization can also be achieved by setting parameter PA-02 = 2 and P00-15 = 1, and selecting zero speed shutdown.

(4) Enable first and then immediately disable Z-axis drop (or disable due to servo failure after enabling)

When the motor in enabled status, the speed higher than the PA-11 speed threshold. If disable suddenly at this time, due to the high motor speed, the brake cannot be closed, which may also cause the Z-axis load to drop. At this time, the problem can be solved by increasing the value of PA-11 or decreasing the value of PA-12, but it should be noted that the set value should be within a reasonable range, otherwise it will reduce the service life of the motor brake.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P0A-11	Brake safety speed	0~3000	rpm	30	Effective immediately	Set anytime	Ordinary user
P0A-12	The longest waiting time for the brake to close after the servo is turned off	1~1000	ms	500	Effective immediately	Set anytime	Ordinary user

(5) After power on, the servo was not enabled but the brake was opened

Firstly, check the servo parameter P13-30 and confirm the output status of the servo brake IO point; Then check whether the IO wiring DO+/DO- of the servo brake control signal is reversed. Because of the servo protection circuit in the DO output, reverse wiring can cause the brake control signal to misguide and lead to the problem of the brake opened but the servo is not enabled.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P13-30	Monitor output signal DO	0~65535	--	0	Read only	Read only	Ordinary user

(6) The power on servo enable but brake cannot be opened

Firstly, check the servo parameter P13-30 and confirm the output status of the servo brake IO point; Check if the wiring of the brake cable is normal, if the servo power supply is stable and greater than 21.6V. After confirming that there are no errors, check whether the DO function is set to the brake function and if the brake logic is set correctly.

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P13-30	Output signal monitoring DO	0~65535	--	0	Read only	Read only	Ordinary user

Code	Name	Set range	Unit	Value	Effective Mode	Set mode	Relevant Mode
P02-02	DO3 terminal function selection	10-brake	--	1	Effective immediately	Set anytime	Ordinary user

6.5.4 Troubleshooting of Brake Issues

1. Open the power on brake directly:

Pay attention to checking if the DO wiring is reversed. Reverse wiring can affect the servo IO logic and cause false triggering of the brake signal. If the enable signal is not given but the brake is in the open state when powered on, it is highly likely that the DO wiring is reversed.

2. The brake cannot be opened:

Check if the wiring of the brake cable is normal, if the servo power supply is stable and greater than 21.6V. After confirming that there are no errors, check if the DO function is set to the brake function and if the brake logic is set correctly.

7 Fault Handling

7.1 Troubleshooting before operation

Fault phenomenon	Fault reason	Handling methods
1. The digital tube does not light up 2. The digital display is not ready, and the two rightmost digital displays are "nr"	1. Abnormal power supply voltage	Check the input power specifications of the driver and measure whether the input voltage on the non driver side and driver side (L1 L2 L3) of the main circuit cable meets the following specifications: 220V driver Effective value: 220V-240V Allowable deviation: -10%~+10% (198V~264V) 380V driver Effective value: 380V-440V Allowable deviation: -10%~+10% (342V~484V)
	2. servo driver fault	Back to factory repair.
After the servo enable signal is set to ON, the servo motor is in a free running state	1.The servo enable signal is invalid (the two digital tubes at the last of the tube display "rd" instead of "ru")	1. Check P01 group to see if the servo enable signal DI terminal and effective logic are correctly set. The factory default DI1 configuration is servo enable signal input ("P1-04 DI1 terminal function selection" is set to "[1] servo enable"), and "P1-20 DI1 terminal logic selection" is set to "[0] ON effective") 2. Check if the external enable switch circuit is working properly
	2. Control mode selection error	Check if the 'P0-00 Control Mode Selection' is incorrectly configured as ' [2] Torque Mode '(default torque command is zero)
	3. Wiring error	1. Check if the power lines U, V, W, and PE of the motor are reliably connected to the servo
	4. Motor damage	2. Check if the power lines of other axis motors have been connected to the driver incorrectly
Panel display "AL.xxx"	Servo malfunction	Refer to section 6.2 to find the cause and troubleshoot the problem.

7.2 Troubleshooting during runtime

7.2.1 Troubleshooting of Operational Malfunctions

Servo enabled state will displayed as "ru" on the tube,and if the servo has not entered the enabled state, please follow the method of "1.1 Troubleshooting before Operation" for troubleshooting.

After inputting the command, the servo did not run as expected or ran unevenly. Please follow the suggestions in the table below for troubleshooting.

Fault phenomenon	Fault reason	Handling methods
When inputting commands, the motor does not rotate	1. Wiring error	Please refer to Chapter 3 "Wiring" to ensure that the command pulse signal line is correctly connected, the enable switch, and the overtravel switch are correctly connected

	<p>2.Servo parameter configuration error</p>	<p>Location operation mode</p> <ol style="list-style-type: none"> 1. Ensure that the "P5-15 position command source" is consistent with the actual input position command method 2. Ensure that the "P5-16 instruction pulse shape" is consistent with the actual input instruction pulse signal shape (when inputting the AB signal, the incorrect configuration is "[0] pulse+direction", and the pulse count will be very small) 3. Ensure that the "P5-00 Single Cycle Pulse Number" is set correctly. When the value of the single cycle pulse number is large, the actual rotation of the motor is very small after inputting the command pulse <p>Speed operation mode</p> <ol style="list-style-type: none"> 1. Ensure that the command source set for "P6-00 Speed Command Selection" matches the actual input command <p>When selecting analog input commands, check whether the AI analog input channel selection is correct ("P6-01 speed command A source", "P6-02 speed command B source"), and check whether the AI terminal wiring is correct</p> <p>When the number is given, check if the "P6-03 speed command digital setting value" is correct</p> <p>When the jog speed command is given, check whether the "P6-04 jog speed setting value" is correct, check whether the P01 group has set the DI function "[18] forward jog" and "[19] reverse jog", and whether the corresponding terminal logic is valid</p> <ol style="list-style-type: none"> 2. Check if the "P6-05 Speed Command Acceleration Time" and "P6-06 Speed Command Deceleration Time" settings are correct <p>Torque operation mode</p> <p>Ensure that the command source set for "P7-00 torque command source" matches the actual input command</p> <p>When selecting analog input commands, check whether the AI analog input channel selection is correct ("P7-01 torque command A source", "P7-02 torque command B source"), and check whether the AI terminal wiring is correct</p> <p>When the number is given, check if the "P7-03 torque command digital setting value" is correct</p>
	<p>3.The input command has not taken effect</p>	<ol style="list-style-type: none"> 1. Ensure that the servo is not in an alarm state (the panel status page displays "AL. xxx"). If an alarm occurs, refer to section 6.2 to identify the cause and troubleshoot the issue 2. Ensure that the servo is in the enabled state when the command is sent (the last two digital tubes on the panel display "ru"). If it is not in the enabled state, check P01 group to see if the servo enable signal DI terminal and effective logic are correctly set, and if the enable switch circuit is working properly 3. Ensure that the DI function "[13] pulse disable", "[37] pulse command disable", or "[12] zero clamp" is not used incorrectly
<p>When inputting command, the motor rotates in the wrong direction</p>	<p>Parameter configuration error</p>	<p>Location operation mode</p> <ol style="list-style-type: none"> 1. Check if the "P02-02 Motor Rotation forward Direction Definition" is set correctly 2. Check if the "P05-17 instruction pulse signal inversion" setting

		<p>corresponds to the actual input pulse polarity, and verify if the terminal wiring is correct</p> <p>3. Check if the DI function "[27] Position Command Direction" has been set and if the corresponding terminal logic is valid</p> <p>Speed operation mode</p> <p>1. Check if the "P02-02 Motor Rotation forward Direction Definition" is set correctly</p> <p>2. When selecting analog input commands, check if the polarity of the input signal is reversed</p> <p>3. When the value is given, check if the "P6-03 speed command digital setting value" is correct</p> <p>4. Check if the DI function "[26] Speed Command Direction" has been set and if the corresponding terminal logic is valid</p> <p>5. When the jog speed command is given, check whether the "P6-04 jog speed setting value" is correct, check whether the P01 group has set the DI function "[18] forward jog" and "[19] reverse jog", and whether the corresponding terminal logic is valid</p> <p>Torque operation mode</p> <p>1. Check if the "P02-02 Motor Rotation forward Direction Definition" is set correctly</p> <p>2. When selecting analog input commands, check if the polarity of the input signal is reversed</p> <p>Check if the DI function "[25] Torque Command Direction" has been set and if the corresponding terminal logic is valid</p>
<p>1. Unstable speed during low-speed operation</p> <p>2. Vibration occurs during running</p>	<p>1. Unreasonable gain setting</p> <p>2. "P03-02 load moment of inertia ratio mismatch</p>	<p>1. Adjust the rigidity level (when the value of "P3-00 self-tuning mode selection" is not "[0] manually adjust the gain parameter", adjust "P3-01 rigidity level")</p> <p>2. Perform gain adjustment. When the value of "P3-00 self-tuning mode selection" is set to "[0] manual adjustment of gain parameter", adjust parameters such as "P3-04 position loop gain", "P3-05 speed loop gain", "P3-06 speed loop integration time constant", etc</p> <p>Unstable during low-speed operation, try increasing the rigidity level</p> <p>Vibration during operation, try to reduce the rigidity level</p> <p>1. In safe operation status, perform "F-003 inertia identification"</p> <p>2. Estimate the load inertia ratio and manually fill in the parameter 'P3-02 load inertia ratio'</p>
<p>Inaccurate positioning</p>	<p>Refer to the next section "7.2.2 Troubleshooting for inaccurate positioning" for handling</p>	

7.2.2 Inaccurate positioning investigation

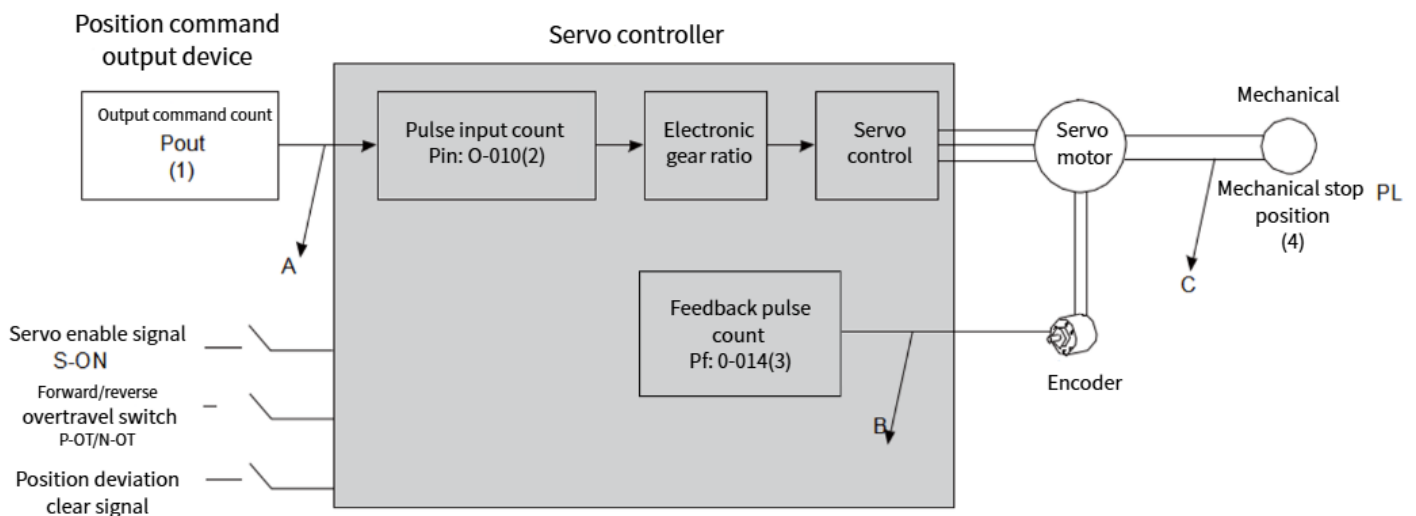


Figure 6-1 Servo positioning control process

Inaccurate positioning occurred, check the 4 signals in the above picture

(1) The output command count Pout (internal parameter of the controller)

(2) The input position command counter Pin received by the servo controller corresponds to the parameter "O-010 pulse command count"

(3) The feedback pulse accumulation value Pf of the servo motor's built-in encoder corresponds to the parameter "O-014 Feedback Pulse Count"

(4) Mechanical stop position PL

In an ideal state where no positional deviation occurs, the following relationship holds:

- $P_{out} = P_{in}$
- $P_f = P_{in} \times \text{Electronic gear ratio}$
- $PL = P_f \times \Delta L$, that ΔL is: 1 position instruction corresponds to load displacement

Follow the method shown in the table below to troubleshoot the problem one by one

phenomenon	$P_{out} \neq P_{in}$
Reason for malfunction	<ol style="list-style-type: none"> ① In the wiring between the position command output controller (such as PLC) and the servo driver, the input position command counting error is caused by the influence of current noise ② During the operation of the motor, the input position command is interrupted.
Troubleshooting methods	<ol style="list-style-type: none"> ① Check if the pulse input terminal (refer to Chapter 3 "Wiring") uses twisted pair shielded wire ② If conditions permit, use differential input for pulse command signals ③ The wiring of the pulse input terminal must be separated from the main circuit (L1, L2, L3, U, V, W) and routed separately ④ Increase the "P5-18 pulse signal filtering time" and "P5-19 direction signal input filtering time"

- ⑤ Check if the "P5-16 Command Pulse Form" matches the actual input signal type
- ⑥ Ensure that the '[2] servo enable' signal is not erroneously set to invalid during operation, default DI1 configuration is '[2] servo enable'
- ⑦ Ensure that the "[14] forward overtravel" or "[15] reverse overtravel" signals are not activated during operation. The default DI3 configuration is "[14] forward overtravel" and DI4 configuration is "[15] reverse overtravel"
- ⑧ If the DI terminal is configured with "[13] pulse disable" or "[37] pulse command disable", ensure that the "[13] pulse disable" or "[37] pulse command disable" signal is not activated during operation

$$P_f \neq P_{in} \times \text{electronic gear ratio}$$

Encoder feedback position signal error (signal interference)

- ① Check if there was a malfunction during operation that resulted in incomplete execution of instructions and servo shutdown
- ② If the DI terminal is configured with "[35] position deviation clearing", ensure that the "[35] position deviation clearing" signal does not take effect during operation
- ③ Check if the "P5-50 position deviation clearing action" is reasonable

$$P_L \neq P_f \times \Delta L$$

Mechanical position sliding occurred between the machine and servo motor

Step by step check the connection status of the machinery and identify the location where relative sliding occurred

7.3 Software Alarm Handling

7.3.1 Alarm category and display

The faults and warnings of servo drives can be classified into three levels based on their severity: Type 1 errors, Type 2 errors, and warnings.

Severity level: Type 1 error > Type 2 error > Warning.

When a single alarm or warning occurs, the status menu of the drive tube will immediately display the current alarm or warning code. When multiple alarms or warnings occur, the alarm code with the highest severity level will be displayed.

Different alarm levels have different displays, and the digital tube alarm displays A.Lxxx represents a type 1 alarm, AL.xxx represents a type 2 alarm, and AL xxx represents a warning;

Example:

A.L040 is an absolute encoder communication abnormality alarm, which belongs to a type of error. It will be displayed on the tube as:



AL.099 is a motor stalling overheat protection alarm, which belongs to Type 2 error. It will be displayed on the tube as:



AL029 is a warning for driver motor mismatch, which is displayed on the panel as:



The following table shows the servo software alarms, describing the alarm names corresponding to the alarm IDs, the clearable attributes of the alarms, and the alarm types.

Alarm ID	Alarm Name	Clearable	Alarm Type
10	Incorrect User Parameter Configuration	No	Type 1 Error
11	User Parameter Verification Error	No	Type 1 Error
12	Invalid User Parameter Value	No	Type 1 Error
13	Parameter Storage Fault	No	Type 1 Error
14	Parameter Reading Fault	No	Type 1 Error
15	EEPROM Read/Write Too Fast	No	Type 1 Error
25	Incorrect Motor Model	No	Type 1 Error
26	Incorrect Driver Model	No	Type 1 Error
27	Driver-Motor Mismatch	Yes	Warning
28	User-Defined Motor	Yes	Warning
30	Incorrect Encoder Type	No	Type 1 Error
39	Absolute Value System Matching Error	No	Type 1 Error
40	Absolute Encoder Communication Abnormality	No	Type 1 Error
41	Absolute Encoder Counting Abnormality	No	Type 1 Error
42	Absolute Encoder EEPROM Reading Abnormality	No	Type 1 Error
43	Absolute Encoder Multi-turn Counting Error	Yes	Type 2 Error
44	Absolute Encoder Multi-turn Counter Overflow	Yes	Type 2 Error
45	Absolute Encoder Battery Fault	Yes	Type 2 Error
46	Absolute Encoder Battery Alarm	Yes	Warning
47	Absolute Encoder Overheating	Yes	Warning
50	Absolute Encoder EEPROM Data Not Programmed	No	Type 1 Error
55	Current Sampling Overflow	Yes	Type 1 Error
56	Current Sampling Too Slow	Yes	Type 1 Error
60	Incorrect Single-turn Pulse Number Setting	Yes	Type 2 Error
61	Incorrect Electronic Gear Ratio 1 Setting	Yes	Type 2 Error
62	Incorrect Electronic Gear Ratio 2 Setting	Yes	Type 2 Error
64	DI Signal Allocation Error	Yes	Type 1 Error
65	Duplicate DI Allocation	Yes	Type 1 Error
66	DO Allocation Error	Yes	Type 1 Error
67	DI Configuration Failure	Yes	Type 1 Error
70	Undervoltage	Yes	Type 1 Error

71	Overvoltage	Yes	Type 1 Error
72	Control Power Undervoltage	No	Type 1 Error
73	Bus Voltage Boost Abnormality	Yes	Type 1 Error
74	Power Supply Phase Loss	Yes	Type 2 Error
75	Soft Start Relay Damage	Yes	Type 2 Error
76	Power Supply Phase Loss Warning	Yes	Warning
77	IGBT Overheating	No	Type 1 Error
78	Heat Sink Overheating	No	Type 1 Error
80	MCU Emergency Stop	No	Type 1 Error
82	Bus Overcurrent	No	Type 1 Error
83	U-Phase Overcurrent	No	Type 1 Error
84	V-Phase Overcurrent	No	Type 1 Error
85	W-Phase Overcurrent	No	Type 1 Error
90	UVW Wiring Error	No	Type 1 Error
91	Runaway	No	Type 1 Error
92	Overspeed	Yes	Type 1 Error
95	Driver Overload	Yes	Type 2 Error
96	Motor Overload	Yes	Type 2 Error
97	Motor Overload	Yes	Type 2 Error
98	Motor Overload Warning	Yes	Warning
99	Motor Locked Rotor Overheat Protection	Yes	Type 2 Error
100	Servo ON Command Invalid	Yes	Type 2 Error
101	Excessive Position Deviation	Yes	Type 2 Error
102	Abnormal Position Command Input	Yes	Type 2 Error
105	Divided Pulse Output Overspeed	Yes	Type 2 Error
106	Divided Pulse Accumulation Overflow	Yes	Type 2 Error
107	Unreasonable Divided Pulse Output Setting	Yes	Type 2 Error
108	Homing Timeout Error	Yes	Warning
109	Regenerative Brake Resistor Overload	Yes	Warning
110	Regenerative Brake Resistor Overcurrent	Yes	Warning
111	Excessively Small External Regenerative Brake Resistor Resistance	Yes	Warning
112	Motor Power Cable Disconnection	Yes	Warning
113	Restart Prompt	Yes	Warning
114	Positive Overtravel Warning	Yes	Warning
115	Negative Overtravel Warning	Yes	Warning
116	Excessively Large AI Zero Offset	Yes	Warning
117	Excessively Large AI1 Input	Yes	Warning
118	Excessively Large AI2 Input	Yes	Warning
120	AI1 Zero Calibration Failure	Yes	Warning
121	AI2 Zero Calibration Failure	Yes	Warning
125	Incorrect Command Pulse Wiring	Yes	Type 2 Error
126	Direction Signal Interference Warning	Yes	Warning
127	Direction Signal Interference Error	No	Type 1 Error

148	Software Position Upper/Lower Limit Error	Yes	Type 2 Error
149	Incorrect Homing Offset Setting	Yes	Type 2 Error
160	Incorrect Synchronization Cycle Setting	Yes	Type 2 Error
161	Excessive Synchronization Signal Deviation	Yes	Type 2 Error
167	Station Number Conflict	Yes	Type 2 Error
168	Incorrect Station Number	Yes	Type 2 Error
169	Abnormal Communication State Machine	Yes	Type 2 Error
170	Synchronization Loss	Yes	Type 2 Error
173	ESI File Not Programmed	Yes	Type 2 Error
174	ESC Initialization Failure	Yes	Type 2 Error
175	Incorrect Homing Mode Setting	Yes	Warning
176	Position Loop Scheduling Error	Yes	Type 1 Error
177	Position Loop Execution Timeout	Yes	Warning

7.3.2 Alarm Clearance

The alarm clearance function can clear the current alarm and restore the servo to the operating state. It can be performed in two ways:

1. Write "[1] Clear Current Alarm" through the function code "F-001 Alarm Clearance".
2. Input an alarm clearance signal through the DI terminal. By default, DI2 is configured as the alarm clearance function ("P1-05 DI2 Terminal Function Selection" set to "[2] Alarm Clearance"), and inputting an ON signal to DI2 can trigger the alarm clearance action.

Notes:

- The alarm clearance action only takes effect when the servo enable input is OFF. This means the upper computer must first turn off the servo enable input before clearing the servo alarm.
- Before performing the alarm clearance action, identify and eliminate the cause of the alarm. If the current alarm condition still exists, the alarm clearance action will not take effect.
- For alarms that need to be eliminated by changing parameters, confirm whether the modified parameters require the servo to be powered off and restarted to take effect. Note that "AL.113 Restart Prompt" is a low-priority warning and will not be displayed when other alarms are present.
- Not all alarms can be cleared. Refer to "Table 7-1 Software Alarm Attribute Table" to confirm if an alarm can be cleared.

7.3.3 Alarm Records

The servo drive has a fault recording function, which can record the names of the last 10 faults and warnings, as well as the status parameters of the servo drive when the fault or warning occurred. If the current alarm ID occurs

in the last 5 different alarm records, the current alarm will not be recorded.

After the "alarm clearing" action, the fault record will still save the fault and warning. Except that writing "[2] clear alarm record" through the function code "F-001 alarm clearing", the stored alarm records can be cleared.

By monitoring the parameter '0-057 Fault Record Index', the alarm record index to be observed can be set. The alarm record information specified by 0-057 can be viewed through 0-058~0-074. After setting this value to n, 0-058~0-074 displays the latest n+1th alarm information. For example, when n=0, it is the latest alarm.

Code	Code name	Unit	Code description
0-057	Fault record index		Fault record index, readable and writable
0-058	Fault code		The fault code of the selected alarm
0-060	Fault time	0.1s	Selected fault time
0-062	Speed during malfunction	rpm	Speed at selected fault
0-063	U-phase current during malfunction	0.01A	U-phase current during selected fault
0-064	V-phase current during malfunction	0.01A	V-phase current during selected fault
0-065	Bus voltage during malfunction	0.1V	Bus voltage at selected fault
0-066	Input terminal status during malfunction		Input terminal status when selecting faults
0-067	Output terminal status during malfunction		Output terminal status at selected fault
0-068	Command speed during malfunction	rpm	Command speed at selected fault
0-069	Command torque during malfunction	‰	Command torque for selected faults
0-070	Feedback torque during malfunction	‰	Feedback torque for selected faults
0-071	Position command during malfunction	p	Position command for selected fault
0-072	Position deviation during malfunction	p	Position deviation during selected fault
0-073	Control word during malfunction		Control word for selected fault
0-074	Status word during malfunction		Status word for selected fault

7.3.4 Software Alarm Troubleshooting Methods

Alarm Code	Alarm Name	Fault Cause	Troubleshooting Method
11	User Verification Error	Parameter 1. Power failure during parameter reset 2. Firmware update	1. After turning off the servo enable input, perform a parameter reset operation (write 2 to F-000) and restart the servo (power-off restart or write 1 to F-000). 2. Update the firmware
12	Invalid Parameter Value	User Parameter value is less than the specified minimum or greater than the specified maximum	1. After turning off the servo enable input, perform a parameter reset operation (write 2 to F-000) and restart the servo (power-off restart or write 1 to F-000). 2. Check the abnormal parameter group number and offset through O-078 and O-079, and correct the corresponding parameter value
13	Parameter Storage Fault	User parameter EEPROM write failure	1. Check if the EEPROM is damaged or poorly soldered. 2. Replace the driver

14	Parameter Reading Fault	User parameter	EEPROM read failure	<ol style="list-style-type: none"> 1. Check if the EEPROM is damaged or poorly soldered. 2. Replace the driver
15	EEPROM Read/Write Too Fast	Excessive EEPROM write requests		<ol style="list-style-type: none"> 1. Check if parameters are being written frequently. If continuous writing is necessary, add 1 to the highest bit of the write address (e.g., change the address of parameter P0540 from 0x528 to 0x8528). 2. Check if frequent reading/writing via SDO is occurring. If so, map the parameters to PDO
21	Position Execution Timeout Fault	The position loop execution cycle is too long for 4 consecutive times		<ol style="list-style-type: none"> 1. Replace the driver. 2. Contact our technical support for processing
25	Incorrect Motor Model	Motor	<ol style="list-style-type: none"> 1. The firmware is too old to support the motor 2. An unsupported motor model is set 	<ol style="list-style-type: none"> 1. Update the firmware. 2. Check if "P0-01 Motor Model" is set correctly
26	Incorrect Driver Model	Driver	An incorrect driver model is set	Check if "P11-00 Driver Model" is set correctly
27	Driver-Motor Mismatch		The rated power of the motor is greater than that of the driver	<ol style="list-style-type: none"> 1. Check if "P0-01 Motor Model" is set correctly. 2. Check if "P11-00 Driver Model" is set correctly. 3. Replace with a higher-power driver or a lower-power motor
28	User-Defined Motor		P00-01 is set to 65535	<ol style="list-style-type: none"> 1. Ignore this warning. 2. Set P0B-27 to 1 to disable this warning
30	Incorrect Encoder Type	Encoder	An unsupported encoder type is set	<ol style="list-style-type: none"> 1. Check if "P0-01 Motor Model" is set correctly. 2. Check if the motor encoder cable connection is normal
39	Absolute Value System Matching Error	Value	The absolute value mode is selected (P0.03=1 or 2), but the motor is a single-turn motor	<ol style="list-style-type: none"> 1. Determine whether the motor is a single-turn or multi-turn motor through the motor nameplate. If it is a single-turn motor, replace it with a multi-turn motor. 2. If the motor is a multi-turn motor and alarm AL.039 is reported after setting P0.03 to 1 or 2, contact our technical support to update the motor parameters
40	Absolute Encoder Communication Abnormality	Encoder	1. Incorrect connection between the motor encoder cable and the	<ol style="list-style-type: none"> 1. Check if the motor encoder cable is correctly connected to the servo. 2. Check if the motor encoder cable is well connected (replace the encoder cable for testing).

			servo		3. Replace the motor if the encoder is damaged
			2. Damaged encoder cable		
			3. Encoder damage		
41	Absolute Encoder Counting Abnormality	Encoder	Encoder fault		1. Perform an encoder reset operation (write 1 to "F-004 Absolute Encoder Reset Operation"). 2. Replace the motor if the fault recurs
42	Absolute Encoder EEPROM Reading Abnormality	Encoder	Encoder fault		1. Check if "P0-01 Motor Model" is set correctly. 2. Check if the motor encoder cable connection is normal. 3. Replace the motor
43	Absolute Encoder Multi-turn Error	Encoder	Encoder fault		1. Perform an encoder reset operation (write 1 to "F-004 Absolute Encoder Reset Operation"). 2. Replace the motor if the fault recurs
44	Absolute Encoder Multi-turn Overflow	Encoder	Encoder fault		1. Perform an encoder reset operation (write 1 to "F-004 Absolute Encoder Reset Operation"). 2. Replace the motor
45	Absolute Encoder Battery Fault	Encoder	1. Encoder battery not connected 2. Low encoder battery voltage		1. Check if the encoder cable is equipped with a battery box. 2. Check if the motor encoder cable is well connected (replace the encoder cable for testing). 3. Replace with a battery of matching voltage (3.6V)
46	Absolute Encoder Battery Alarm	Encoder	1. Encoder battery voltage is lower than the alarm voltage 2. Low encoder battery power		Replace with a battery of matching voltage (3.6V)
47	Absolute Encoder Overheating	Encoder	1. Excessively high encoder temperature 2. Encoder damage		1. Improve the motor heat dissipation conditions. 2. Perform an encoder reset operation (write 1 to "F-004 Absolute Encoder Reset Operation"). 3. Replace the motor if the fault recurs
50	Motor Model Programmed	Not	The motor model is not programmed at the		1. Contact the supplier to replace the motor. 2. Contact technical personnel to program the motor model.

		factory		3. Check if the P013-00 firmware version is 1.31 or higher. Lower versions cannot detect Aotai motor models
60	Incorrect Single-turn Pulse Number Setting	The single-turn pulse number setting is too small or too large		Ensure the single-turn pulse number P5-00 is in the range of 3~1073741827
61	Incorrect Electronic Gear Ratio 1 Setting	Unreasonable electronic gear ratio 1 setting		Ensure the gear ratio setting meets the following relationship: - P0501: Electronic gear ratio 1 numerator - P0502: Electronic gear ratio 1 denominator - P1002: Encoder resolution
62	Incorrect Electronic Gear Ratio 2 Setting	Unreasonable electronic gear ratio 2 setting		Ensure the gear ratio setting meets the following relationship: - P0503: Electronic gear ratio 2 numerator - P0504: Electronic gear ratio 2 denominator - P1002: Encoder resolution
64	DI Signal Allocation Error	The DI is allocated an invalid signal		Check the P01 parameter group to ensure no illegal values are used for each DI function configuration
65	Duplicate DI Allocation	The same function is repeatedly allocated to multiple DI terminals during DI function allocation		1. Check the P01 parameter group to ensure no duplicate DI function configurations. 2. Check the P15 parameter group to ensure no duplicate virtual IO allocation functions
66	DO Allocation Error	The DO is allocated an invalid signal		1. Check the P02 parameter group to ensure no illegal values are used for each DO function configuration. 2. Check the P15 parameter group to ensure no duplicate virtual IO allocation functions
70	Undervoltage	1. Excessively low input power voltage 2. Momentary power outage 3. Power voltage drop during operation 4. Power supply phase		1. Check the input power specification of the driver, and measure the input voltage of the main circuit cables (L1, L2, L3) on both the non-driver side and the driver side to see if they meet the specifications. 2. Ensure the power supply is stable. 3. Monitor the input power voltage of the driver and check if too many other devices are turned on on the same main circuit power supply, causing insufficient power supply and voltage drop.

			loss	4. If three-phase power supply is used, ensure L1, L2, and L3 are all connected to the power supply
71	Overvoltage		1. Excessively high main circuit input voltage 2. Brake resistor not connected, damaged, or with excessively large resistance 3. Excessively large regenerative energy during sudden deceleration	1. Check the input power specification of the driver, and measure the input voltage of the main circuit cables (L1, L2, L3) on both the non-driver side and the driver side to see if they meet the specifications. 2. Check and connect the brake resistor (if P and D are short-circuited externally, the internal brake resistor is used; the external brake resistor is connected through P and C). Measure the brake resistor resistance (after the servo is powered off, measure the resistance between the power terminals P and C). If the resistance is excessively large, replace it with a brake resistor of the recommended resistance. After replacement, set P00-05~P00-07 according to the actual situation. Refer to the brake resistor selection instructions for the selection method. 3. If the working condition allows, increase the deceleration time during operation. Reduce the load or add a reducer if possible
72	Control Power Undervoltage		1. Excessively low input power voltage 2. Unstable power supply	1. Check the input power specification of the driver, and measure the input voltage of the main circuit cables (L1, L2, L3) on both the non-driver side and the driver side to see if they meet the specifications. 2. Check if the power supply cable is in good contact. 3. Check if the power supply is stable
73	Bus Voltage Boost Abnormality		Abnormal power supply caused by frequent power on/off	1. Ensure the interval between driver power on/off is not less than 1min. 2. If the alarm is triggered, power off and wait for 3min before restoring power. 3. Set P00-15 to 1 to disable the power-off rapid discharge function to reduce this alarm. 4. Set P0B-30 to 3000 to disable this alarm
74	Power Supply Phase Loss		Incorrect three-phase input wiring	1. Check if three-phase power supply is used (L1, L2, L3 must all be connected). 2. Check if the power supply cable is in good contact. 3. Set "PB-02 Power Input Phase Loss Protection Selection" to 1 or 2 to disable this alarm
75	Soft Start Relay Damage		Damage to the hardware soft start relay	Return to the factory for repair and replace the soft start relay
76	Power Supply		Incorrect three-phase	1. Check if three-phase power supply is used (L1, L2, L3 must all be connected).

	Phase Loss	input wiring		2. Check if the power supply cable is in good contact.
	Warning			3. Set "PB-02 Power Input Phase Loss Protection Selection" to 2 to disable this alarm
77	IGBT Overheating	1. Excessively high ambient temperature 2. Fan fault 3. Long-term overload operation		1. Improve the driver heat dissipation conditions and install the driver strictly according to the recommended installation direction and spacing. 2. Reduce the ambient temperature of the servo driver. 3. Check if the fan blade is stuck by foreign objects. 4. Replace the driver if the fan is faulty. 5. Increase the acceleration/deceleration time during operation. 6. Reduce the load. 7. Replace with a higher-power driver and motor
78	Heat Sink Overheating	1. Excessively high ambient temperature 2. Fan fault 3. Long-term overload operation		1. Improve the driver heat dissipation conditions and install the driver strictly according to the recommended installation direction and spacing. 2. Reduce the ambient temperature of the servo driver. 3. Check if the fan blade is stuck by foreign objects. 4. Replace the driver if the fan is faulty. 5. Increase the acceleration/deceleration time during operation. 6. Reduce the load. 7. Replace with a higher-power driver and motor
82	Bus Overcurrent	1. Excessively small or short-circuited brake resistor 2. Incorrect motor power cable wiring 3. Short-circuited motor power cable 4. Motor damage 5. Abnormal input command 6. Unreasonable gain setting	small or brake resistor cable wiring motor power cable input command gain setting	1. When using the internal brake resistor (P and D are short-circuited), disconnect the connection between P and D and measure the resistance between D and C. If the resistance is 0, replace the internal brake resistor. 2. When using the external brake resistor (connected through P and C), measure the resistance of the external brake resistor. If it is short-circuited or excessively small, replace it with a brake resistor selected according to the "brake resistor selection instructions". After replacement, set P00-05~P00-07 according to the actual situation. 3. Check the correctness of the motor power cable U, V, W, and PE wiring. 4. Check if the motor power cable U, V, W, and PE wiring is loose. 5. Check the motor power cable U, V, W, and PE wiring for short circuits. 6. Disconnect the motor power cable from the servo and measure if there is a short circuit between the motor U, V, W, and PE. If there is a short circuit, replace the motor. 7. Disconnect the motor power cable from the servo and measure if the resistance

between the motor U, V, and W is balanced (measure the resistance between UV, UW, and VW separately). If it is unbalanced (the resistance difference between the three measurements is too large), replace the motor.

8. Ensure the command is input after the servo is enabled.

9. Increase the acceleration/deceleration time of the input command.

10. Adjust the servo gain. Reset the servo gain to the factory default value and readjust to reduce overshoot

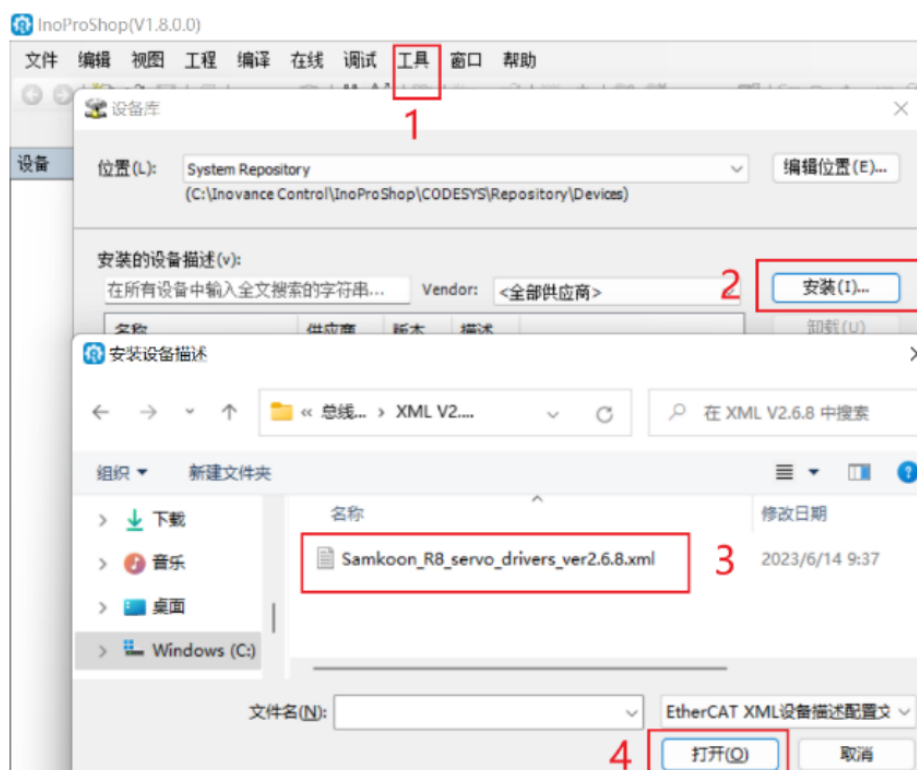
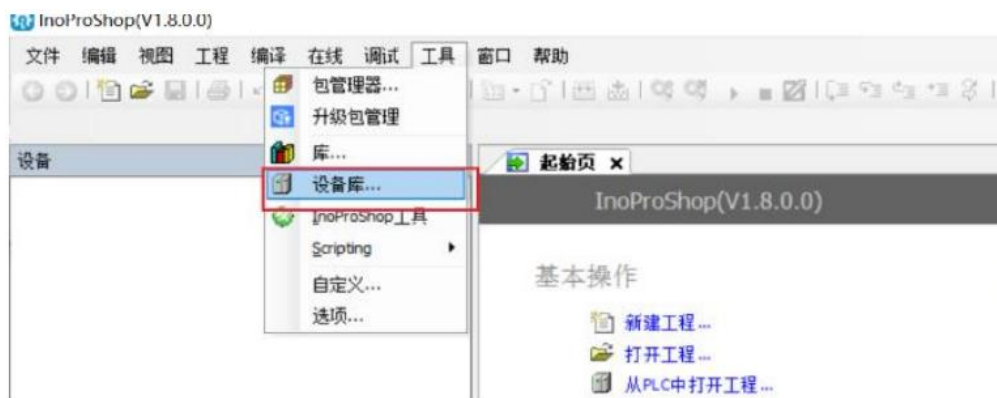
8 Application Examples

8.1 Communication Between Inovance PLC_AM600 and S8N-750

This case briefly describes the connection and usage steps using one S8N-750 and Inovance PLC AM600 in synchronous cycle mode.

Preparation:

1. Set the servo driver P00-00 to 8 (EtherCat mode). If multiple servo drivers are connected to the controller, check if the network cables are connected according to the inlet and outlet ports.
2. Download and install the IonProShop software (version V1.8.0.0 is used in this case).
3. Install the S8N-750 device description file: Samkoon_S8_servo_drivers_ver3.1.9.xml (if not available, download from the official website or request from relevant technical personnel). Installation steps: Initial interface of IonProShop software → Tools → Device Library → Install → Select the Samkoon S8 series device description file: Samkoon_S8_servo_drivers_ver3.1.9.xml.



Connection Steps Between S8N-750 Servo and Inovance AM600:

1. Set the computer IP address to the same network segment as the PLC:
 - Computer → Local Area Connection → Properties → Internet Protocol Version 4 (TCP/IPv4) Properties → Set the address. Since the default factory address of AM600 is 192.168.1.88, set the IP address to the same segment (e.g., 192.168.1.X, where X is a value from 1 to 255 excluding 88) to enable communication.

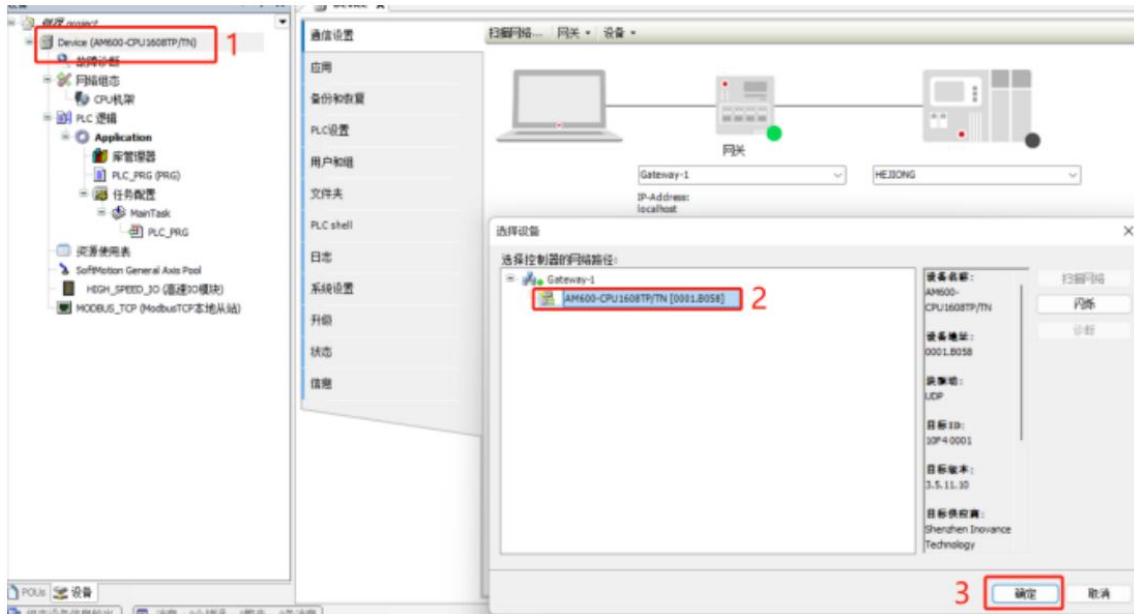


2. Create a new project:
 - Create a standard project and select Structured Text (ST) or other PLC programming languages.



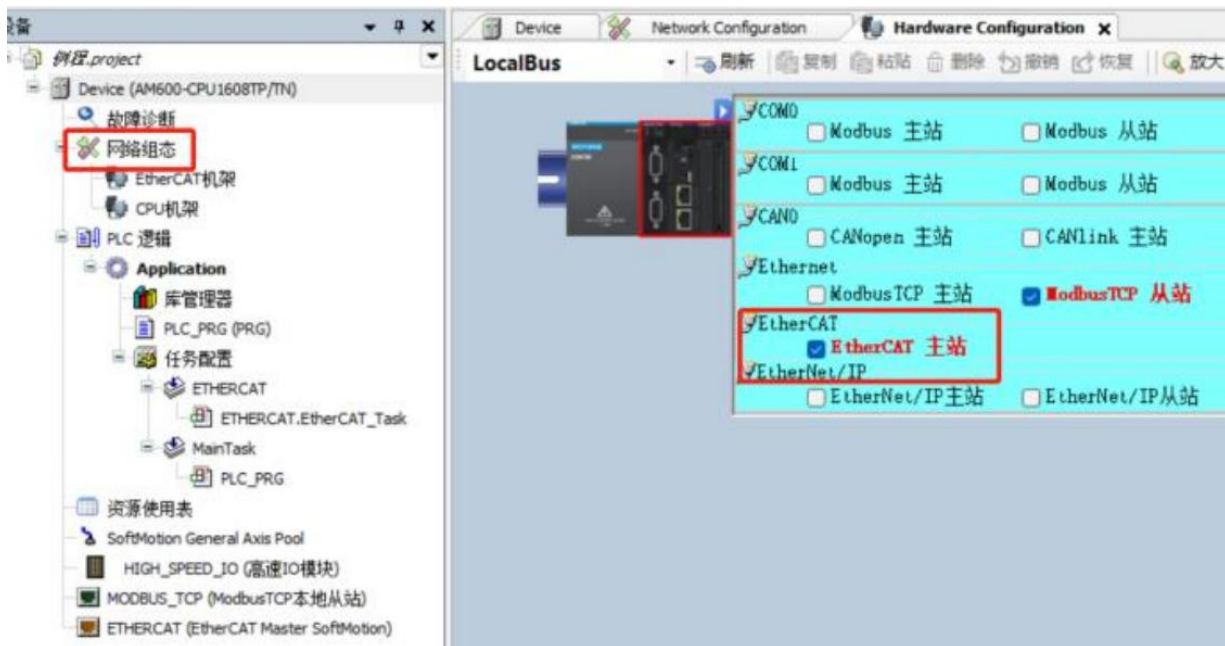
3. Connect to the PLC:
 - Double-click "Device (AM600-CPU1608TP/TN)" → Communication Settings → Scan Network →

Select AM600-CPU1608TP/TN [0001.B058] → Click "OK".



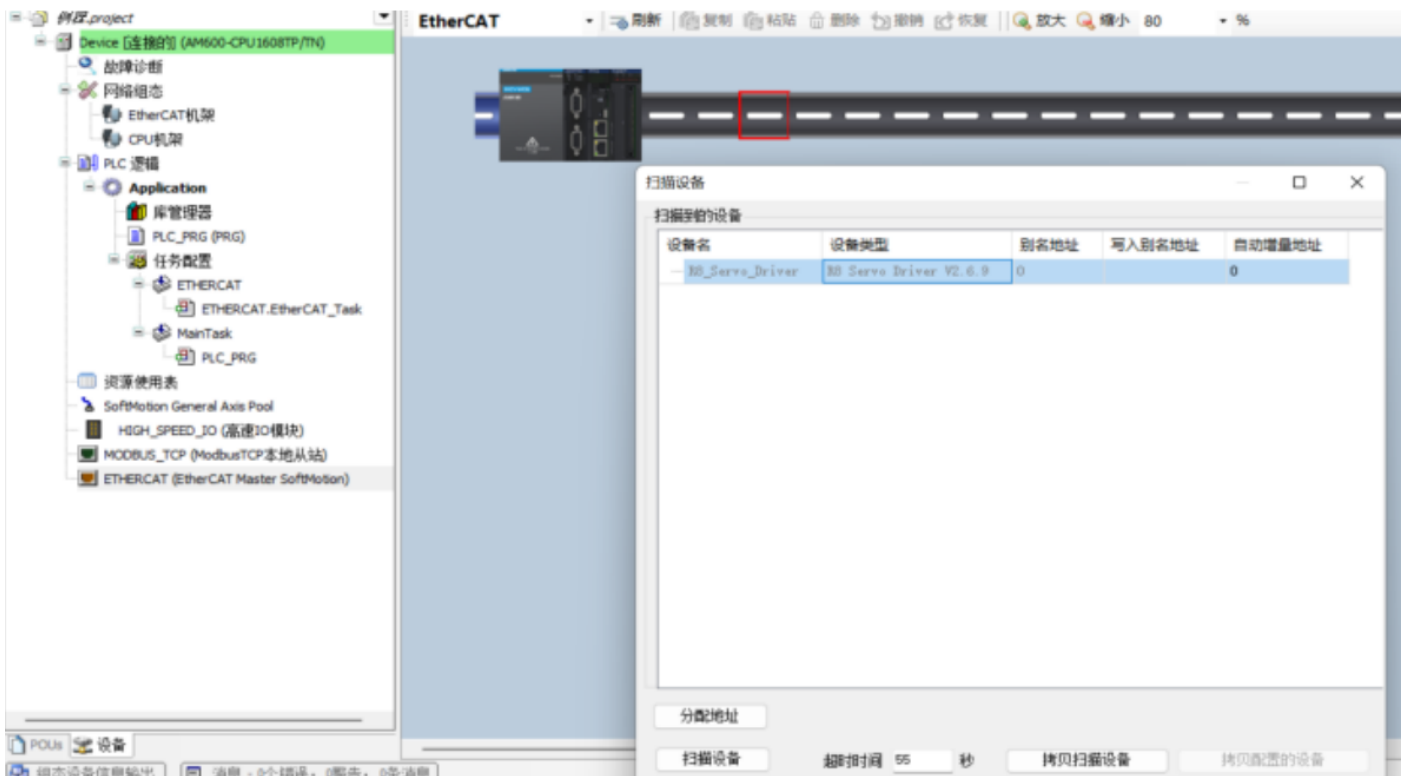
4. Add an EtherCAT master station:

- Double-click "Network Configuration" → Check the "EtherCAT Master" option.

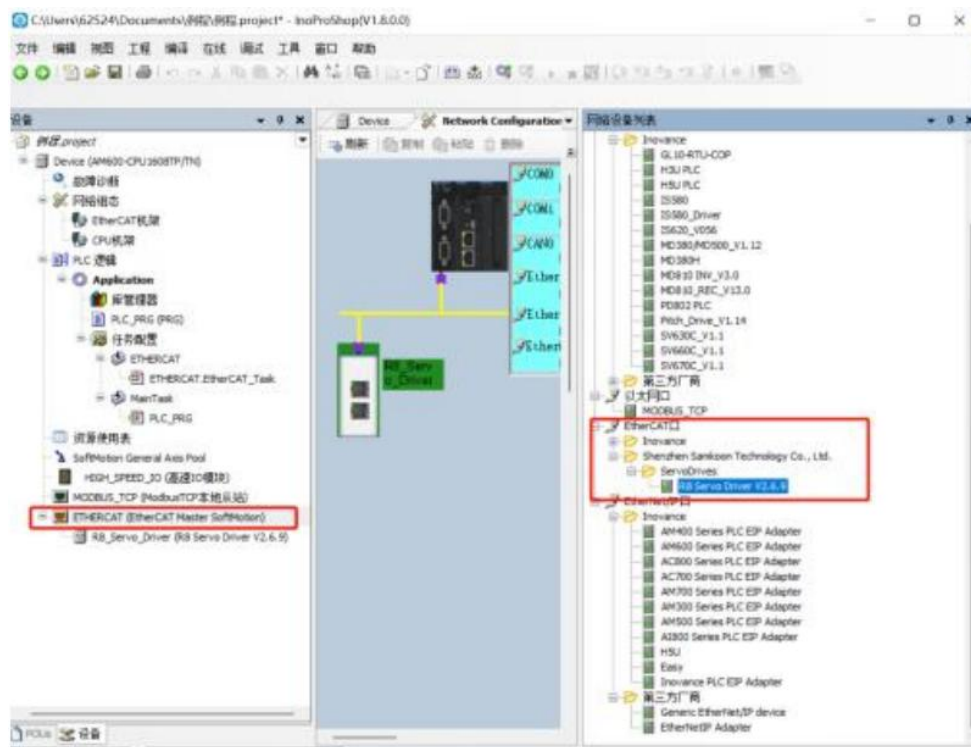


5. Add servo slave stations:

- Automatic addition: Right-click "ETHERCAT (EtherCAT Master)" → Scan Devices → After scanning the servo, click "Copy All Devices to Project".

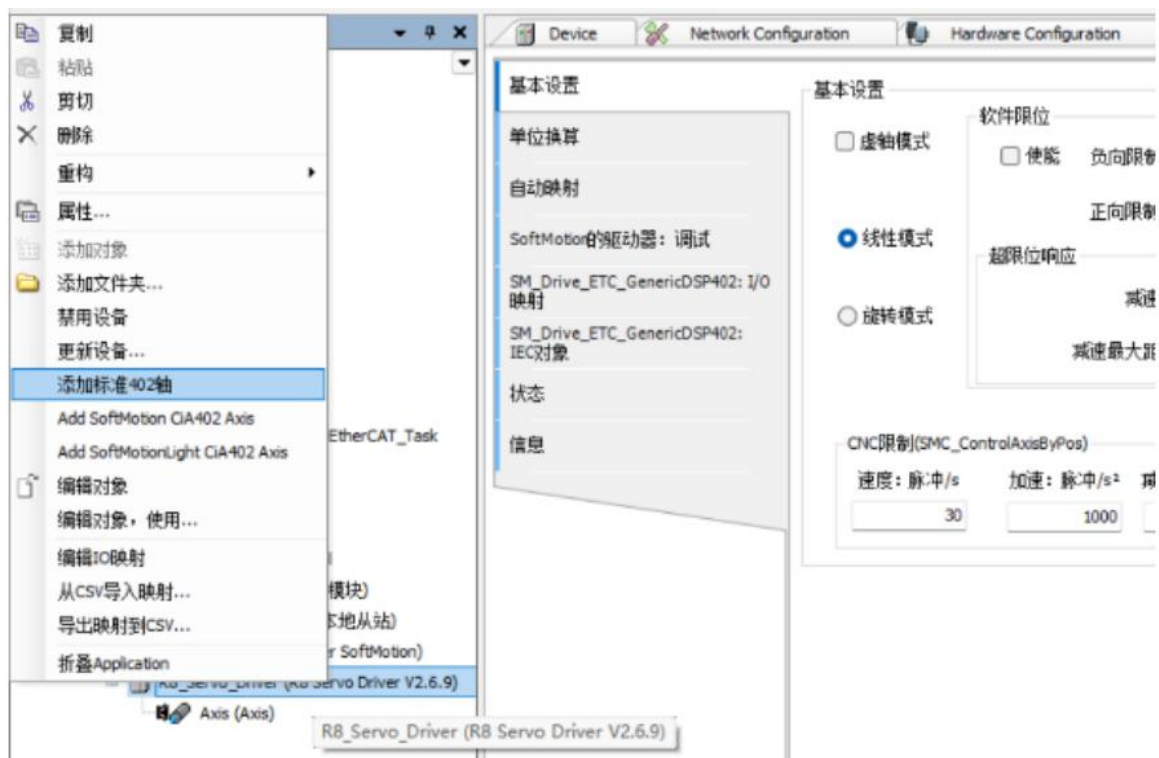


- Manual addition: Double-click Network Configuration → Network Device List → EtherCAT Port → Shenzhen Samkoon Technology Co., Ltd. → R8 Servo Driver V2.6.9.



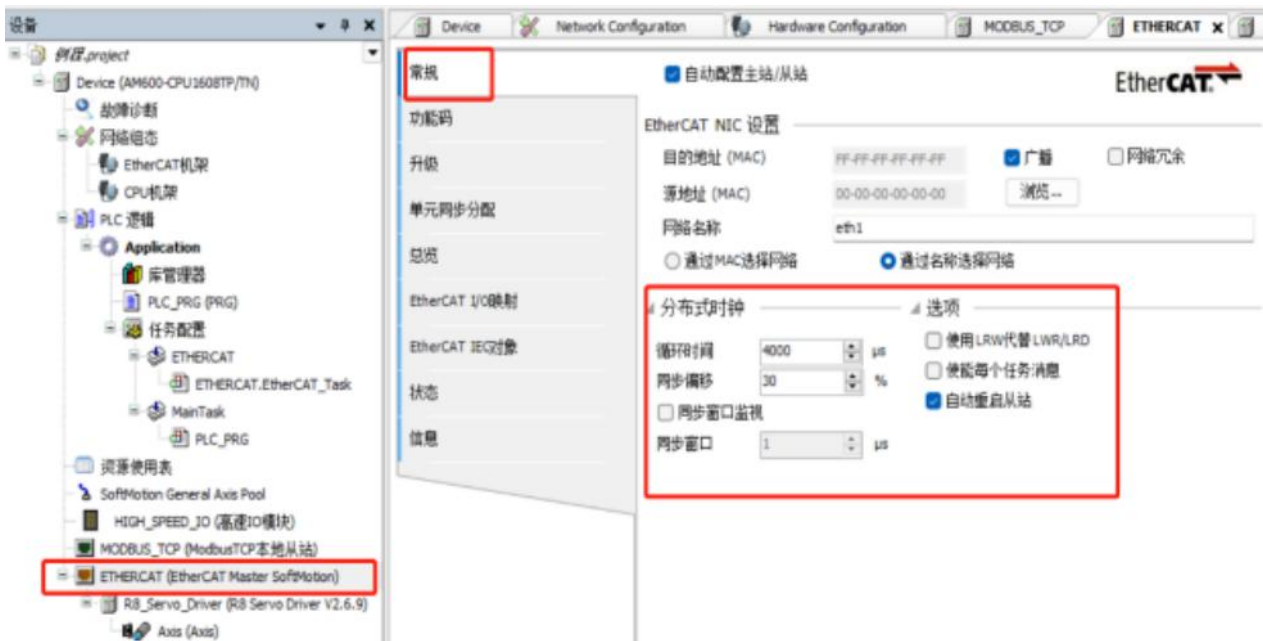
6. Add a motion control axis:

- o Select a servo driver → Right-click and select "Add Standard 402 Axis".



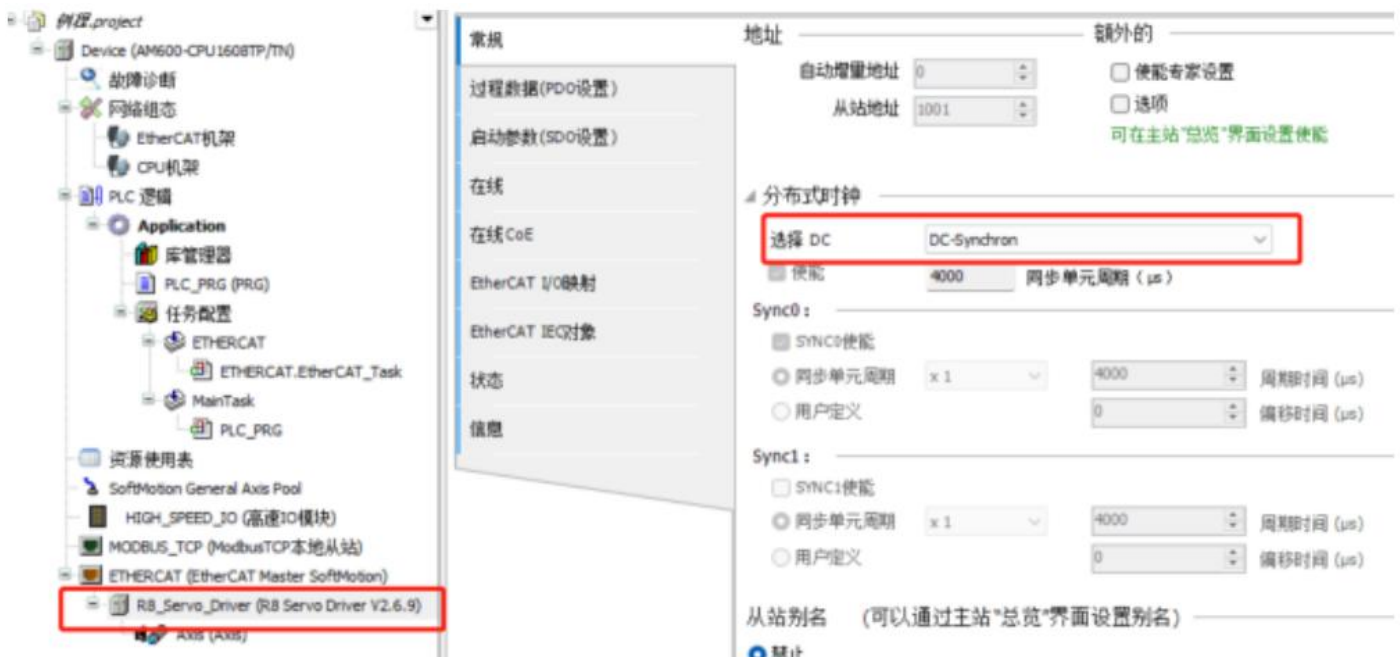
7. Set relevant parameters:

- o Set the synchronization unit cycle: ETHERCAT (EtherCAT Master) → General → Distributed Clock → Set an appropriate cycle time (default is 4ms, minimum is 1ms). It is recommended to check the option "Auto Restart Servo".



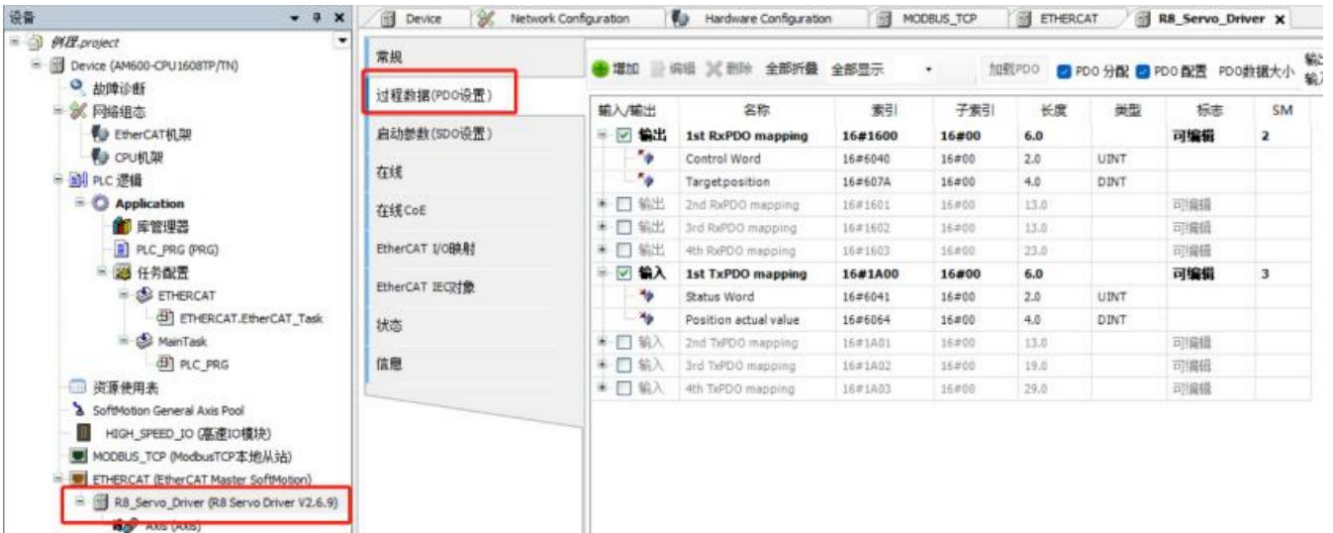
8. Set the distributed clock of the servo slave station:

- Select any servo → General → Distributed Clock → Select "DC-Synchronous".



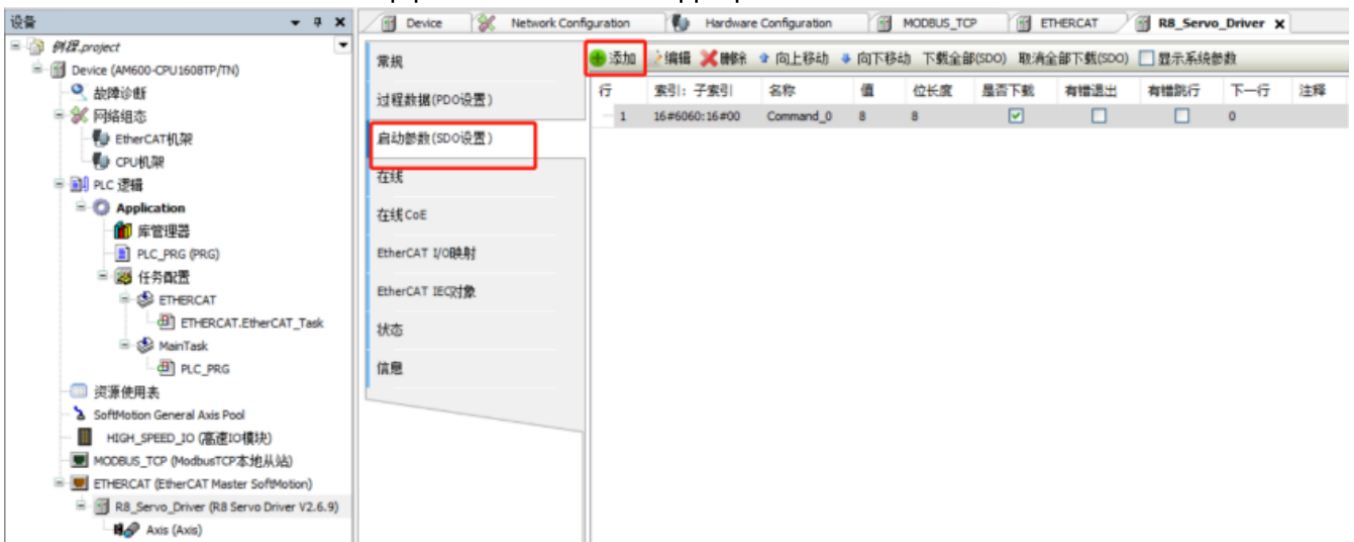
9. Add/delete RPDO/TPDO for the servo slave station (the default first group of RPDO/TPDO parameters is used. If not necessary, the default parameters can be used. The following takes modifying the first group of RPDO/TPDO as an example to briefly introduce the method):

- Double-click the servo for which RPDO/TPDO needs to be modified → General → Check "Process Data (PDO Settings)" → Check 16#1600 1st RxPDO mapping and 16#1A00 1st Txpdo mapping.



10. Add startup parameters:

- Select the servo for which startup parameters need to be added → "Startup Parameters Page" → Add → Add startup parameters and set appropriate values.



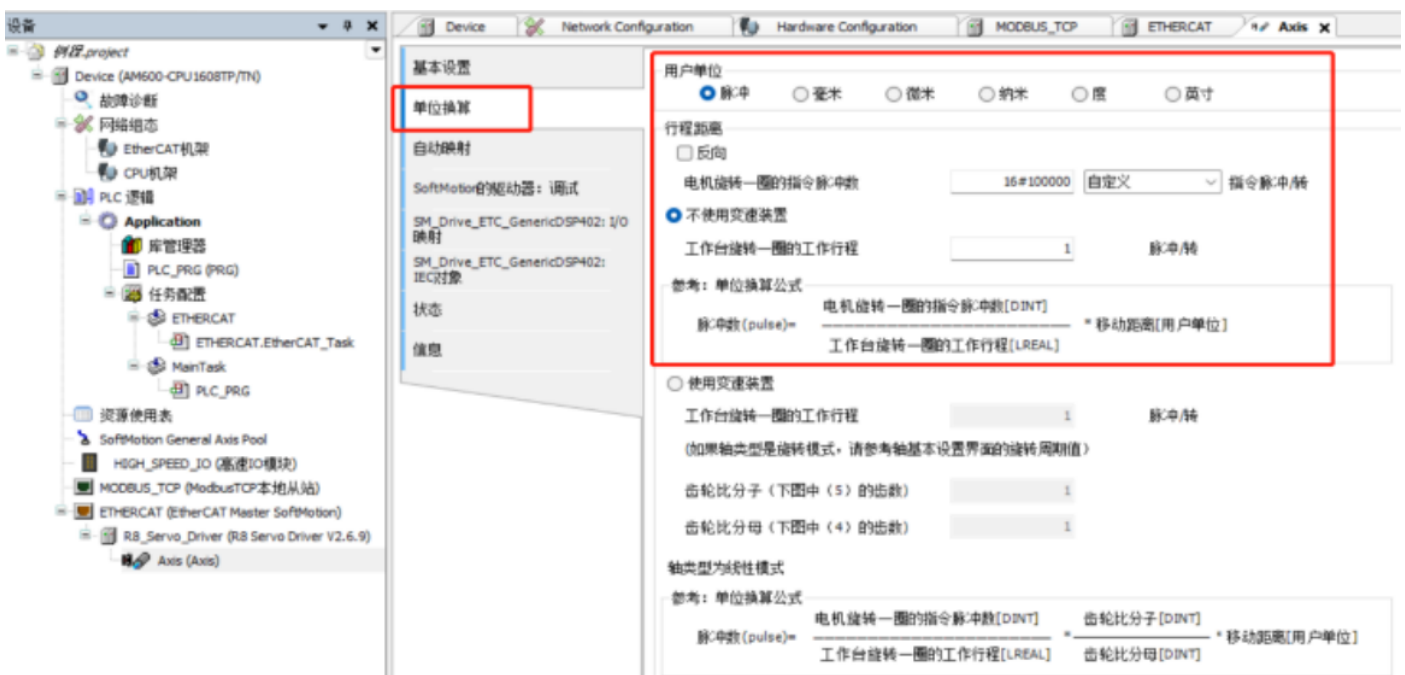
11. Set the motion control axis type:

- Select any servo slave station motion control axis → Page "SoftMotion Driver: Basic" → Axis Type and Limits:
 - Virtual axis mode: For occasions where no actual servo motor is connected.
 - Rotational mode: For rotating shafts with unidirectional operation. Using linear mode may cause position counting overflow and position calculation errors.
 - Linear mode: For reciprocating mechanisms with limited stroke (used by default).



12. Set the encoder unit:

- Set the motion control axis encoder resolution:
 - Select any servo slave station motion control axis → "Unit Conversion" page.
 - Set an appropriate encoder resolution. This parameter is related to the electronic gear ratio. If the load reducer, lead, etc., are not considered and only the number of pulses per motor revolution is considered, the default parameters can be used. That is, when using the internal electronic gear ratio of the S8 servo, the following settings can be made:
 - Set "Incremental" to the value of P0.08. For example, if P0.08=10000, set this value to 10000; if P0.08=131072, set this value to 131073.
 - The "Applied Unit" is the number of pulses per revolution. If you want 10000 pulses to rotate the motor shaft one revolution, set it to 10000. If you want the motion control command speed to numerically correspond to the actual motor speed, the "Applied Unit" should be set to 60.



13. Write the PLC program:

- Example of enable and cyclic position mode commands:

```

1 PROGRAM PLC_PRG
2 VAR
3   MC_power0: MC_Power;
4   MC_MoveRelative_1:MC_MoveRelative;
5   JF1:BOOL;
6   JB1:BOOL;
7   RUNF1:BOOL;
8   MoveR_1:BOOL;
9   MoveR_Done:BOOL;
10  MR_1: BOOL;
11 END_VAR

1 MC_Power0 (Axis:=Axis,Enable:=TRUE,bRegulatorOn:=TRUE,bDriveStart:=TRUE,);
2
3
4   MC_MoveRelative_1(
5     Axis:=Axis ,
6     Execute:= MoveR_1,
7     Distance:= 50,
8     Velocity:= 5,
9     Acceleration:= 5,
10    Deceleration:= 5,
11    Jerk:= ,
12    BufferMode:= ,
13    Done=> MoveR_Done,
14    Busy=> ,
15    Active=> ,
16    CommandAborted=> ,
17    Error=> ,
18    ErrorID=> );

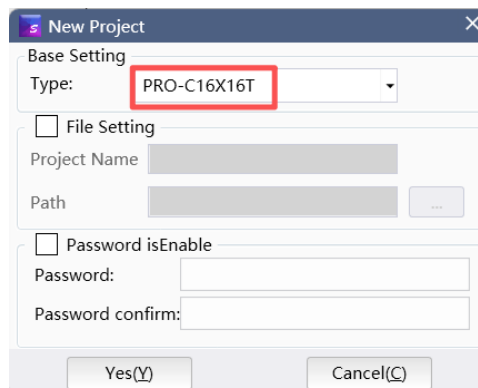
```

8.2 Communication Between Samkoon PRO_C16X16TB and S8N-750

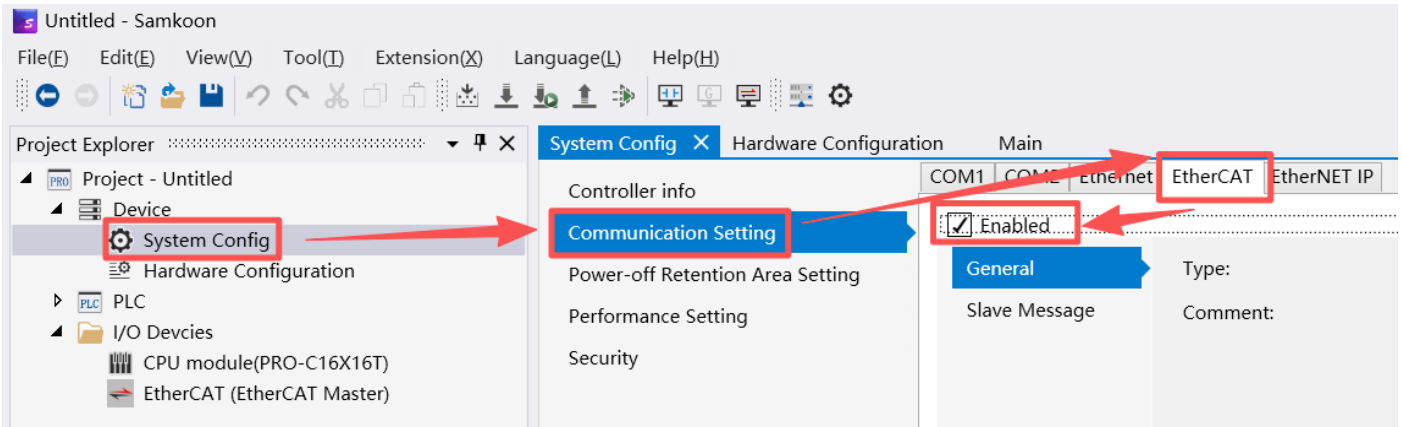
This case takes the connection of two S8N-750 servo drivers with a PLC in cyclic synchronous mode as an example to briefly illustrate the connection and usage steps.

Preparation:

1. Set the servo driver parameter P00-00 to 8 (EtherCAT mode). If multiple servo drivers are connected to the controller, ensure the network cables are connected according to the input and output ports.
2. Download and install the IonProShop software (Version V1.1.31 is used in this case).
3. Create a new project and select the model "PRO-C16X16T".

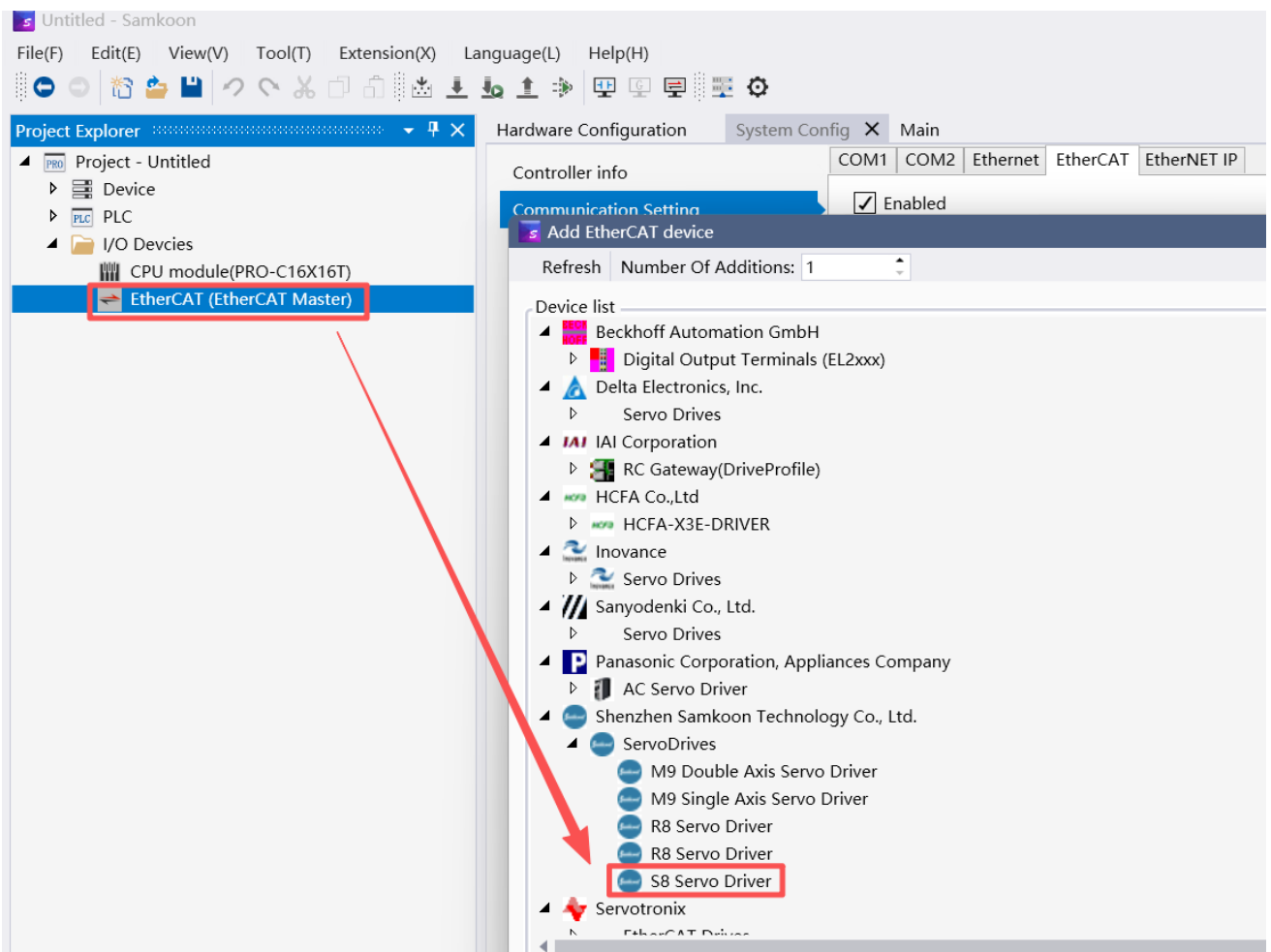


4. Enable EtherCAT: System Configuration → Communication Settings → EtherCAT → Enable.



5. Add slave stations

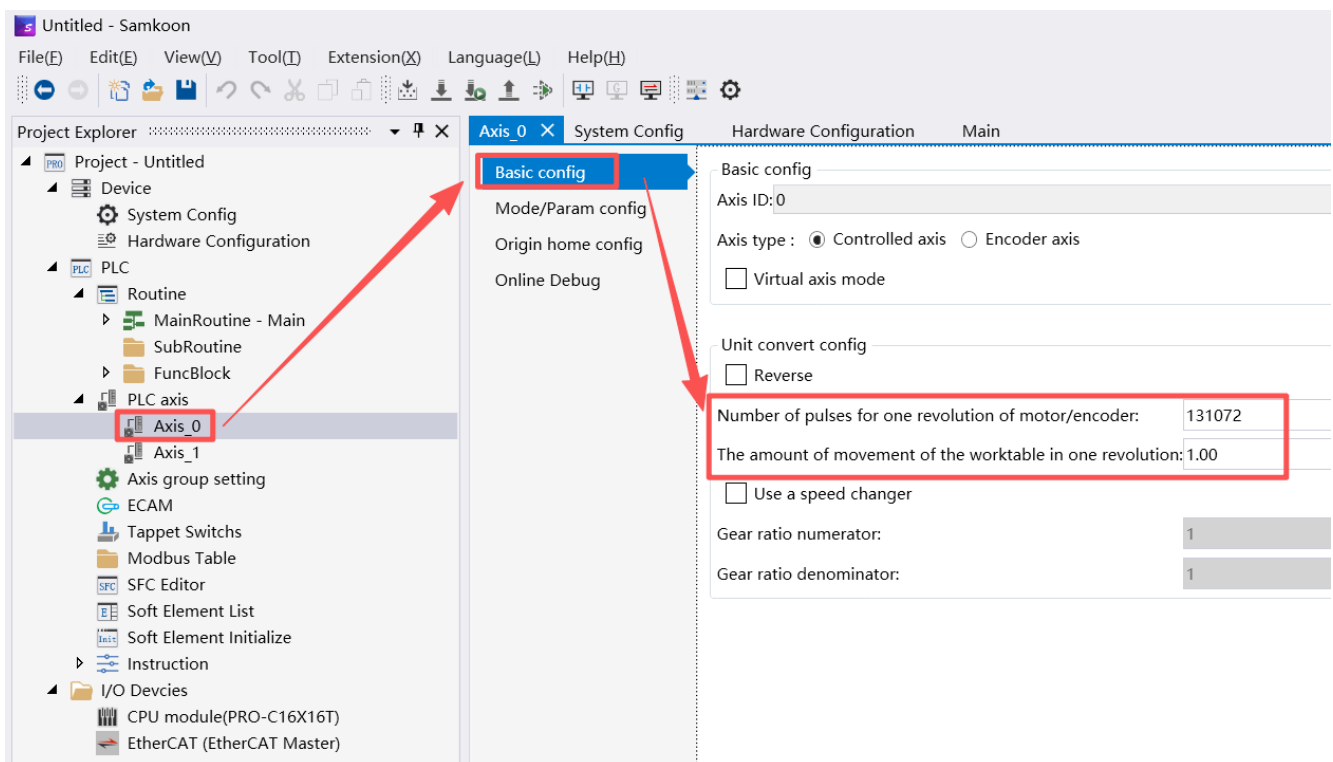
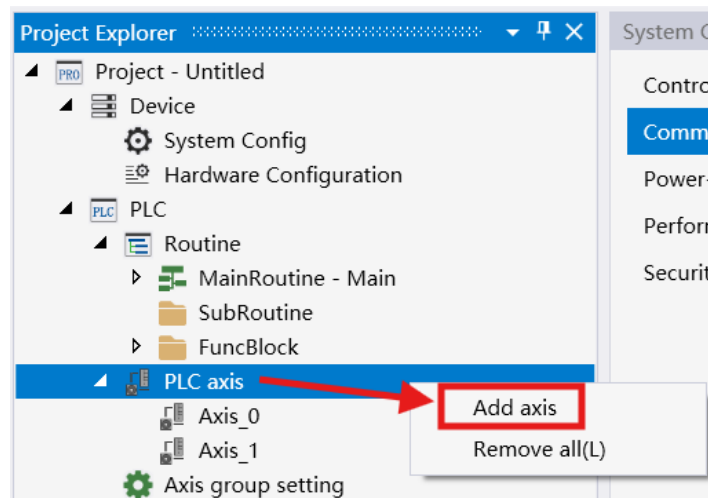
Right-click the "EtherCAT Master Station" and select "S8 Servo Driver" from the pop-up window to add an S8 slave station (two slave stations are added here). If "S8 Servo Driver" cannot be found in the pop-up window, you need to add the servo's XML file to the "EtherCAT" folder under the installation path of "SamProIDE". The XML file can be downloaded from the official website or requested from relevant technical personnel.



6. Add Control Axes

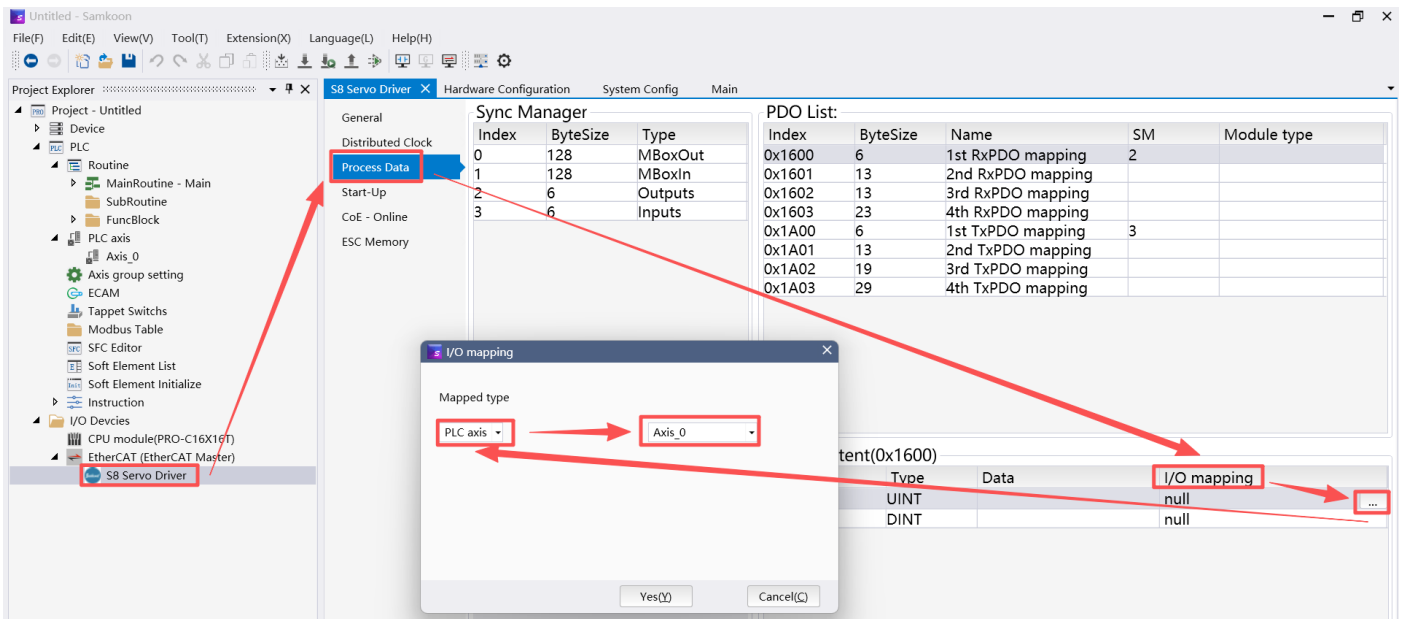
Right-click "PLC Control Axes" and select "Add Axis" (two PLC control axes need to be added here). Double-click "Axis", select "Basic Configuration", and set the "Number of Pulses per Motor/Encoder

Rotation" according to the actual motor. If a 23-bit motor is connected, set it to "8388608"; if a 17-bit motor is connected, set it to "131072".



7. Axes Mapping

Double-click "S8 Servo Driver" → "Process Data" → "I/O Mapping" list → Click the "..." on the right of "null" → The "I/O Mapping" window will pop up → Select the mapping type as "PLC Control Axis" and choose the corresponding control axis.



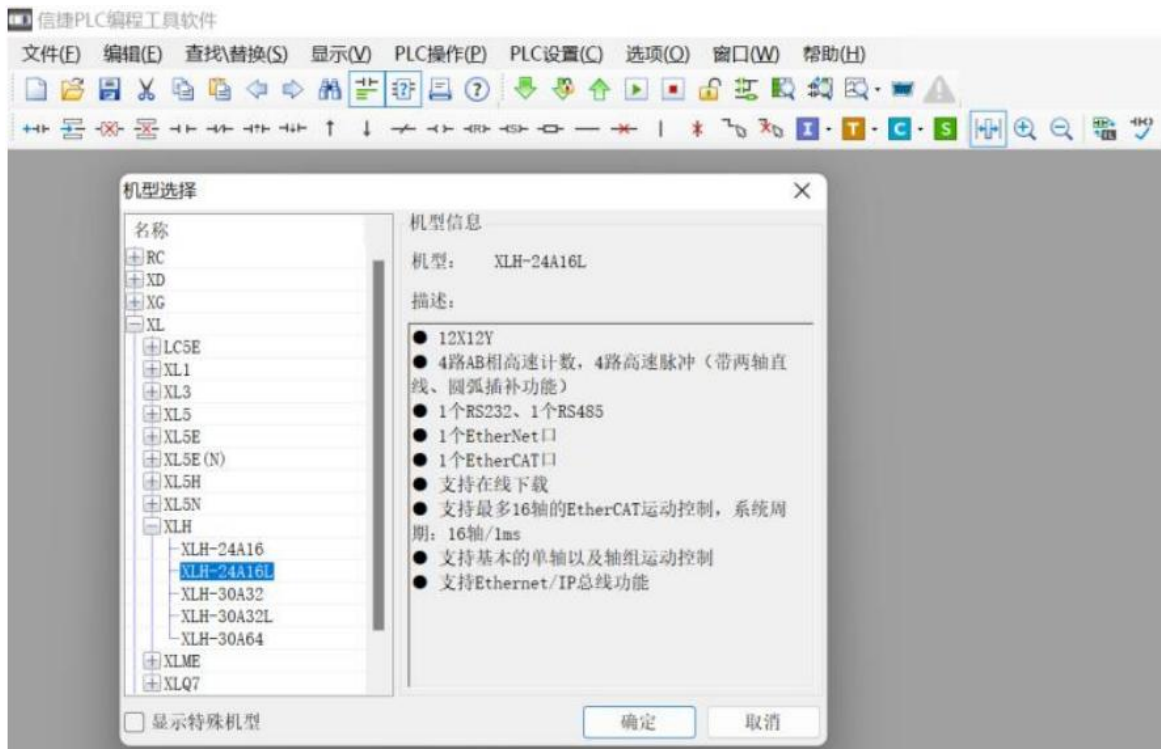
8. Program Writing and Download

8.3 Connection Steps Between S8N-750 Servo and Samkoon PRO_C16X16TB

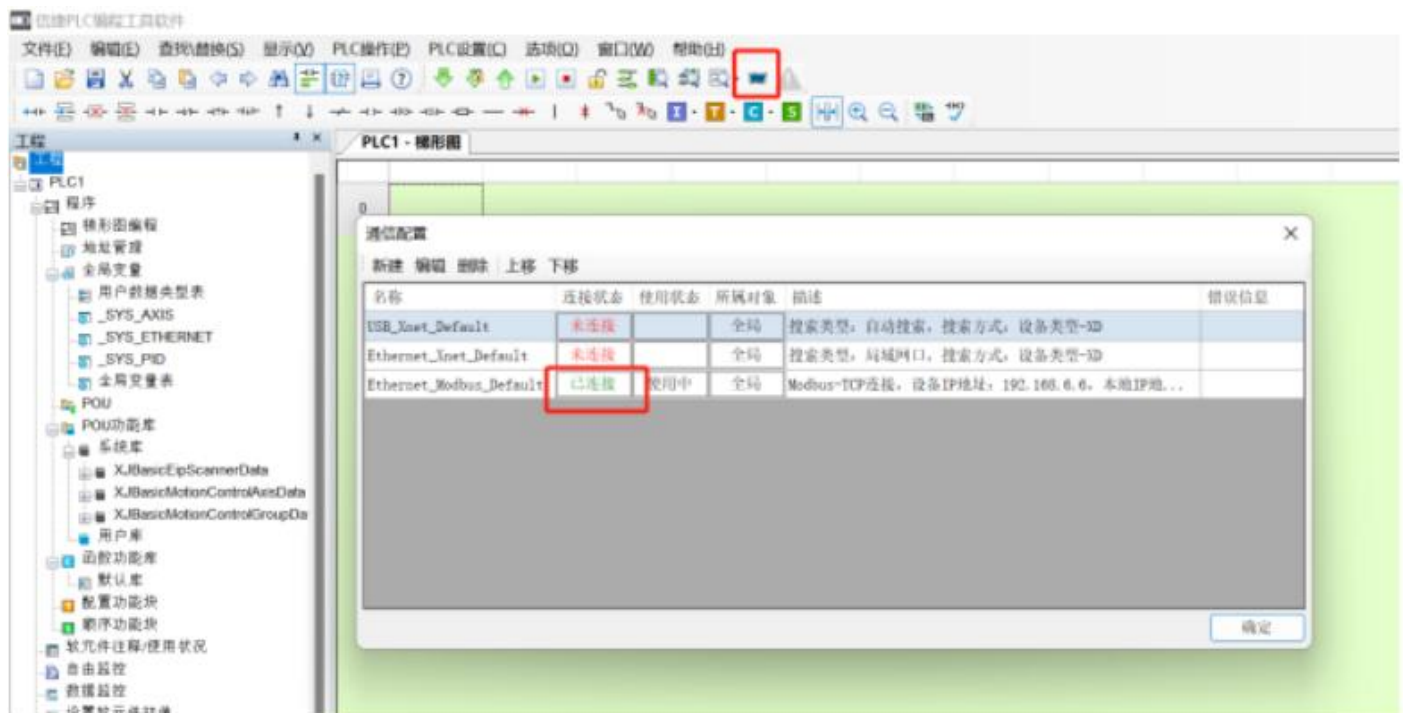
This case study uses two S8N-750 PLCs running in synchronous cycle mode as an example to briefly illustrate the connection and usage steps.

Preparation:

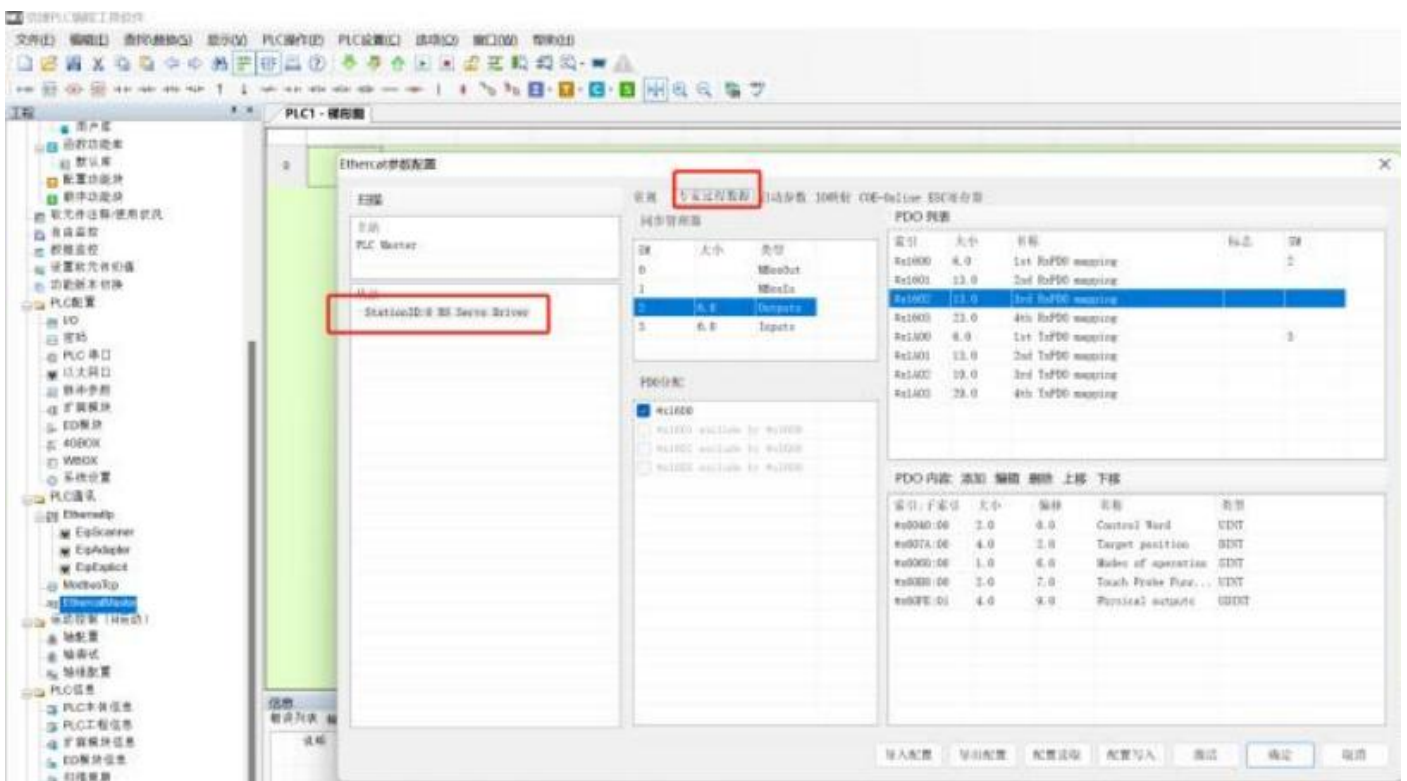
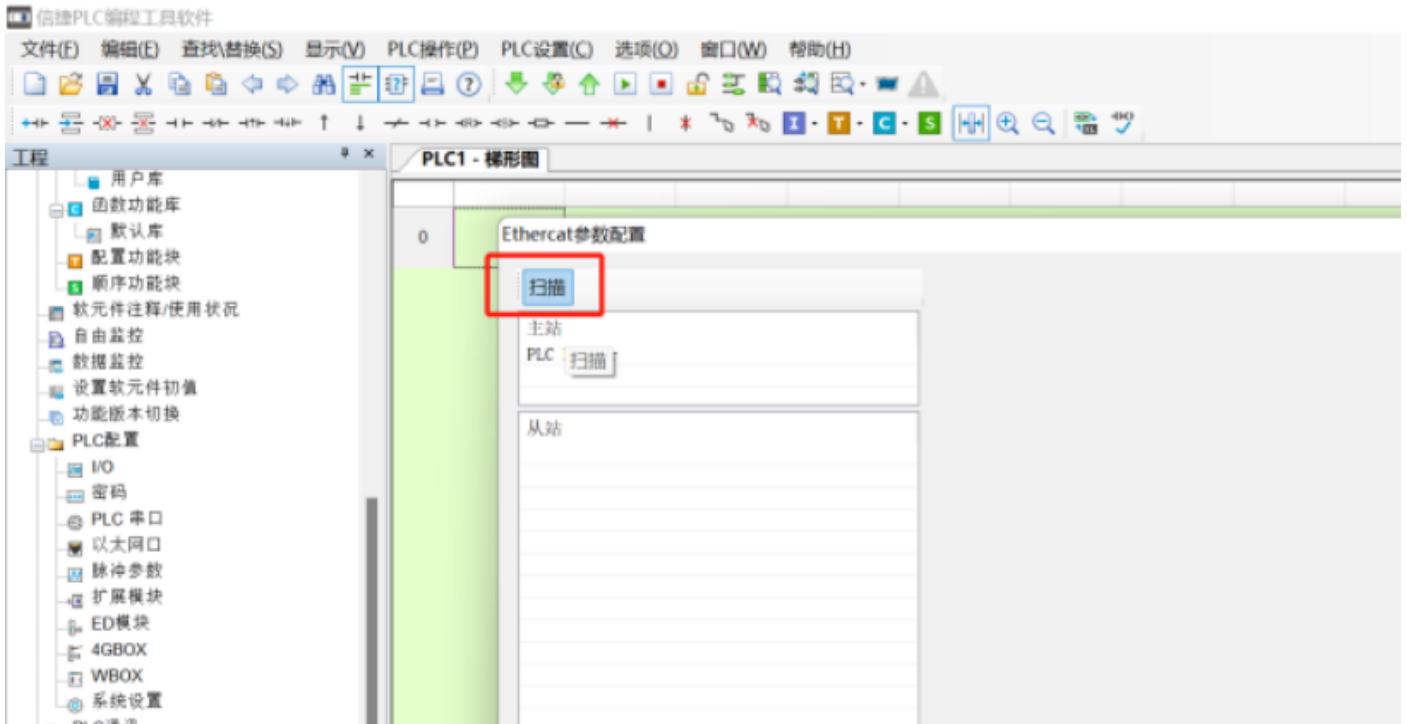
1. Set the servo drive P00-00 to 8 (EtherCat mode). If multiple servo drives are connected to the controller, check that the network cables are connected correctly to the inlet and outlet ports.
2. Download and install the Xinje PLC programming tool software. The version used in this case is V3.1.17c.
3. Create a new project and select the model "PRO-C16X16T".



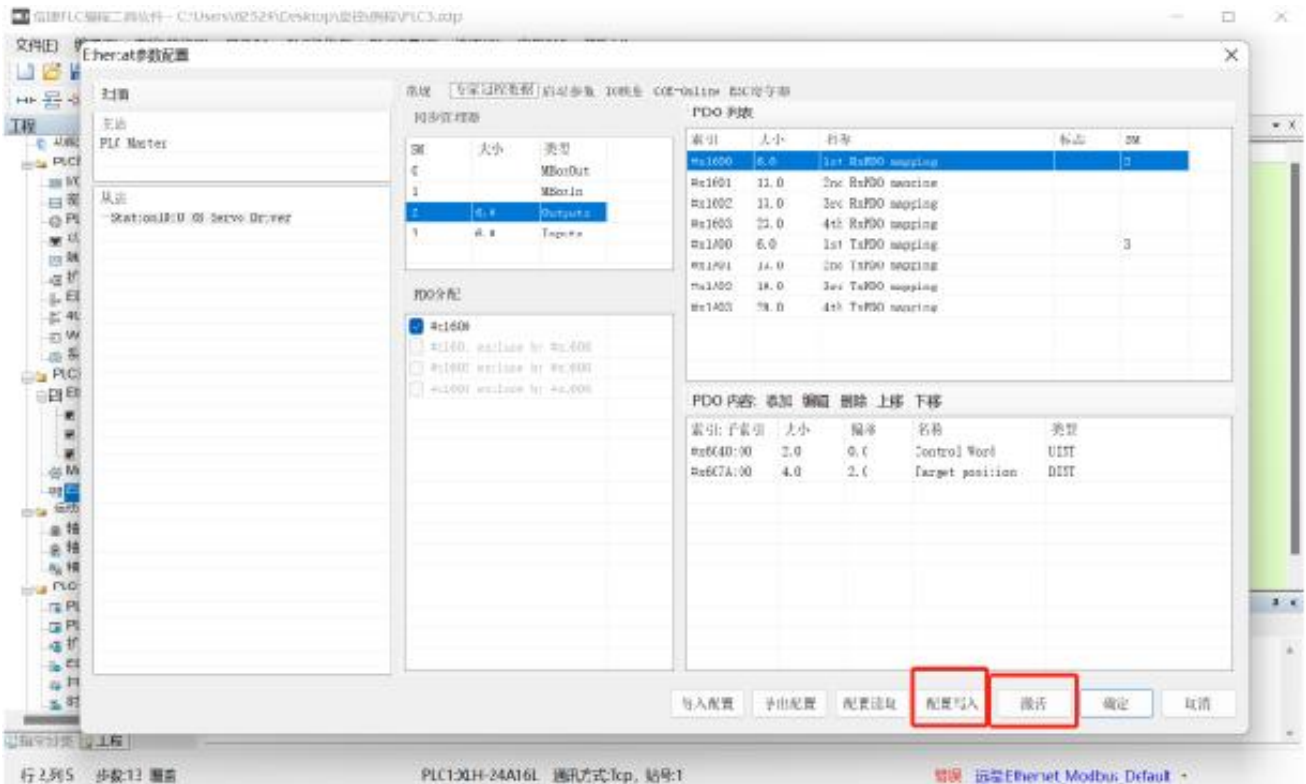
Set the Ethernet address to the 192.168.6.XXX range. Specifically, go to Control Panel → Network and Sharing Center → Ethernet → Properties → Internet Protocol Version 4 (TCP/IPv4) → Properties, and set the IP address and default gateway to the 192.168.6.XXX range. After setting this up, in the communication parameter settings, click on the connection status. If it shows "connected," then the Xinje controller XLH-24A16L is connected to the computer.



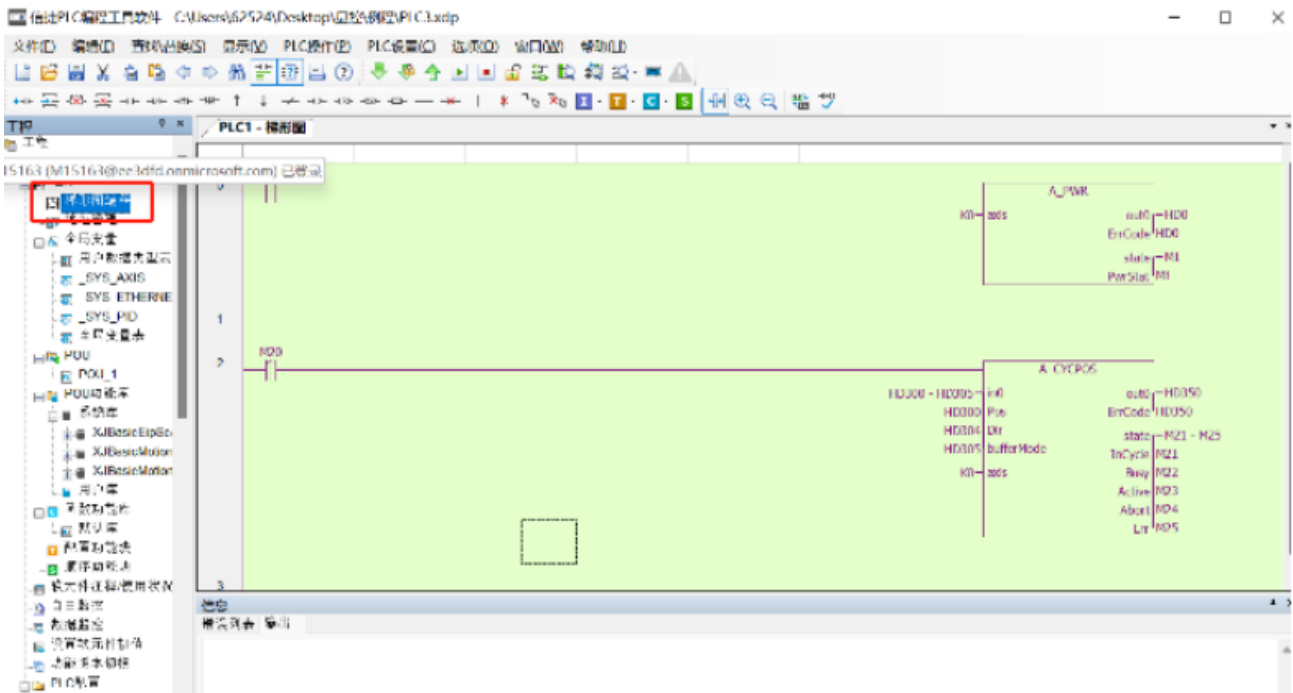
4. Configure EtherCat



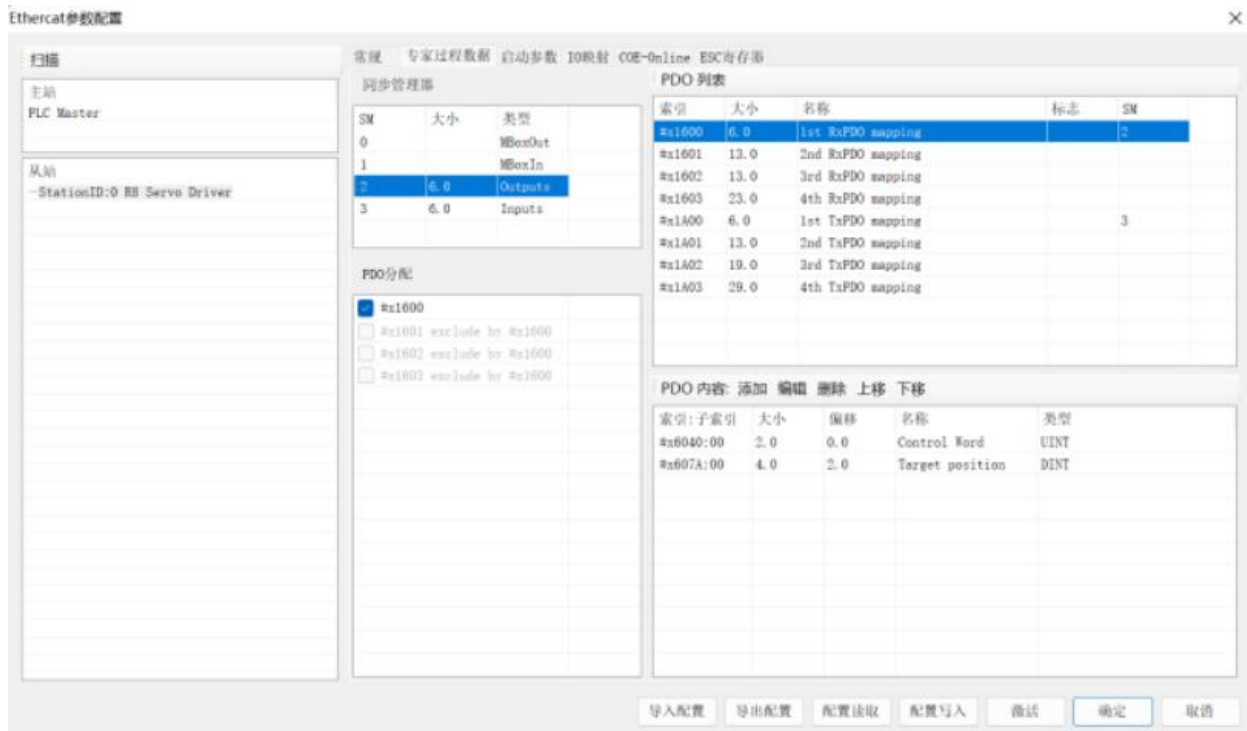
- After confirming the parameters, click "Write Configuration" and then click "Activate" to write the parameters into the controller.



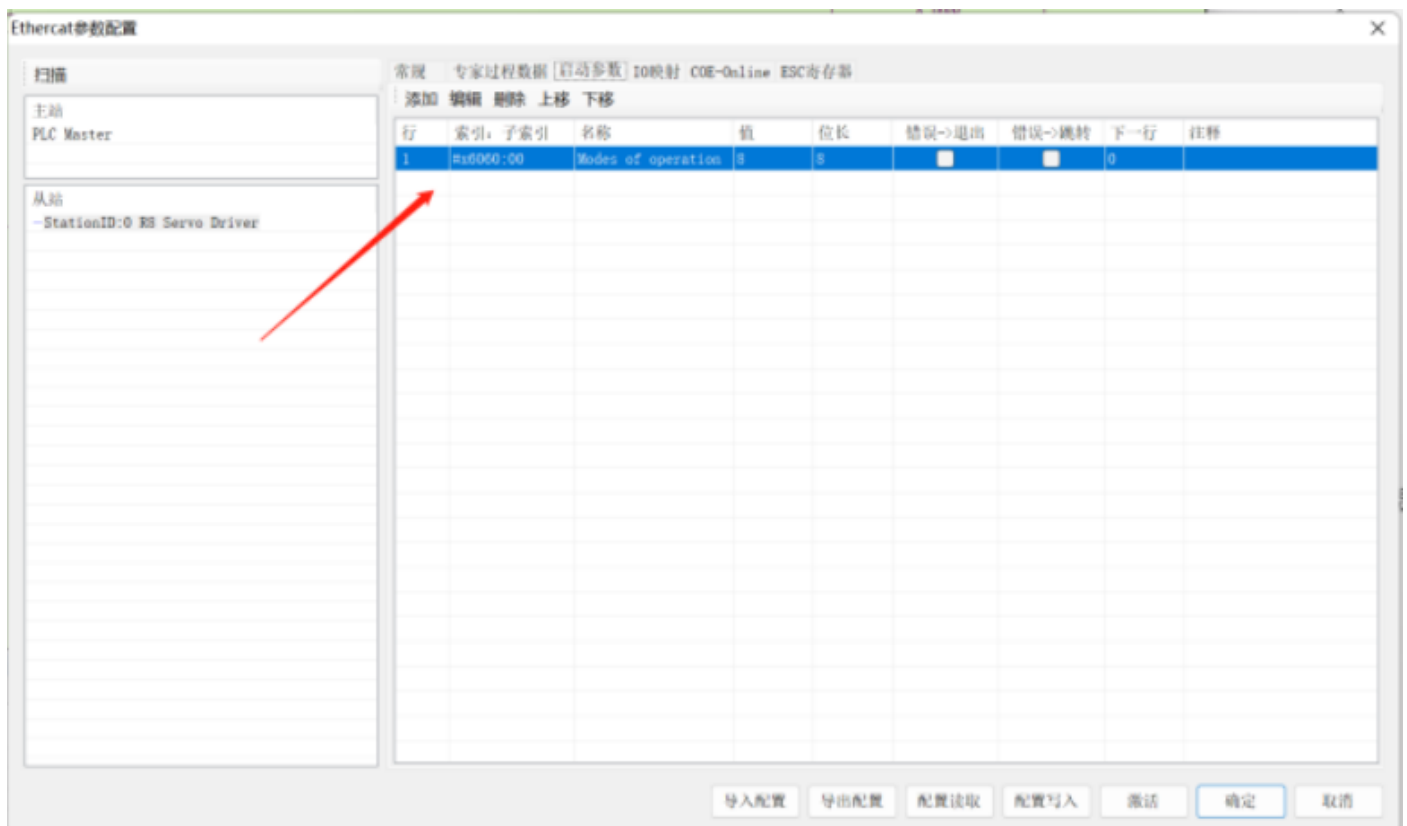
6. Write the corresponding modules in the ladder diagram according to the requirements.



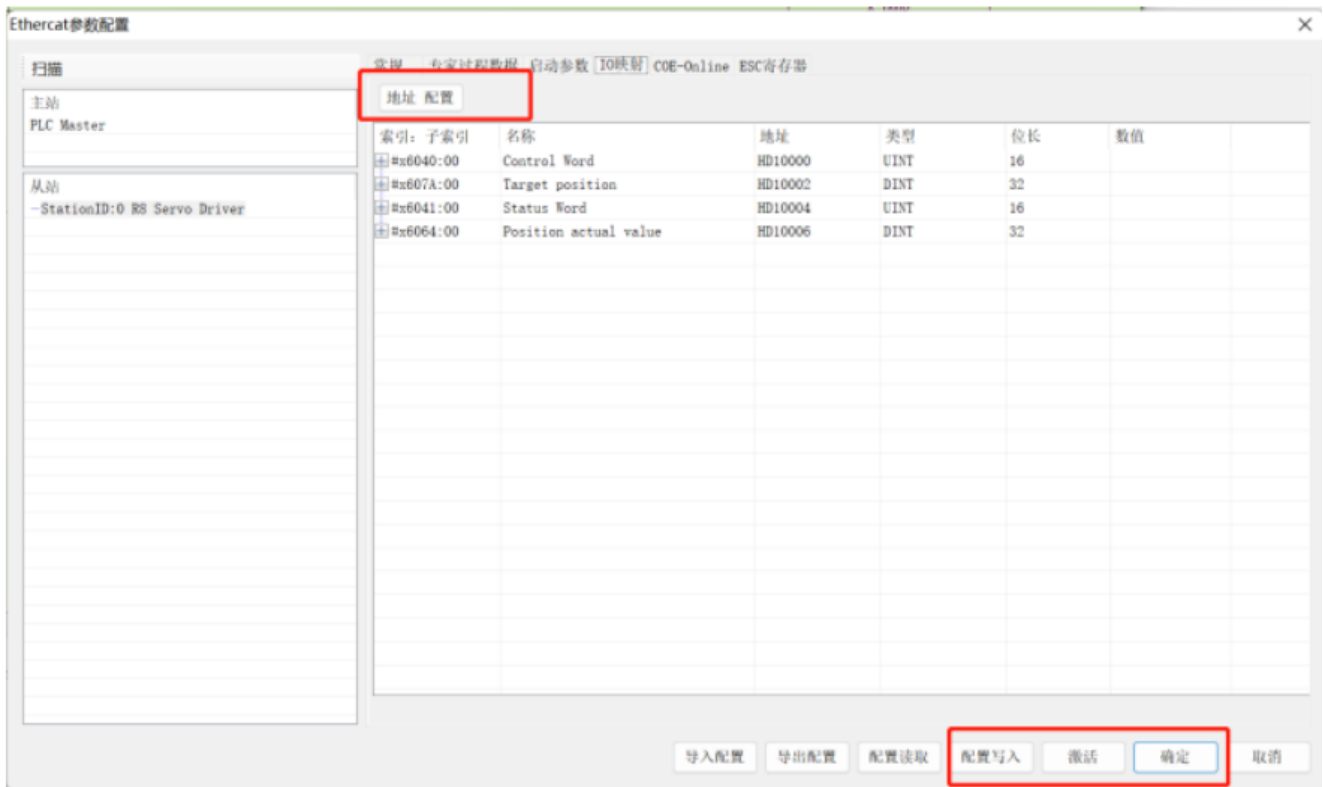
7. After starting the parameter settings, check 1600 and 1A00 in the expert process data.



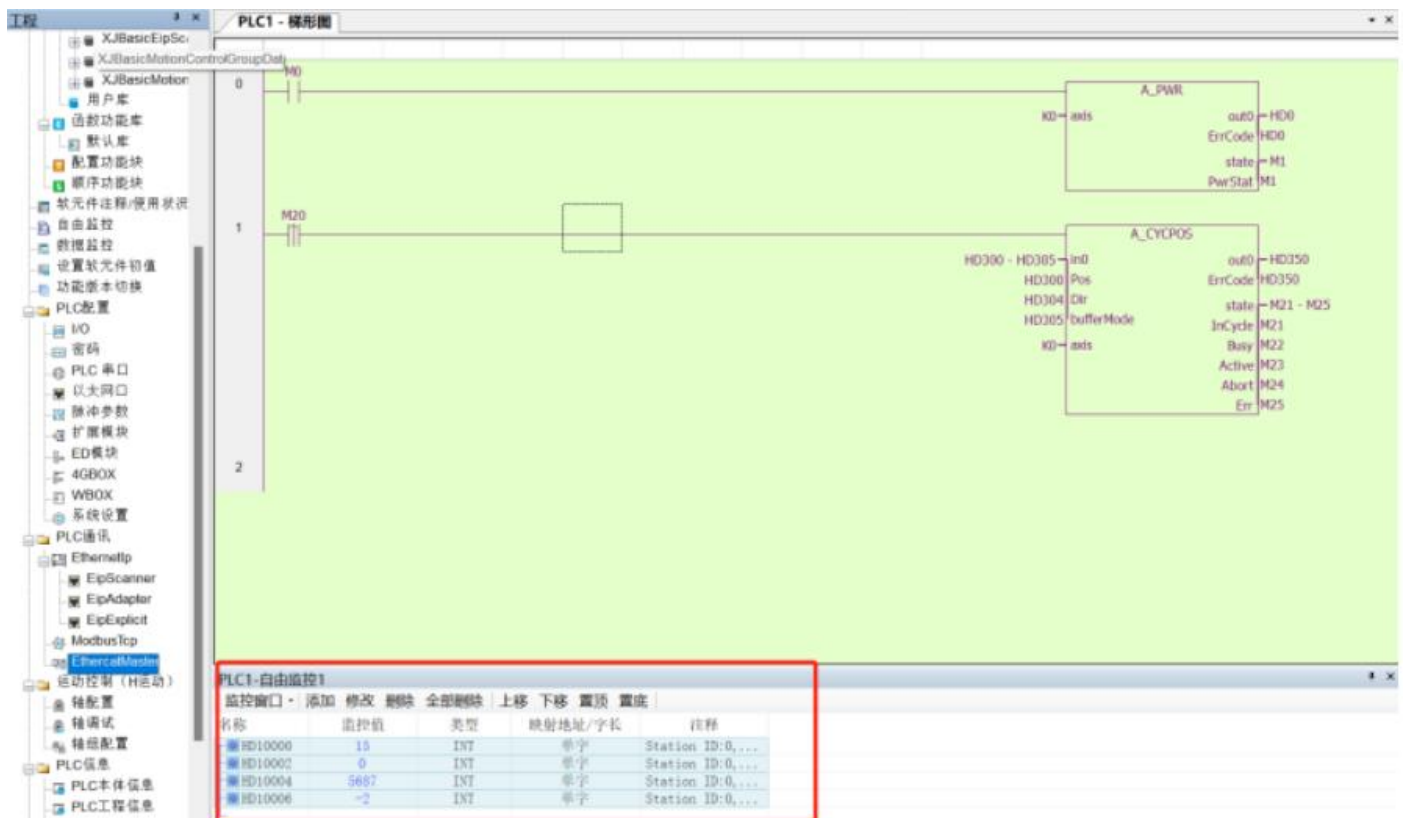
- Then, enter the corresponding parameters in the startup parameters and confirm the values. For example, in HM mode, import the parameters that need to be assigned values upon power-up in the startup parameters. In CSP mode, 0x6060 needs to be set to 8 upon power-up.



- Confirm the IO mapping address. Changing the mapped address will modify the corresponding SDO dictionary parameters. After confirmation, click Configuration Write → Activate → OK to apply the parameters.



10. After running the PLC, the mapped parameter values can be read in the monitoring system.

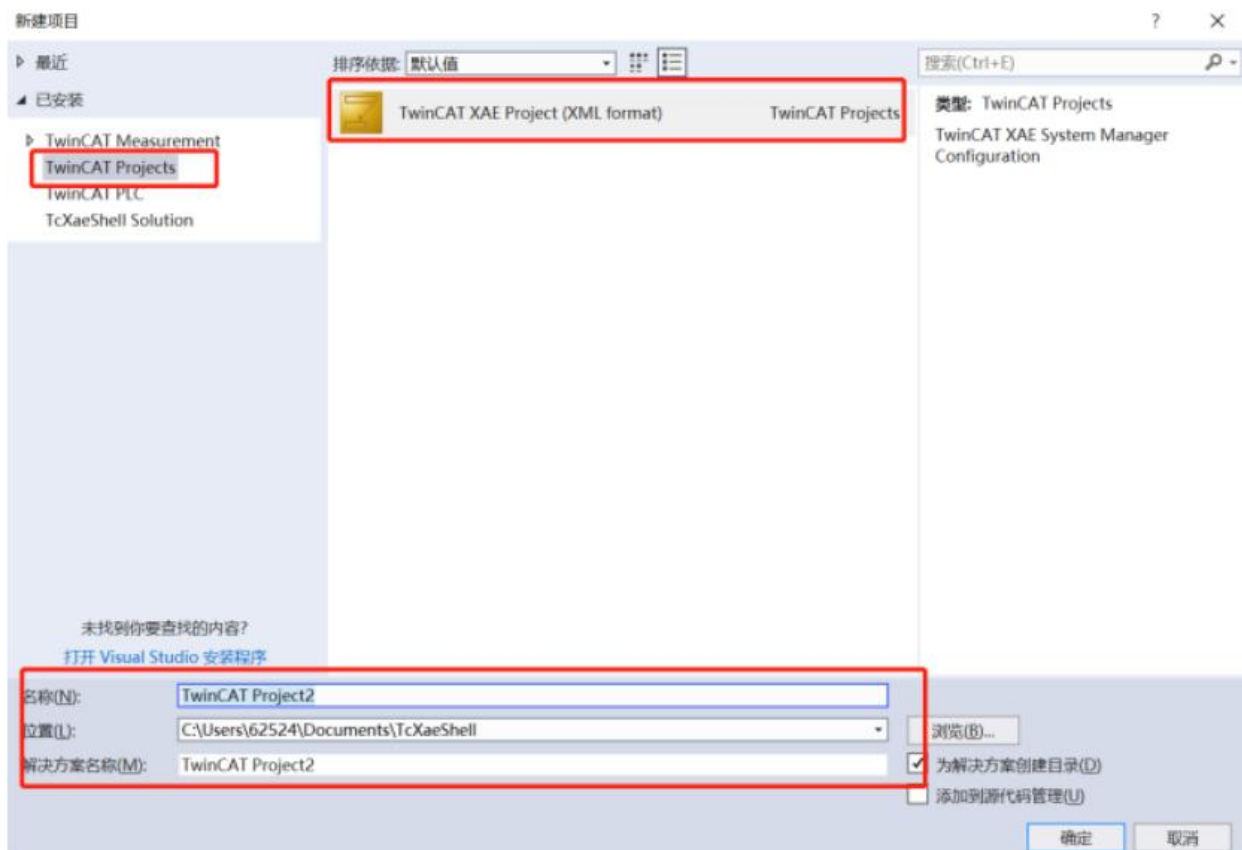
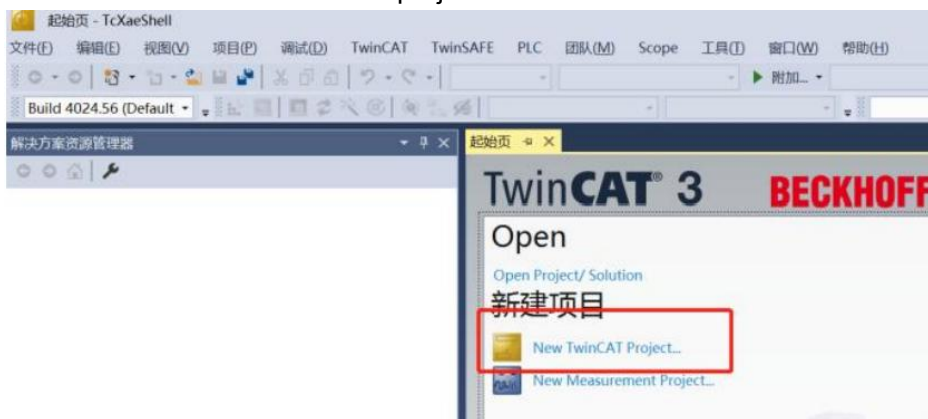


8.4 Communication Between Beckhoff TwinCAT3 and S8N-750

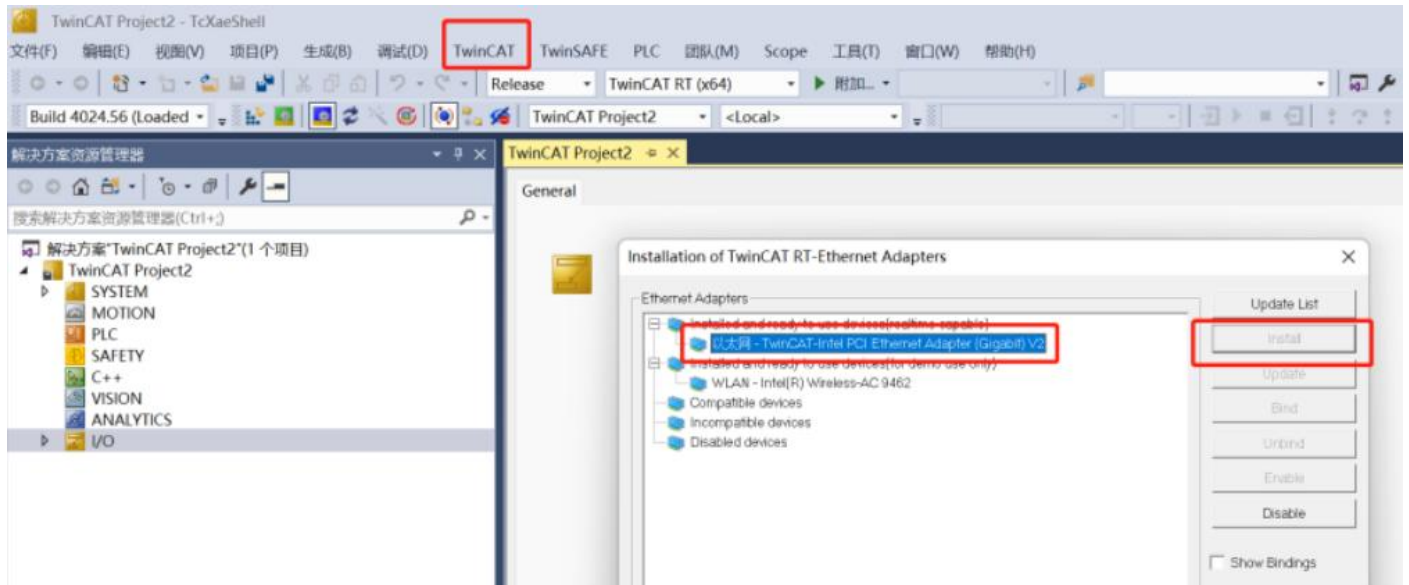
This case study uses a single S8N-750 servo drive connected to Beckhoff's official TwinCAT3 software in synchronous cycle mode as an example to briefly explain the connection and usage steps.

Preparation:

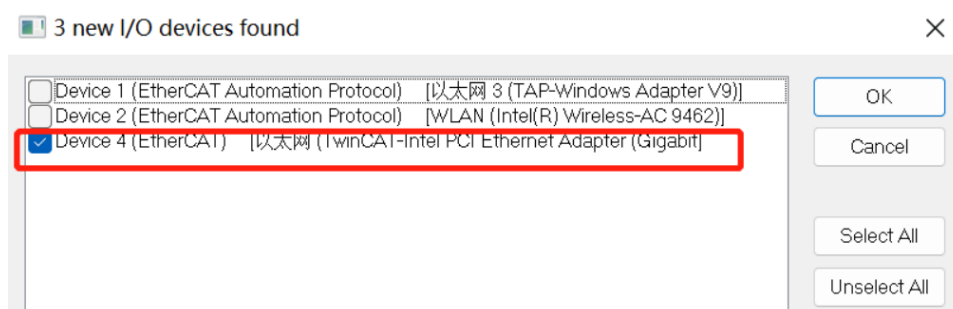
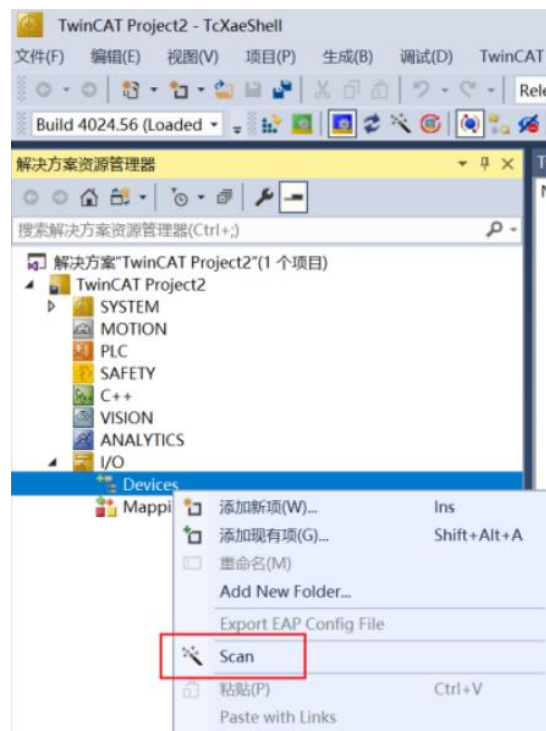
1. Set the servo drive P00-00 to 8 (EtherCAT mode). If multiple servo drives are connected to the controller, check that the network cables are connected correctly for the inlet and outlet ports.
2. Check that your computer hardware has an Intel 100Mbps Ethernet card. Other brands of network cards may not support EtherCAT.
3. Install the TwinCAT software, which can be obtained from the Beckhoff website and supports Windows 7 and Windows 10.
4. Copy the S8N-750's EtherCAT configuration file (Samkoon_S8_servo_drivers_ver3.1.9.xml) to the TwinCAT installation directory: TwinCAT\3.1\Config\IO\EtherCAT.
5. Open TwinCAT3 and create a new TwinCAT3 project.

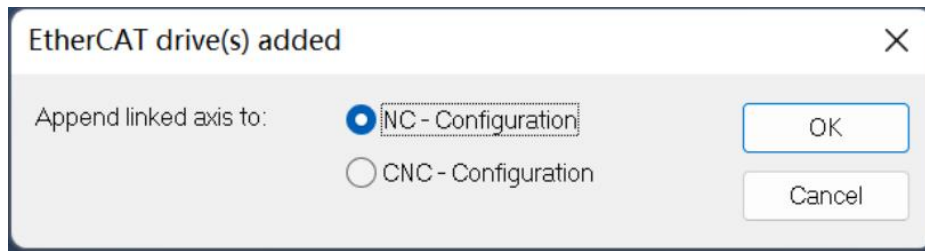


- To install the network card driver, open the menu "Show Real Time Ethernet Compatible Devices..." → a dialog box will pop up as shown in the image below → select the local website in the "Incompatible devices" section → click "install".

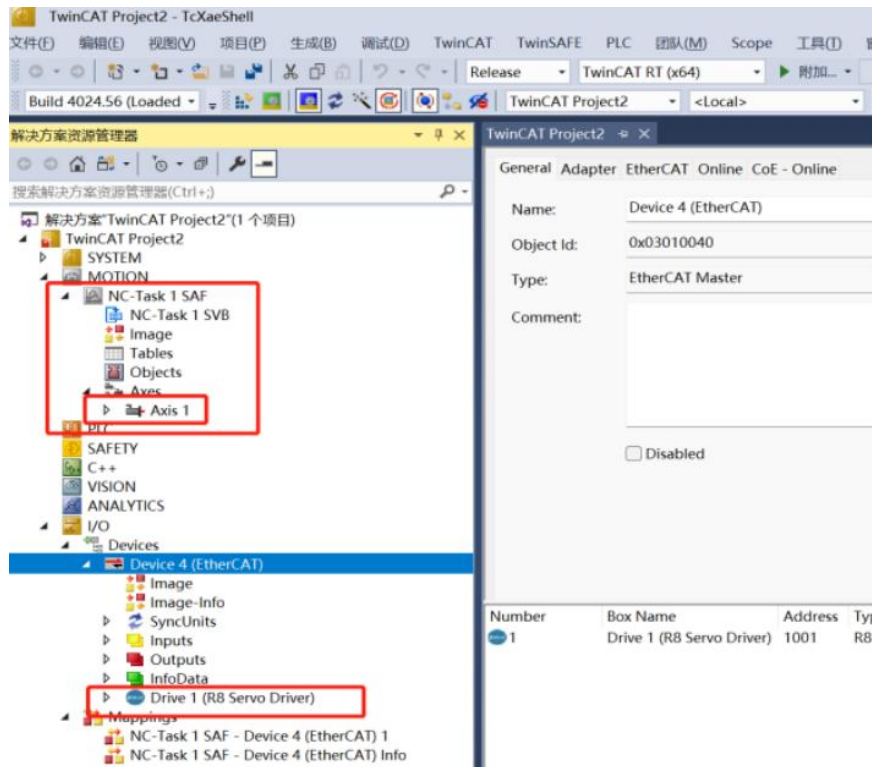


- Hardware Scan: Switch TwinCAT3 to config mode, right-click Devices → click Scan to scan EtherCAT slaves → after scanning, select NC-Configuration mode.

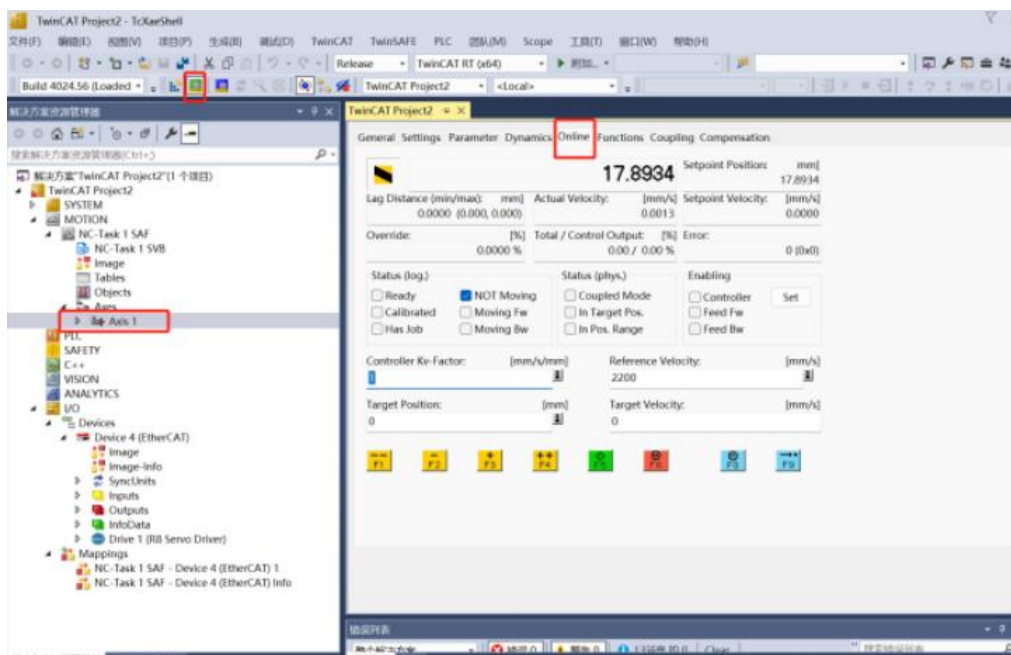




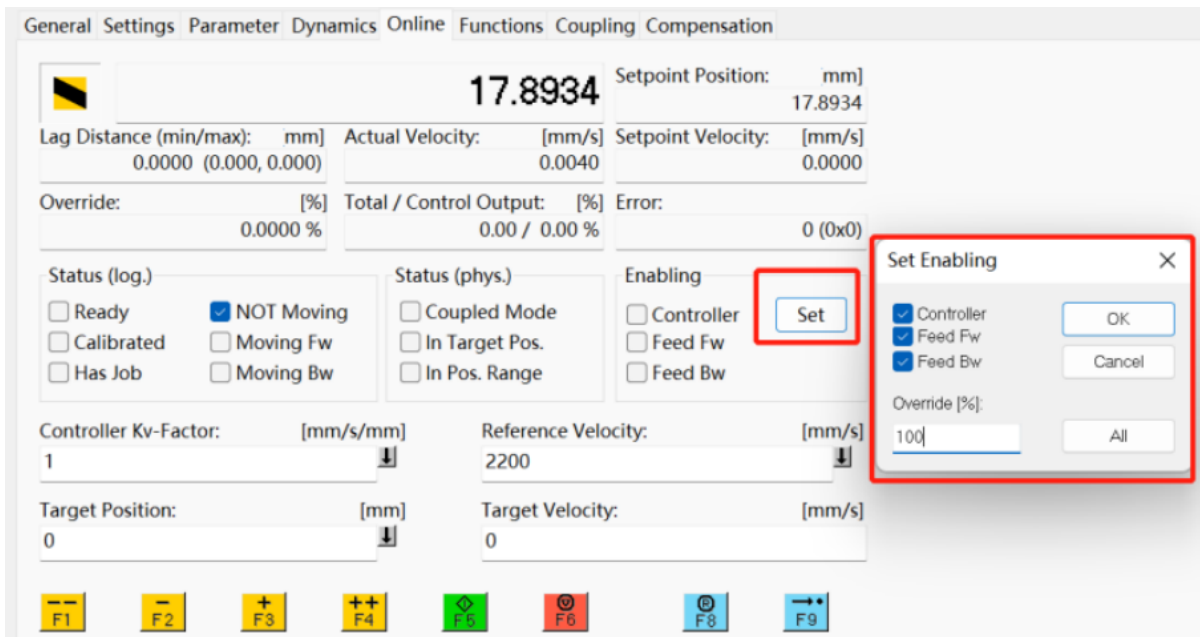
8. After scanning, you can see an NC axis Axis1 in MOTION, corresponding to the servo-connected motor. You can see the scanned driver, R8 Servo Driver, in Device.



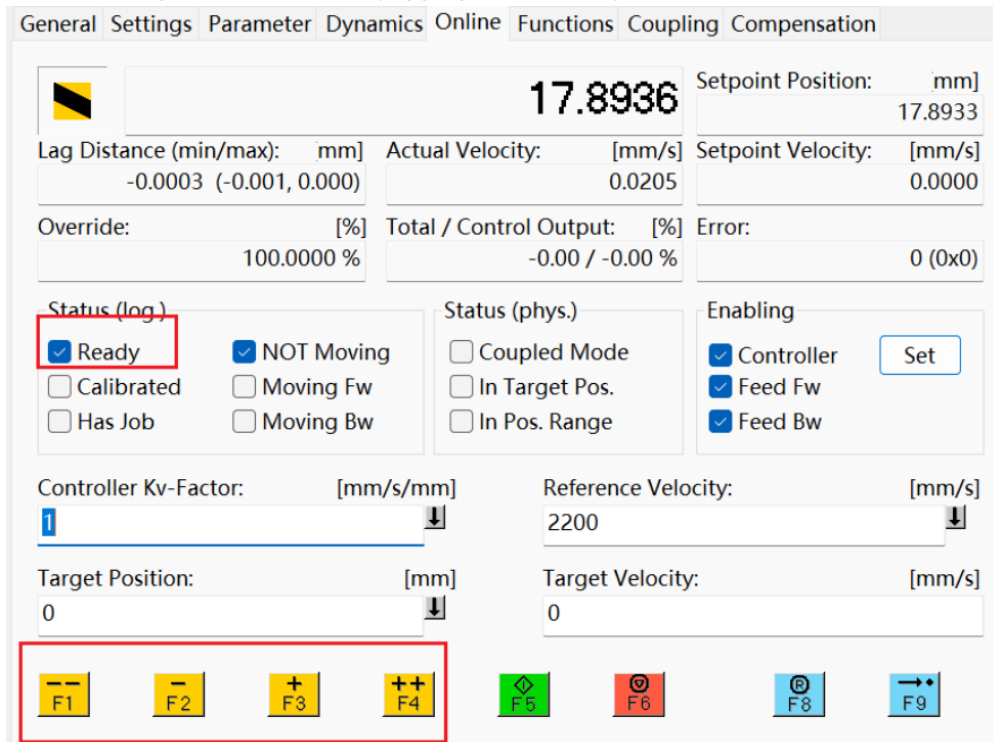
9. Debug via the NC-Online interface: Switch TwinCAT3 to run mode → click the MOTION icon → Axis → Online to enter the debugging interface. If you cannot see the real-time motor position in the MOTION or Online interface, please ensure that the motor model and activation are correct.



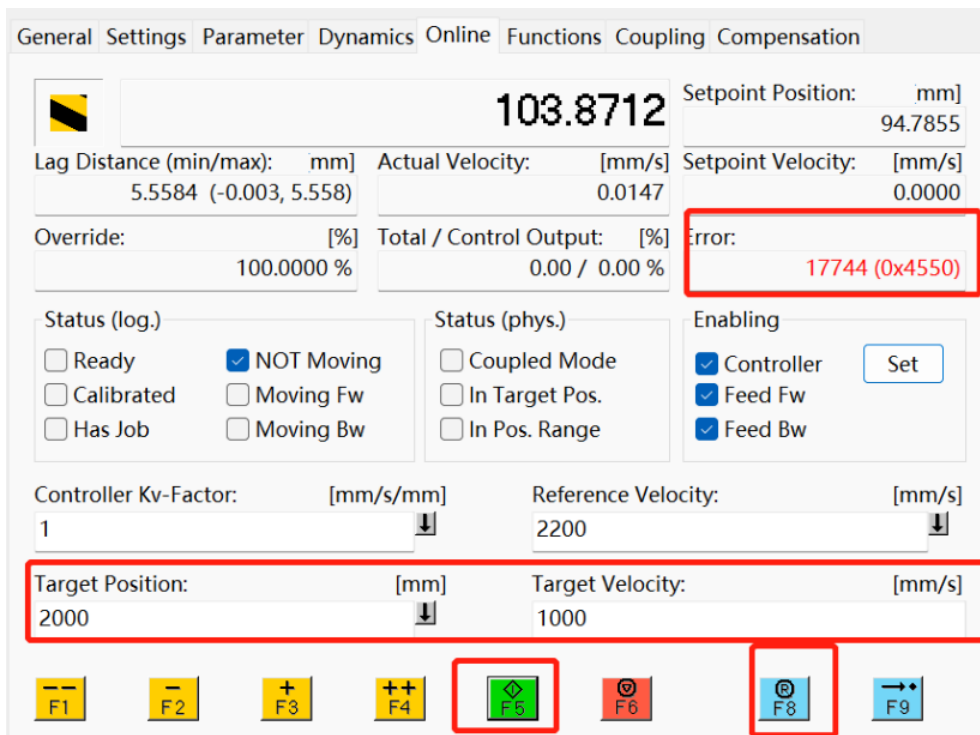
10. Click Set, manually check Controller, Feed FW, and Feed BW, and set Override (speed ratio), then click OK, or directly click ALL to enable the axis and automatically set the speed ratio to 100%.



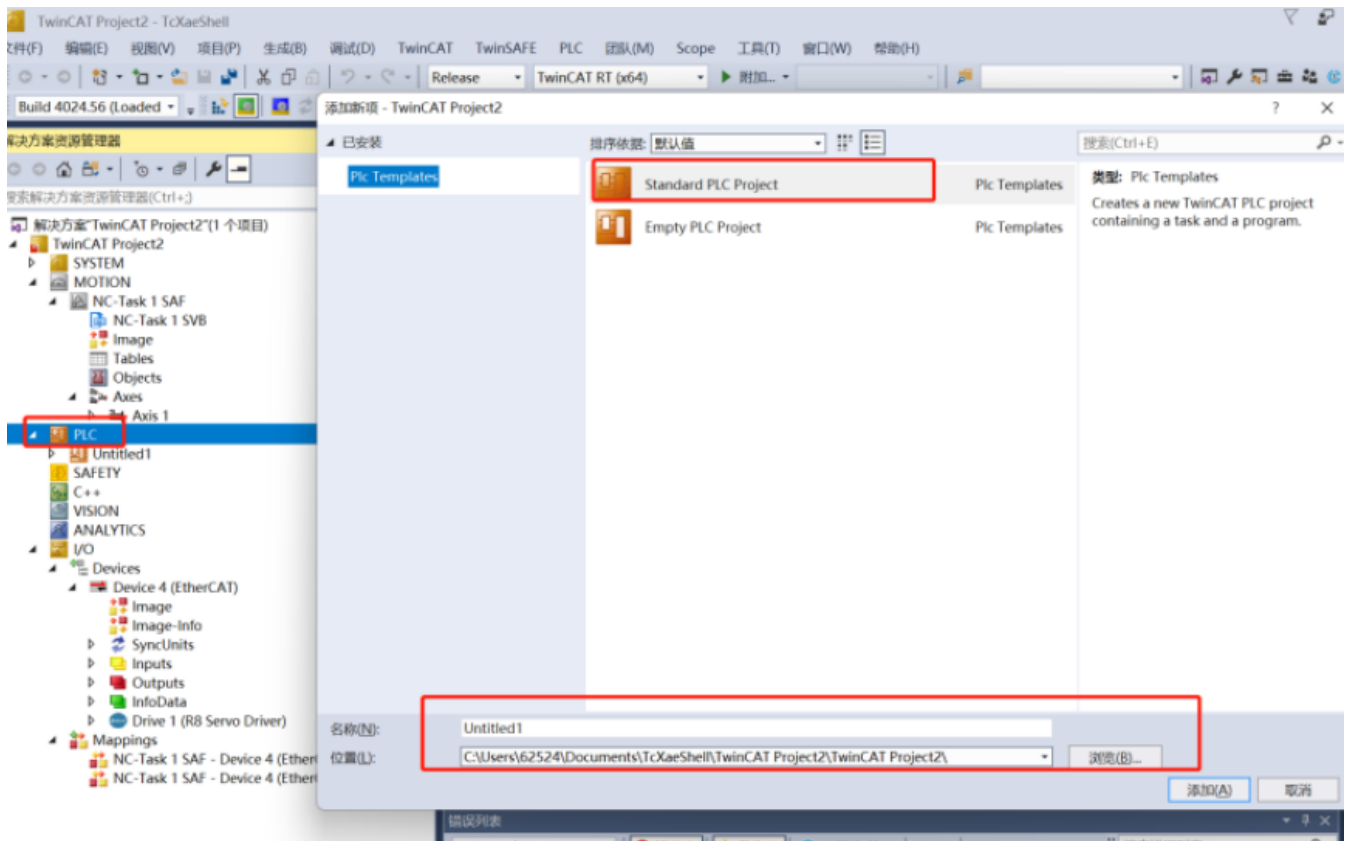
11. If the "Ready" status is checked, the motor is enabled. You can then use F1-F4 to jog the axis. The jogging speed is set in the "Manual Velocity" section of the "Parameter" tab. The default speeds are 100mm/s and 600mm/s, corresponding to slow and fast jogging respectively.



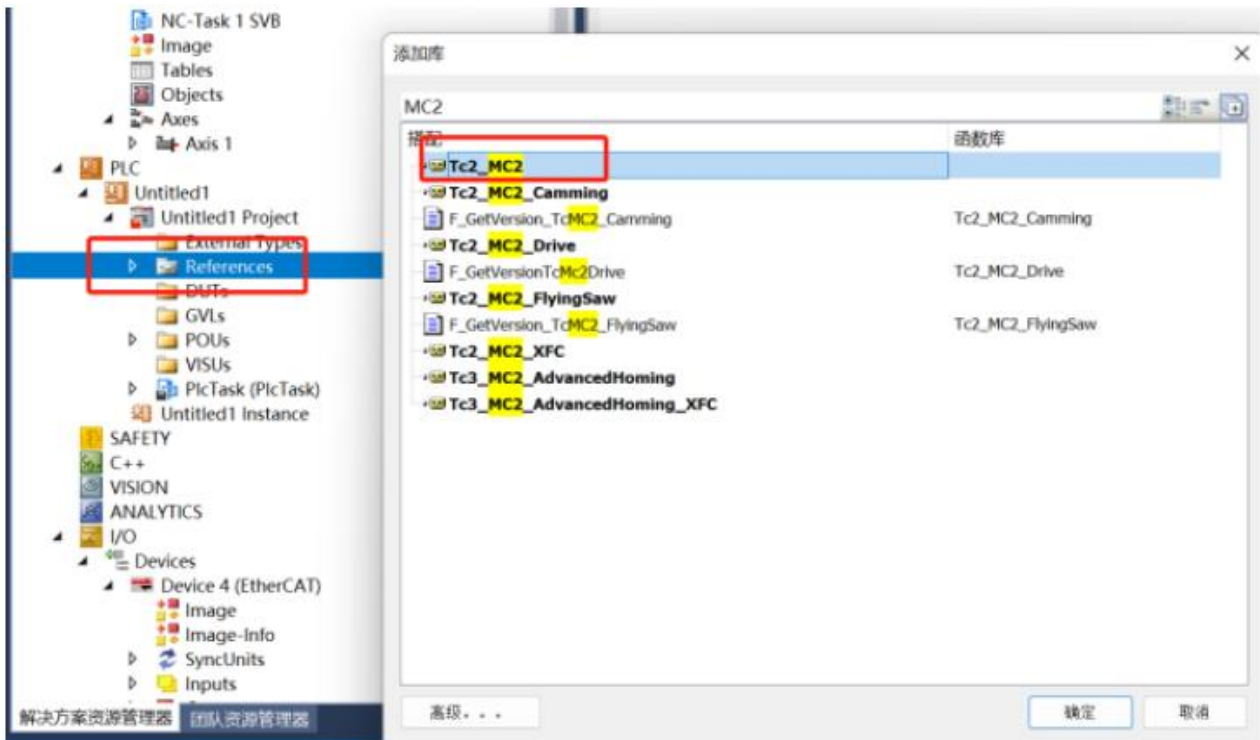
12. After setting the "Target position" and "Target Velocity," press F5 to control the position. The motor will move to the target position at the set speed. This is absolute positioning. The positioning process can be stopped using F6. If an error occurs, an error code will be displayed in the Error field. You need to use F8 to reset the error; otherwise, the axis will not continue to move.



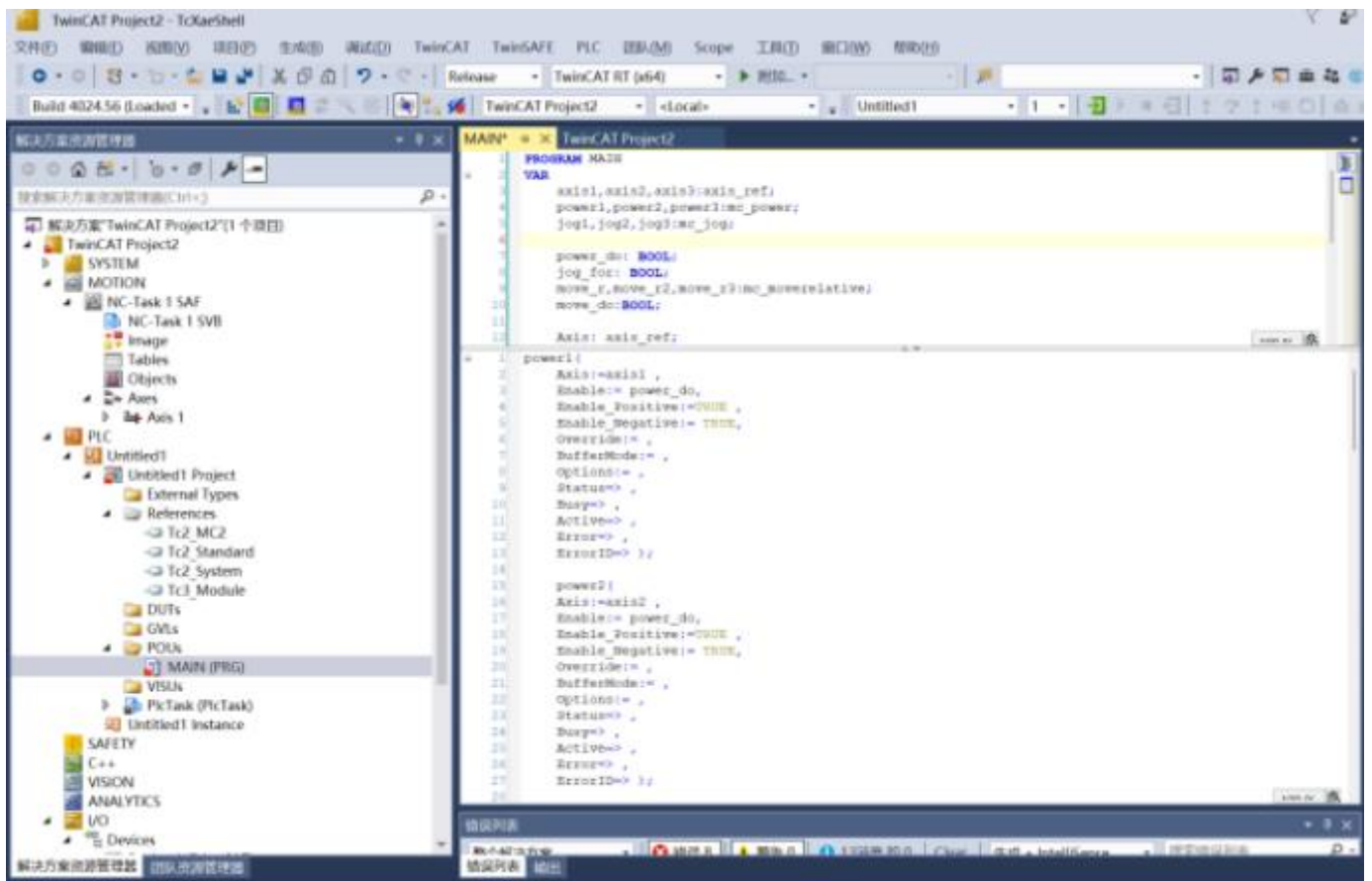
13. PLC controls servo operation. Right-click the PLC to create a new PLC program.

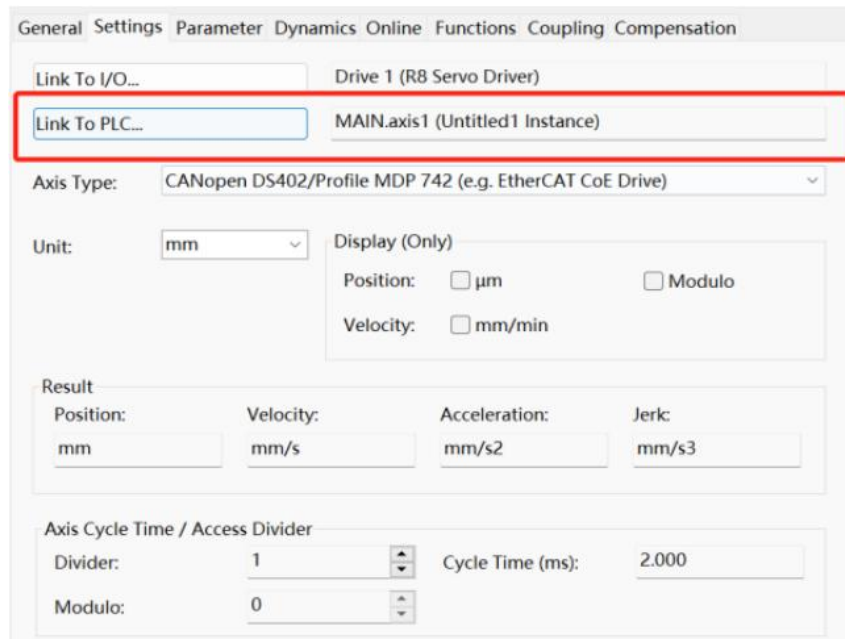


14. Add a motion control library for easy access to various motion control modules. Right-click References → Add library.

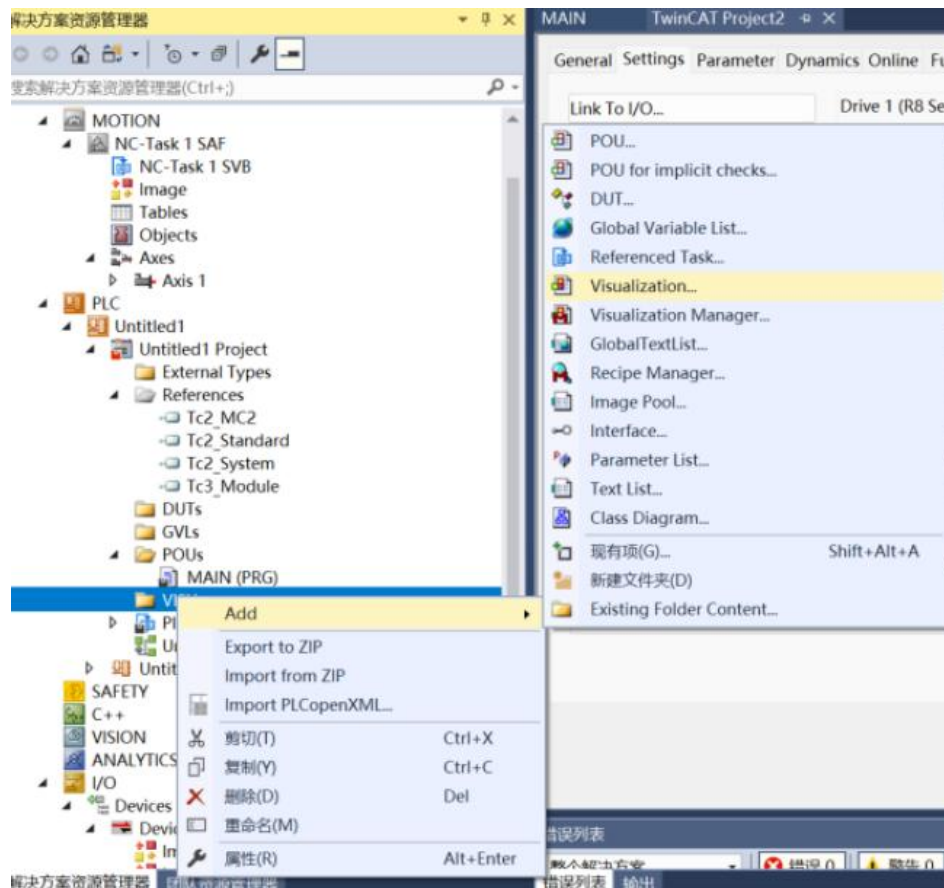


15. Call various motion control modules and associate axes with variables in the PLC.





16. Create a visualization interface. Click VISUs → Add → Visualization under PLC.



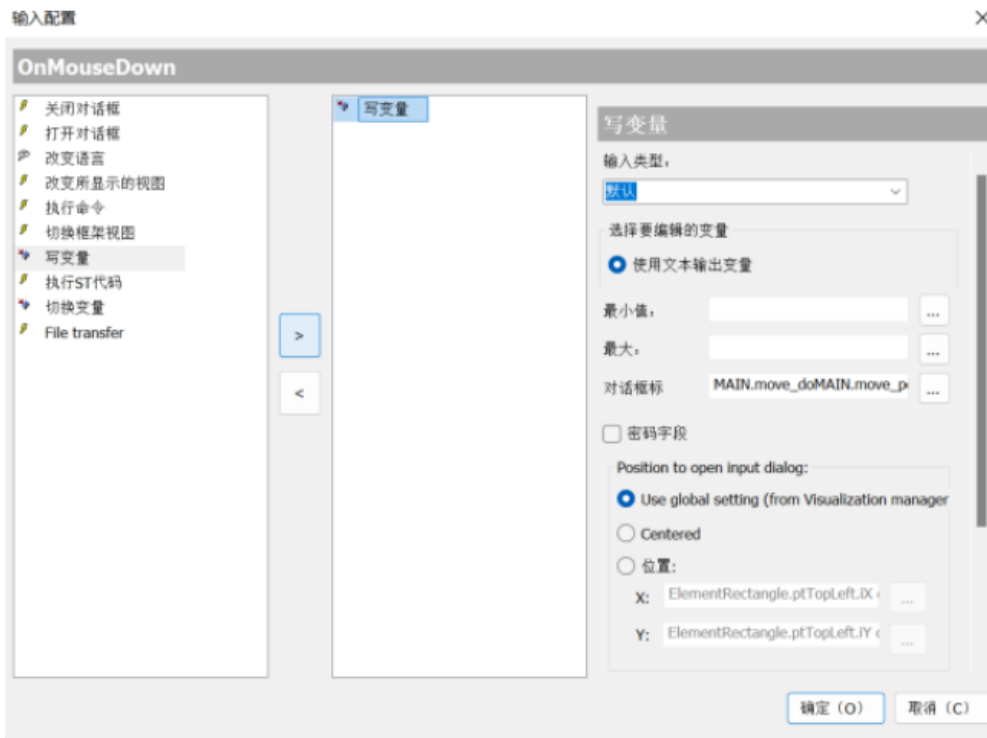
17. Add a rectangle control to the newly added visualization interface. Toolbar → Rectangle, create a new rectangle button and bind the associated variable. Double-click the control and in the Properties tab on the right, enter MAIN.axis.NcToPLC.ActPos in Texts → text variable. This indicates that the control points to the actual position in the axis variable.

Filter Sort by Sort order Advanced	
属性	值
元素名称	GenElemInst_3
Type of element	Rectangle
* Position	
* Colors	
Use gradient color	<input checked="" type="checkbox"/>
Gradient setting	linear, Black, White
= Element look	
Line width	1
Fill attributes	Filled
Line style	Solid
* Texts	
* Text properties	
* Absolute movem...	
* Relative moveme...	
= Text variables	
Text variable	MAIN.Axis.NcToPlc.ActPos
Tooltip variable	
* Color variables	
* State variables	
* 输入配置	

18. Create another control to represent the current speed of the axis. Enter MAIN.axis.NcToPlc.ActVelo in Text variable. And a rectangular control to input the target position value for absolute position movement. Create a rectangular control → Text variable → enter MAIN.move_position (an lreal type variable added in the program), click Inputconfiguration → OnMouseClicked. In the pop-up interface, select Write a Variable, click > to add the function, and on the right, select Use another variable to point to the variable MAIN.move_position.

Text variable MAIN.Axis.NcToPlc.ActVelo

Filter Sort by Sort order Advanced	
属性	值
元素名称	GenElemInst_5
Type of element	Rectangle
* Position	
* Colors	
Use gradient color	<input checked="" type="checkbox"/>
Gradient setting	linear, Black, White
= Element look	
Line width	1
Fill attributes	Filled
Line style	Solid
* Texts	
* Text properties	
* Absolute movem...	
* Relative moveme...	
= Text variables	
Text variable	MAIN.Axis.NcToPlc.ActVelo
Tooltip variable	
* Color variables	
* State variables	
= 输入配置	
OnMouseDown	配置...
OnMouseUp	配置...
* Tap	
* Toggle	



19. Create two button controls to control enable and axis movement. In the enable control's Inputconfiguration → Toggle (alternating button) → Variable item, enter MAIN.power_do. Click once to set it to 1, and click again to set it to 0. In the axis movement trigger control's Inputconfiguration → Tap (instant button) → Variable item, enter MAIN.move_do. Set it to 1 only when clicked, and 0 when released.

属性	值
元素名称	GenElemInst_8
元素类型	Button
* Position	
* Colors	
Use gradient color	<input type="checkbox"/>
Gradient setting	linear, Black, White
Button height	0
* Bitmap info	
* Texts	
Text	
Tooltip	
* Text properties	
= Absolute movem...	
* Movement	
Rotation	
Scaling	
= Relative moveme...	
* Movement top...	
* Movement bot...	
* Text variables	
* Color variables	
* State variables	
= 输入配置	
OnMouseDown	配置...
OnMouseUp	配置...
* Tap	
= Toggle	
Variable	MAIN.power_do

属性	值
元素名称	GenElemInst_8
元素类型	Button
* Position	
* Colors	
Use gradient color	<input type="checkbox"/>
Gradient setting	linear, Black, White
Button height	0
* Bitmap info	
= Texts	
Text	
Tooltip	
* Text properties	
= Absolute movem...	
* Movement	
Rotation	
Scaling	
= Relative moveme...	
* Mover Relative movement	
* Movement bot...	
* Text variables	
* Color variables	
* State variables	
= 输入配置	
OnMouseDown	配置...
OnMouseUp	配置...
= Tap	
Variable	MAIN.move_do
Tap FALSE	<input type="checkbox"/>
* Toggle	

The variable that will be tapped to TRUE (the normal situation) or FALSE when the mouse is pressed on this

9 User Parameters

Function Code Group Number	Group Description
P00	Servo Basic Parameter Group
P01	IO Input Parameter Group
P02	IO Output Parameter Group
P03	Gain Adjustment Parameter Group
P05	Position Control Parameter Group
P06	Speed Control Parameter Group
P07	Torque Control Parameter Group
P08	Analog Quantity Parameter Group
P09	Communication Control Parameter Group
P0A	Stop Control Parameter Group
P0B	Fault and Protection Parameter Group
P0C	Multi-Segment Position Control Parameter Group
P0D	Multi-Segment Speed Control Parameter Group
P0E	Adaptive Adjustment Parameter Group
P10	Motor Parameter Group
P11	Driver Parameter Group
P12	Auxiliary Function Parameter Group
P13	Monitoring Parameter Group
P14	Full Closed-Loop Control Parameter Group
P15	Virtual IO Parameter Group
P16	Version Information Parameter Group
P1B	System Information Parameter Group
P2D	Communication Status Parameter Group
P2E	Motion Control Parameter Group

9.1 P00 Servo Basic Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P00-00	Mode Selection	0-Position Mode 1-Speed Mode 2-Torque Mode 3-Position & Speed Hybrid Mode 4-Position & Torque Hybrid Mode 5-Speed & Torque Hybrid Mode 6-Position, Speed & Torque Hybrid	--	0	Immediate Effect	Stop Setting	General User

		Mode 7-Reserved 8-EtherCAT Bus Mode					
P00-01	Motor Model	2-60HS_A01330 4-80HS_A02430	--	6	Stop and Restart	Stop Setting	General User
P00-02	Motor Rotation Positive Direction Definition	0-CCW (Counterclockwise) Direction as Positive 1-CW (Clockwise) Direction as Positive	--	0	Stop and Restart	Stop Setting	General User
P00-03	Absolute Position Detection System	0-Incremental Position Mode 1-Absolute Position Linear Mode 2-Absolute Position Rotational Mode	--	0	Stop and Restart	Stop Setting	General User
P00-04	Power Failure Save Current Position	0-Do Not Save Current Position on Power Failure 1-Save Current Position on Power Failure	--	0	Immediate Effect	Anytime Setting	General User
P00-05	Regeneration Control Setting	0-Use Built-in Regenerative Resistor 1-Use External Regenerative Resistor 2-Use External Regenerative Resistor with Fan Cooling 3-Do Not Use Regenerative Resistor	--	0	Immediate Effect	Stop Setting	General User
P00-06	External Regenerative Resistor Power	1~65535	W	40	Immediate Effect	Stop Setting	General User
P00-07	External Regenerative Resistor Resistance	1~1000	Ω	50	Immediate Effect	Stop Setting	General User
P00-08	Panel Default Monitoring Parameter	-1~32767	--	-1	Immediate Effect	Anytime Setting	General User
P00-10	Speed Display Filter Time	0~5000	ms	50	Immediate Effect	Stop Setting	General User
P00-12	User Password	0~65535	--	0	Immediate Effect	Anytime Setting	General User
P00-14	Manufacturer Password	0~65535	--	0	Immediate Effect	Anytime Setting	General User
P00-15	Power Failure Quick Discharge	0-Enable Power Failure Quick Discharge Function 1-Disable Power Failure Quick Discharge Function	--	0	Immediate Effect	Anytime Setting	General User

	Disable						
P00-16	User Password Communication Setting Enable	0-Do Not Allow Communication Setting of User Password 1-Allow Communication Setting of User Password	--	1	Immediate Effect	Anytime Setting	General User
P00-20	Motor Model Writing Mode	0-Write Prohibited Mode 1-Intelligent Writing Mode 2-Forced Writing Mode 3-Erase Mode	--	0	Restart to Take Effect	Anytime Setting	Panel Operation
P00-21	Servo Internal Enable	0-Enable Determined by EtherCAT Working Status or IO Input 1-Servo Always Enabled 2-Servo Always Enabled, Clear on Fault 3-Servo Always Disabled	--	0	Immediate Effect	Anytime Setting	General User
P00-22	Motor Torque Boost	0~1	--	0	Restart to Take Effect	Anytime Setting	Panel Operation
P00-23	Parameter Backup	0-Function Disabled 1-Function Enabled	--	0	Restart to Take Effect	Anytime Setting	Panel Operation
P00-24	Encoder EEPROM Access Mode	0- Do Not Read Parameters from Motor Encoder 1- Read Motor ID from Motor Encoder and Identify Motor via Motor ID	--	0	Restart to Take Effect	Anytime Setting	General User
P00-25	Disable AL011 Alarm	0- Do Not Disable AL011 (Parameter Verification Abnormality) Alarm 1- Disable AL011 (Parameter Verification Abnormality) Alarm. After the alarm occurs, enable this function only when all parameters are modified correctly.	--	0	Stop and Restart	Anytime Setting	General User
P00-26	Disable AL013 Alarm	0- Do Not Disable AL013 (Parameter Verification Abnormality) Alarm 1- Disable AL013 (Parameter Verification Abnormality) Alarm	--	0	Restart to Take Effect	Anytime Setting	General User
P00-28	Alarm Mask	00X: Mask AL.022 (Keyboard Access Timeout) Alarm 00X0: Mask AL.192 (Analog Sampling False Trigger) Alarm 0X00: Mask AL.033 (Incremental Encoder Z Wire Break) Alarm X000: Mask AL.031 (Incremental Encoder Deviation Too Large) Alarm	--	0	Immediate Effect	Stop Setting	General User
P00-29	Alarm Mask 1	00XX: AL.040 Alarm Threshold. The	--	0	Immediate	Stop Setting	General

		alarm will be triggered only when the encoder communication timeout occurs XX times consecutively.			Effect		User
P00-30	Alarm Mask AL.102	000X: AL.102 Alarm Mask 00X0: AL.056 Alarm Mask	--	0	Immediate Effect	Stop Setting	General User

9.2 P01 IO Input Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P01-00	Input Signal Unassigned Default State	0~6535(Hexadecimal) 0~15 bits setting meaning: bit0-Servo Enable, bit1-Fault Reset bit2-Gain Switch, bit3-Command Switch bit4-Command Direction Switch bit5-Internal Command Switch 0 bit6-Internal Command Switch 1 bit7-Internal Command Switch 2 bit8-Internal Command Switch 3 bit9-Operation Mode Switch 0 bit10-Operation Mode Switch 1 bit11-Zero Clamp, bit12-Pulse Inhibit bit13-Forward Rotation Inhibit, bit14-Reverse Rotation Inhibit bit15-Forward External Torque Limit	--	0	Stop and Restart	Anytime Setting	General User
P01-01	Input Signal Unassigned Default State	0~65535 (hexadecimal) 0~15 bits setting meaning: bit0-Reverse External Torque Limit bit1-Jog Forward bit2-Jog Reverse bit3-Reserved, bit4-Reserved, bit5-Reserved, bit6-Reserved bit7-Electronic Gear Switch bit8-Torque Command Direction bit9-Speed Command Direction bit10-Position Command Direction bit11-Multi-Segment Position Operation Enable	--	0	Stop and Restart	Anytime Setting	General User

		bit12-Cancel Interrupt Fixed-Length Action bit13-Reserved bit14-Home Signal bit15-Home Return Trigger Signal					
P01-02	Input Signal Unassigned Default State	0~127 (hexadecimal) 0~6 bits setting meaning: bit0-Interrupt Fixed-Length Inhibit bit1-Emergency Stop bit2-Position Deviation Clear bit3-Speed Limit Selection bit4-Pulse Command Inhibit bit5-Probe 1 bit6-Probe 2	--	0	Stop and Restart	Anytime Setting	General User
P01-03	Input Signal Unassigned Default State	Reserved	--	0	Stop and Restart	Anytime Setting	General User
P01-04	DI1 Terminal Function Selection	0 - Not Assigned 1 - Servo Enable 2 - Fault Reset 3 - Gain Switch 4 - Command Switch 5 - Command Direction Switch 6 - Internal Command Switch 0 7 - Internal Command Switch 1 8 - Internal Command Switch 2 9 - Internal Command Switch 3 10 - Operation Mode Switch 0 11 - Operation Mode Switch 1 12 - Zero Clamp 13 - Pulse Inhibit 14 - Forward Rotation Inhibit 15 - Reverse Rotation Inhibit 16 - Forward External Torque Limit Switch 17 - Reverse External Torque Limit Switch 18 - Jog Forward 19 - Jog Reverse 20 - Reserved, 21 - Reserved, 22 - Reserved, 23 - Reserved 24 - Electronic Gear Switch 25 - Torque Command Direction 26 - Speed Command Direction	--	1	Immediate Effect	Stop Setting	General User

		<p>27 - Position Command Direction</p> <p>28 - Multi - Segment Position Operation Enable</p> <p>29 - Cancel Interrupt Fixed - Length Action</p> <p>30 - When P05 - 40 = 1, set the current position as the origin via DI30, and return to the set electrical zero point by triggering DI32</p> <p>31 - Home Signal</p> <p>32 - Home Return Trigger Signal</p> <p>33 - Interrupt Fixed - Length Inhibit</p> <p>34 - Emergency Stop</p> <p>35 - Position Deviation Clear</p> <p>36 - Speed Limit Selection</p> <p>37 - Pulse Command Inhibit</p> <p>38 - Probe 1</p> <p>39 - Probe 2</p>					
P01-05	DI2 Terminal Function Selection	<p>0 - Not Assigned</p> <p>1 - Servo Enable</p> <p>2 - Fault Reset</p> <p>3 - Gain Switch</p> <p>4 - Command Switch</p> <p>5 - Command Direction Switch</p> <p>6 - Internal Command Switch 0</p> <p>7 - Internal Command Switch 1</p> <p>8 - Internal Command Switch 2</p> <p>9 - Internal Command Switch 3</p> <p>10 - Operation Mode Switch 0</p> <p>11 - Operation Mode Switch 1</p> <p>12 - Zero Clamp</p> <p>13 - Pulse Inhibit</p> <p>14 - Forward Rotation Inhibit</p> <p>15 - Reverse Rotation Inhibit</p> <p>16 - Forward External Torque Limit Switch</p> <p>17 - Reverse External Torque Limit Switch</p> <p>18 - Jog Forward</p> <p>19 - Jog Reverse</p> <p>20 - Reserved</p> <p>21 - Reserved</p> <p>22 - Reserved</p> <p>23 - Reserved</p>	--	2	Immediate Effect	Stop Setting	General User

		<p>24 - Electronic Gear Switch</p> <p>25 - Torque Command Direction</p> <p>26 - Speed Command Direction</p> <p>27 - Position Command Direction</p> <p>28 - Multi - Segment Position Operation Enable</p> <p>29 - Cancel Interrupt Fixed - Length Action</p> <p>30 - When P05 - 40 = 1, set the current position as the origin via DI30, and return to the set electrical zero point by triggering DI32</p> <p>31 - Home Signal</p> <p>32 - Home Return Trigger Signal</p> <p>33 - Interrupt Fixed - Length Inhibit</p> <p>34 - Emergency Stop</p> <p>35 - Position Deviation Clear</p> <p>36 - Speed Limit Selection</p> <p>37 - Pulse Command Inhibit</p> <p>38 - Probe 1</p> <p>39 - Probe 2</p>					
P01-06	DI3 Terminal Function Selection	<p>0 - Not Assigned</p> <p>1 - Servo Enable</p> <p>2 - Fault Reset</p> <p>3 - Gain Switch</p> <p>4 - Command Switch</p> <p>5 - Command Direction Switch</p> <p>6 - Internal Command Switch 0</p> <p>7 - Internal Command Switch 1</p> <p>8 - Internal Command Switch 2</p> <p>9 - Internal Command Switch 3</p> <p>10 - Operation Mode Switch 0</p> <p>11 - Operation Mode Switch 1</p> <p>12 - Zero Clamp</p> <p>13 - Pulse Inhibit</p> <p>14 - Forward Rotation Inhibit</p> <p>15 - Reverse Rotation Inhibit</p> <p>16 - Forward External Torque Limit Switch</p> <p>17 - Reverse External Torque Limit Switch</p> <p>18 - Jog Forward</p> <p>19 - Jog Reverse</p> <p>20 - Reserved, 21 - Reserved, 22 - Reserved,</p>	--	14	Immediate Effect	Stop Setting	General User

		<p>23 - Reserved</p> <p>24 - Electronic Gear Switch</p> <p>25 - Torque Command Direction</p> <p>26 - Speed Command Direction</p> <p>27 - Position Command Direction</p> <p>28 - Multi - Segment Position Operation Enable</p> <p>29 - Cancel Interrupt Fixed - Length Action</p> <p>30 - When P05 - 40 = 1, set the current position as the origin via DI30, and return to the set electrical zero point by triggering DI32</p> <p>31 - Home Signal</p> <p>32 - Home Return Trigger Signal</p> <p>33 - Interrupt Fixed - Length Inhibit</p> <p>34 - Emergency Stop</p> <p>35 - Position Deviation Clear</p> <p>36 - Speed Limit Selection</p> <p>37 - Pulse Command Inhibit</p> <p>38 - Probe 1</p> <p>39 - Probe 2</p>				
P01-07	DI4 Terminal Function Selection	<p>0 - Not Assigned</p> <p>1 - Servo Enable</p> <p>2 - Fault Reset</p> <p>3 - Gain Switch</p> <p>4 - Command Switch</p> <p>5 - Command Direction Switch</p> <p>6 - Internal Command Switch 0</p> <p>7 - Internal Command Switch 1</p> <p>8 - Internal Command Switch 2</p> <p>9 - Internal Command Switch 3</p> <p>10 - Operation Mode Switch 0</p> <p>11 - Operation Mode Switch 1</p> <p>12 - Zero Clamp</p> <p>13 - Pulse Inhibit</p> <p>14 - Forward Rotation Inhibit</p> <p>15 - Reverse Rotation Inhibit</p> <p>16 - Forward External Torque Limit Switch</p> <p>17 - Reverse External Torque Limit Switch</p> <p>18 - Jog Forward</p> <p>19 - Jog Reverse</p>	15	Immediate Effect	Stop Setting	General User

		20 - Reserved, 21 - Reserved, 22 - Reserved, 23 - Reserved 24 - Electronic Gear Switch 25 - Torque Command Direction 26 - Speed Command Direction 27 - Position Command Direction 28 - Multi - Segment Position Operation Enable 29 - Cancel Interrupt Fixed - Length Action 30 - When P05 - 40 = 1, set the current position as the origin via DI30, and return to the set electrical zero point by triggering DI32 31 - Home Signal 32 - Home Return Trigger Signal 33 - Interrupt Fixed - Length Inhibit 34 - Emergency Stop 35 - Position Deviation Clear 36 - Speed Limit Selection 37 - Pulse Command Inhibit 38 - Probe 1 39 - Probe 2					
P01-20	Sub-Logic DI1 Terminal Selection	0-Low Active (Conduction) (ON) 1-High Active (Shutdown) (OFF) 2-Rising Edge Active (ON->OFF) 3-Falling Edge Active (OFF->ON) 4-Edge Active (ON<->OFF)	--	0	Immediate Effect	Stop Setting	General User
P01-21	Sub-Logic DI2 Terminal Selection	0-Low Active (Conduction) (ON) 1-High Active (Shutdown) (OFF) 2-Rising Edge Active (ON->OFF) 3-Falling Edge Active (OFF->ON) 4-Edge Active (ON<->OFF)	--	0	Immediate Effect	Stop Setting	General User
P01-22	Sub-Logic DI3 Terminal Selection	0-Low Active (Conduction) (ON) 1-High Active (Shutdown) (OFF) 2-Rising Edge Active (ON->OFF) 3-Falling Edge Active (OFF->ON) 4-Edge Active (ON<->OFF)	--	0	Immediate Effect	Stop Setting	General User
P01-23	Sub-Logic DI4 Terminal Selection	0-Low Active (Conduction) (ON) 1-High Active (Shutdown) (OFF) 2-Rising Edge Active (ON->OFF) 3-Falling Edge Active (OFF->ON) 4-Edge Active (ON<->OFF)	--	0	Immediate Effect	Stop Setting	General User
P01-43	Digital Input Filter Time	0~32	--	0	Restart to Take Effect	Stop Setting	General User

9.3 P02 IO Output Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P02-00	DO1 Terminal Function Selection	0-Undefined 1-Servo Ready Signal 2-Rotation Signal 3-Zero Speed Signal 4-Torque Arrival 5-Speed Arrival Signal 6-Position Arrival Signal 7-Position Approach Signal 8-Torque Limit 9-Speed Limit 10-Brake, 11-Warning, 12-Alarm, 13-Reserved 14-Reserved, 15-Reserved 16-Interrupt Fixed-Length Completion 17-Home Return Completion 18-Electrical Home Return Completion 19-Speed Arrival 20-Initial Angle Identification Completion 21-Z Phase Signal Output	--	1	Immediate Effect	Anytime Setting	General User
P02-01	DO2 Terminal Function Selection	0-Undefined 1-Servo Ready Signal 2-Rotation Signal 2-Zero Speed Signal 4-Torque Arrival 5-Speed Arrival Signal 6-Position Arrival Signal 7-Position Approach Signal 8-Torque Limit 9-Speed Limit 10-Brake, 11-Warning, 12-Alarm, 13-Reserved 14-Reserved, 15-Reserved 16-Interrupt Fixed-Length Completion 17-Home Return Completion 18-Electrical Home Return Completion 19-Speed Arrival 20-Initial Angle Identification	--	6	Immediate Effect	Anytime Setting	General User

		Completion					
P02-02	DO3 Terminal Function Selection	0-Undefined 1-Servo Ready Signal 2-Rotation Signal 3-Zero Speed Signal 4-Torque Arrival 5-Speed Arrival Signal 6-Position Arrival Signal 7-Position Approach Signal 8-Torque Limit 9-Speed Limit 10-Brake, 11-Warning, 12-Alarm, 13-Reserved 14-Reserved, 15-Reserved , 16-Interrupt Fixed-Length Completion 17-Home Return Completion 18-Electrical Home Return Completion 19-Speed Arrival 20-Initial Angle Identification Completion	--	10	Immediate Effect	Anytime Setting	General User
P02-03	DO4 Terminal Function Selection	0-Undefined 1-Servo Ready Signal 2-Rotation Signal 3-Zero Speed Signal 4-Torque Arrival 5-Speed Arrival Signal 6-Position Arrival Signal 7-Position Approach Signal 8-Torque Limit 9-Speed Limit , 10-Brake, 11-Warning, 12-Alarm, 13-Reserved 14-Reserved, 15-Reserved 16-Interrupt Fixed-Length Completion 17-Home Return Completion 18-Electrical Home Return Completion 19-Speed Arrival 20-Initial Angle Identification Completion	--	12	Immediate Effect	Anytime Setting	General User
P02-16	DO1 Terminal Logic Selection	0-Output ON when Active 1-Output OFF when Active	--	0	Immediate Effect	Anytime Setting	General User

P02-17	DO2 Terminal Logic Selection	0-Output ON when Active 1-Output OFF when Active	--	0	Immediate Effect	Anytime Setting	General User
P02-18	DO3 Terminal Logic Selection	0-Output ON when Active 1-Output OFF when Active	--	0	Immediate Effect	Anytime Setting	General User
P02-19	DO4 Terminal Logic Selection	0-Output ON when Active 1-Output OFF when Active	--	0	Immediate Effect	Anytime Setting	General User
P02-32	DO Signal Source	0~7	--	0	Immediate Effect	Stop Setting	General User
P02-35	Speed DO Filter Time	0~5000	ms	10	Immediate Effect	Stop Setting	General User

9.4 P03 Gain Adjustment Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P03-00	Auto-Tuning Mode Selection	0-Manual Gain Parameter Adjustment 1-Standard Mode, Use Standard Mode Rigidity Table to Adjust Gain Parameters 2-Positioning Mode, Use Positioning Mode Rigidity Table to Adjust Gain Parameters	--	1	Immediate Effect	Anytime Setting	General User
P03-01	Rigidity Level	0~31	--	12	Immediate Effect	Anytime Setting	General User
P03-02	Load Moment of Inertia Ratio	0~120.00	Ratio	1.00	Immediate Effect	Anytime Setting	General User
P03-03	Real-Time Inertia Ratio	0~655.35	%	0	Immediate Effect	Anytime Setting	General User
P03-04	Position Loop Gain	0~200.00	Hz	40.0	Immediate Effect	Anytime Setting	General User
P03-05	Speed Loop Gain	1~200.00	Hz	25.0	Immediate Effect	Anytime Setting	General User
P03-06	Speed Loop Integral Time Constant	15~512.00	ms	31.83	Immediate Effect	Anytime Setting	General User
P03-07	2nd Position Loop Gain	0~200.00	Hz	64.0	Immediate Effect	Anytime Setting	General User
P03-08	2nd Speed Loop Gain	1~200.00	Hz	40.0	Immediate Effect	Anytime Setting	General User
P03-09	2nd Speed Loop	15~512.00	ms	20.00	Immediate Effect	Anytime Setting	General User

	Integral Time Constant				Effect	Setting	User
P03-10	PDF Control Coefficient	0~1000	‰	1000	Immediate Effect	Anytime Setting	Manufacturer Mode
P03-11	Damping	0~1000	‰	0	Immediate Effect	Anytime Setting	Manufacturer Mode
P03-12	Position Feedforward Control Selection	0-No Speed Feedforward 1-Internal Speed Feedforward 1-Pulse Type: AI1 Used for Speed Feedforward Bus Type: In CSP Mode, 60B1 Used for Speed Feedforward 3-Pulse Type: AI2 Used for Speed Feedforward	--	1	Immediate Effect	Stop Setting	General User
P03-13	Speed Feedforward Filter Time	0~64.00	ms	0.50	Immediate Effect	Anytime Setting	General User
P03-14	Speed Feedforward Gain Ratio	0~30.00	Times	0.00	Immediate Effect	Anytime Setting	General User
P03-15	Torque Feedforward Filter Time	0~64.00	ms	0.50	Immediate Effect	Anytime Setting	General User
P03-16	Torque Feedforward Gain	0~2.000	Ratio	0.000	Immediate Effect	Anytime Setting	General User
P03-17	Speed Feedback Average Filter Level	0~4	--	0	Immediate Effect	Stop Setting	General User
P03-18	Speed Feedback Low-Pass Filter Cutoff Frequency	100~4000	Hz	4000	Immediate Effect	Anytime Setting	General User
P03-19	Performance Mode	0-High Speed Mode 1-High Performance Mode, Kp Switching 2-High Performance Mode, Ki Switching	--	0	Stop and Restart	Stop Setting	Manufacturer Mode
P03-20	Gain Switching Mode	0-GF Mode: Fixed First Group Gain 1-GF Mode: Fixed First Group Gain, Use External DI for P, PI Switching 2-GS Mode: Switch Using External DI Signal 3-GS Mode: Switch According to Torque Command Magnitude	--	0	Immediate Effect	Anytime Setting	General User

		<p>4-GS Mode: Switch According to Speed Command Magnitude</p> <p>5-GS Mode: Switch According to Speed Command Acceleration Magnitude</p> <p>6-GI Mode: Interpolate According to Speed Command Magnitude</p> <p>7-GS Mode: Switch According to Position Deviation Magnitude</p> <p>8-GS Mode: No Position Command <First Group Gain>, With Position Command <Second Group Gain></p> <p>9-GS Mode: Positioning Completed <First Group Gain>, Positioning Not Completed <Second Group Gain></p> <p>10-GS Mode: Switch According to Speed Feedback Magnitude</p> <p>11-GS Mode: No Position Command and Small Feedback Speed <First Group Gain>, With Position Command <Second Group Gain></p>					
P03-21	Gain Switching Delay Time	0~100.00	ms	5.0	Immediate Effect	Anytime Setting	General User
P03-22	Gain Switching Threshold	0~20000	--	50	Immediate Effect	Anytime Setting	General User
P03-23	Gain Switching Hysteresis	0~20000	--	30	Immediate Effect	Anytime Setting	General User
P03-24	Position Gain Switching Time	0~100.00	ms	3.0	Immediate Effect	Anytime Setting	General User
P03-25	Speed Feedback Selection	<p>0-FPGA Speed Measurement</p> <p>1-MCU Uses M Method for Speed Measurement</p>	--	0	Stop and Restart	Anytime Setting	R&D Personnel
P03-26	Current Loop Gain Adjustment Coefficient	0-10240	--	1024	Immediate Effect	Anytime Setting	General User

9.5 P05 Position Control Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P05-00	Single Circle Pulse Number	0~1048576	P/REV	10000	Stop and Restart	Stop Setting	General User
P05-02	Electronic Gear Numerator Ratio 1	1~1073741824	--	131072	Immediate Effect	Anytime Setting	General User
P05-04	Electronic Gear Denominator Ratio 1	1~1073741824	--	10000	Immediate Effect	Anytime Setting	General User
P05-06	Electronic Gear Numerator Ratio 2	1~1073741824	--	131072	Immediate Effect	Anytime Setting	General User
P05-08	Electronic Gear Denominator Ratio 2	1~1073741824	--	10000	Immediate Effect	Anytime Setting	General User
P05-14	Electronic Gear Switch Enable	0~1	--	0	Immediate Effect	Stop Setting	General User
P05-15	Position Command Source	0-Low-Speed Pulse Input 1-High-Speed Pulse Input 2-Frequency-Divided Output OA, OB Signals 3-Always 0 4-Internal Multi-Segment Pulse Input	--	0	Immediate Effect	Stop Setting	General User
P05-16	Command Pulse Form	0-Pulse + Direction 1-AB Phase x4 2-CW + CCW 3-AB Phase x1	--	0	Stop and Restart	Stop Setting	General User
P05-17	Command Pulse Signal Inversion	0-Pulse, Sign Neither Inverted 1-Pulse Inverted, Sign Not Inverted 2-Pulse Not Inverted, Sign Inverted 3-Pulse Inverted, Sign Inverted	--	0	Stop and Restart	Stop Setting	General User
P05-18	Pulse Signal Filter Time	0~255	20ns	25	Stop and Restart	Stop Setting	General User
P05-19	Direction Signal Input Filter Time	0~255	20ns	25	Stop and Restart	Stop Setting	General User
P05-20	Position Command Filter Time	0~6553.5	ms	0	Immediate Effect	Stop Setting	General User
P05-21	Position Command Speed Calculation Filter Time	0~128.0	ms	0	Immediate Effect	Stop Setting	General User

P05-22	Position Unit Setting	0-Encoder Unit 1-Command Unit	--	1	Stop and Restart	Anytime Setting	General User
P05-25	Pulse Output Source Selection	0-Encoder Distributed Output 1-Command Pulse Synchronous Output 2-No Output 3-Parameter Trigger, Start Output by P5-35, Output the Number of Pulses Set by P5-34	--	0	Stop and Restart	Stop Setting	General User
P05-26	Pulse Frequency-Divided Output Phase	0-A Leading B 1-B Leading A	--	0	Stop and Restart	Stop Setting	General User
P05-27	Z Pulse Output Active Level	0-High Level Active 1-Low Level Active	--	1	Stop and Restart	Stop Setting	General User
P05-28	Maximum Single-Phase Frequency of Pulse Output	1~25000	KHz	1000	Immediate Effect	Anytime Setting	General User
P05-29	Minimum Single-Phase Frequency of Pulse Output	1~25000	KHz	50	Immediate Effect	Anytime Setting	General User
P05-30	Number of Single-Phase Pulses for Pulse Output	0~0xFFFFFFFF	P	2500	Stop and Restart	Stop Setting	General User
P05-32	Pulse Output Signal Type	0-AB Phase x4 1-Pulse + Direction 2-CW + CCW 3-AB Phase x1	--	0	Immediate Effect	Anytime Setting	General User
P05-33	Pulse Output Default Logic Level	0-A Low, B Low 1-A High, B Low 2-A Low, B High 3-A High, B High	--	0	Stop and Restart	Anytime Setting	General User
P05-34	Number of Single Pulse Outputs	-32768~32767	P	0	Immediate Effect	Anytime Setting	R&D Personnel
P05-35	Single Trigger of Pulse Output	0~1	--	0	Immediate Effect	Anytime Setting	R&D Personnel
P05-36	Pulse Output Count	-2147483648~2147483647	P	0	Read Only	Read Only	General User
P05-38	Pulse Output Execution Mode	0-High Synchronization Mode, Small Pulse Output Delay, Large Output Frequency Fluctuation \\ 1-Stable Mode, Stable Pulse Output Frequency, but Large Delay	--	0	Stop and Restart	Anytime Setting	General User

P05-39	Z Pulse Dead Time	0~30000	0.01°	0.03	Stop and Restart	Anytime Setting	General User
P05-40	Home Reset Enable	<p>0-Disable Home Reset 1-Enable Home Reset Function via DI Input ORGSET Signal.</p> <p>2-Enable Electrical Home Return Function via DI Input ORGSET Signal</p> <p>3-Start Home Reset Immediately After Power-On.</p> <p>4-Perform Home Reset Immediately.</p> <p>5-Perform Electrical Home Return Immediately</p> <p>6-Set Current Position as Home</p>	--	0	Immediate Effect	Anytime Setting	General User
P05-41	Home Reset Mode	<p>0-Forward Homing, Deceleration Point is Home Switch</p> <p>1-Reverse Homing, Deceleration Point is Home Switch</p> <p>2-Forward Homing, Deceleration Point is Z Signal</p> <p>3-Reverse Homing, Deceleration Point is Z Signal</p> <p>4-Forward Homing, Deceleration Point is Home Switch Signal, Home is Z Signal</p> <p>5-Reverse Homing, Deceleration Point is Home Switch Signal, Home is Z Signal</p> <p>6-Forward Homing, Deceleration Point and Home are Forward Limit Switch</p> <p>7-Reverse Homing, Deceleration Point and Home are Reverse Limit Switch</p> <p>8-Forward Homing, Deceleration Point is Forward Limit Switch, Home is Z Signal</p>	--	0	Immediate Effect	Stop Setting	General User

		9-Reverse Homing, Deceleration Point is Reverse Limit Switch, Home is Z Signal 10-When P05-40=1, the current position can be set as Home via DI Trigger (32)					
P05-42	Home High-Speed Search Speed	0~3000	rpm	100	Immediate Effect	Anytime Setting	General User
P05-43	Home Low-Speed Search Speed	0~1000	rpm	10	Immediate Effect	Anytime Setting	General User
P05-44	Home Acceleration/Deceleration Time	0~1000	ms	1000	Immediate Effect	Anytime Setting	General User
P05-45	Home Search Time	0~65535	ms	50000	Immediate Effect	Anytime Setting	General User
P05-46	Home Offset and Limit Handling Mode	0~3 (bitwise) bit0-Whether Home is Offset. bit1-Whether to Reverse Home Search When Encountering Limit	--	0	Immediate Effect	Stop Setting	General User
P05-48	Home Mechanical Offset	-1073741824~1073741824	ins	0	Immediate Effect	Anytime Setting	General User
P05-50	Position Deviation Clear Action	0-Clear Position Deviation Count When Servo is Off and Fault Occurs 1-Clear Position Deviation Count When Fault Occurs 2-Clear Position Deviation Count via CLR Signal	--	0	Immediate Effect	Stop Setting	General User
P05-51	Position Completion Signal COIN Output Condition	0-Output When the Absolute Value of Position Deviation is Less Than the Position Completion Threshold (Object Dictionary 6067h for Bus Type) . 1-Output When the Absolute Value of Position Deviation is Less Than the Position Completion Threshold (Object Dictionary 6067h for Bus Type) and the Filtered	--	0	Immediate Effect	Anytime Setting	General User

		Position Command is 0. 2-Output When the Absolute Value of Position Deviation is Less Than the Position Completion Threshold (Object Dictionary 6067h for Bus Type) and the Unfiltered Position Command is 0.					
P05-52	Position Completion Threshold	1~65535	ins	1	Immediate Effect	Anytime Setting	General User
P05-53	Position Completion Approach Signal Threshold	1~65535	ins	10000	Immediate Effect	Anytime Setting	General User
P05-54	Position Completion Hold Time	0~30000	ms	0	Immediate Effect	Anytime Setting	General User
P05-56	Multi-Circle Absolute Position Offset (Lower 32 Bits)	0~1073741824	P	0	Immediate Effect	Stop Setting	General User
P05-58	Multi-Circle Absolute Position Offset (Upper 32 Bits)	0~1073741824	P	0	Immediate Effect	Stop Setting	General User
P05-60	Encoder Multi-Circle Data Offset	0~65535	P	0	Immediate Effect	Stop Setting	General User
P05-61	Multi-Circle Absolute Position Mechanical Gear Ratio Numerator (Mode 2)	1~65535	--	1	Immediate Effect	Stop Setting	General User
P05-62	Multi-Circle Absolute Position Mechanical Gear Ratio Denominator (Mode 2)	1~65535	--	1	Immediate Effect	Stop Setting	General User
P05-64	Multi-Circle Absolute Position Mechanical Absolute Position Upper Limit (Lower) (Mode 2)	0~1073741824	P	0	Immediate Effect	Stop Setting	General User
P05-66	Multi-Circle Absolute Position Mechanical Absolute Position Upper Limit (Upper) (Mode 2)	0~1073741824	P	0	Immediate Effect	Stop Setting	General User
P05-76	Z Signal Pulse Width	0~1000	250us	8 (Default 2ms)	Stop and Restart	Stop Setting	General User

9.6 P06 Speed Control Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P06-00	Speed Command Source	0-Speed Command A 1-Speed Command B 2-Speed Command A + Speed Command B 3-Speed Command A/Speed Command B Switching	--	0	Immediate Effect	Stop Setting	General User
P06-01	Speed Command A Source	0-User Parameter Setting	--	0	Immediate Effect	Stop Setting	General User
P06-02	Speed Command B Source	0-User Parameter Setting	--	0	Immediate Effect	Stop Setting	General User
P06-03	Digital Speed Command Setting Value	-6000~6000	rpm	200	Immediate Effect	Anytime Setting	General User
P06-04	Jog Speed Setting Value	0~6000	rpm	100	Immediate Effect	Anytime Setting	General User
P06-05	Speed Command Acceleration Ramp Time	0~65535	ms	200	Immediate Effect	Anytime Setting	General User
P06-06	Speed Command Deceleration Ramp Time	0~65535	ms	200	Immediate Effect	Anytime Setting	General User
P06-07	Maximum Rotational Speed Limit Value	0~6000	rpm	6000	Immediate Effect	Anytime Setting	General User
P06-08	Speed Forward Limit	0~6000	rpm	6000	Immediate Effect	Anytime Setting	General User
P06-09	Speed Reverse Limit	0~6000	rpm	6000	Immediate Effect	Anytime Setting	General User
P06-10	Torque Feedforward Enable	0-Do Not Use Torque Feedforward in Speed Loop. 1-Use Torque Feedforward in Speed Loop	--	1	Immediate Effect	Anytime Setting	General User

P06-11	Zero Speed Clamp/Zero Speed Fixed Command Threshold	0~6000	rpm	10	Immediate Effect	Anytime Setting	General User
P06-12	Rotation Detection Speed Threshold	0~1000	rpm	20	Immediate Effect	Anytime Setting	General User
P06-13	Speed Consistency Signal Width	0~100	rpm	10	Immediate Effect	Anytime Setting	General User
P06-14	Speed Arrival Signal Threshold	10~6000	rpm	1000	Immediate Effect	Anytime Setting	General User
P06-15	Zero Speed Output Signal Threshold	1~6000	rpm	10	Immediate Effect	Anytime Setting	General User

9.7 P07 Torque Control Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P07-00	Torque Command Selection	0-Torque Command A 1-Torque Command B 2-Torque Command A + Torque Command B 3-Torque Command A/B, Switchable 4-Communication Given (P31-10)	--	0	Immediate Effect	Stop Setting	General User
P07-01	Torque Command A Source	0-Internal Digital Given (P7-03)	--	0	Immediate Effect	Stop Setting	General User
P07-02	Torque Command B Source	0-Internal Digital Given (P7-03)	--	0	Immediate Effect	Stop Setting	General User
P07-03	Torque Command Keyboard Setting	-3000~3000	%	0	Immediate Effect	Anytime Setting	General User
P07-04	Torque Limit Source	0-Internal Torque Limit, using P7-05 and P7-06 for limitation.	--	0	Immediate Effect	Anytime Setting	General User

		<p>1-Torque Limit Switchable. Forward Torque Limit: P-CL selects P7-05/P7-07. Reverse Torque Limit: N-CL selects P7-06/P7-08.</p> <p>2-Use Analog Quantity/Object Dictionary to limit torque.</p> <p>3-Use Analog Quantity/Object Dictionary to limit torque. P-CL and N-CL respectively control whether to enable external torque limits P7-07 and P7-08. If external torque limits are enabled, the smaller value between the analog quantity and external torque is used for limitation.</p> <p>4-Torque Limit Switchable. Forward Torque Limit: P-CL selects P7-04/Analog Quantity (EtherCAT). Reverse Torque Limit: N-CL selects P7-05/Analog Quantity (EtherCAT).</p>					
P07-05	Forward Internal Torque Limit Value	0~3	Ratio	3.000	Immediate Effect	Anytime Setting	General User
P07-06	Reverse Internal Torque Limit Value	0~3	Ratio	3.000	Immediate Effect	Anytime Setting	General User
P07-07	Forward External Torque Limit Value	0~3	Ratio	3.000	Immediate Effect	Anytime Setting	General User
P07-08	Reverse External Torque Limit Value	0~3	Ratio	3.000	Immediate Effect	Anytime Setting	General User
P07-09	Torque Command Filter Time 1	0~3000	ms	0.8	Immediate Effect	Anytime Setting	General User

P07-10	Torque Command Filter Time 2	0~3000	ms	0.8	Immediate Effect	Anytime Setting	General User
P07-11	Emergency Stop Torque	0~3	Ratio	1.000	Immediate Effect	Stop Setting	General User
P07-12	Speed Limit Source Selection	0-Internal Speed Limit, P7-13 and P7-14 1-Pulse Type: Use Analog Quantity for Limitation; Bus Type: Use 607Fh Value for Limitation, 2-Forward and Reverse Speed Limits are the Same, Use V-SEL to Select Limit Value P7-13/P7-14	--	1	Immediate Effect	Anytime Setting	General User
P07-13	Internal Speed Forward Limit Value in Torque Control	0~6000	rpm	3000	Immediate Effect	Anytime Setting	General User
P07-14	Internal Speed Reverse Limit Value in Torque Control	0~6000	rpm	3000	Immediate Effect	Anytime Setting	General User
P07-15	Torque Arrival Reference Value	0~300.00	%	0.0	Immediate Effect	Anytime Setting	General User
P07-16	Torque Arrival Hysteresis	0~300.00	%	20.0	Immediate Effect	Anytime Setting	General User
P07-17	Speed Limit Judgment Time	0.5~300	ms	1.0	Immediate Effect	Anytime Setting	General User
P07-18	T-LMT Selection	0-AI1 1-AI2	--	0	Immediate Effect	Anytime Setting	Manufacturer Mode
P07-19	V-LMT Selection	0-AI1 1-AI2	--	1	Immediate Effect	Anytime Setting	Manufacturer Mode

9.8 P08 Analog Quantity Parameter Group

Function Code	Parameter Name	Setting Range	Unit	Factory Value	Effective Mode	Setting Mode	Setting Level
P08-00	Analog Speed Corresponding to 10V	0~6000	rpm	3000	Immediate Effect	Anytime Setting	General User
P08-01	Analog Torque Corresponding to 10V	0~300	%	100	Immediate Effect	Anytime Setting	General User
P08-02	AI1 Offset	-32768~32767	mv	0	Immediate Effect	Anytime Setting	General User
P08-03	AI1 Input Filter Time	0~65535	10us	200	Immediate Effect	Anytime Setting	General User
P08-04	Median Filter AI1 Input Enable	0-Disable 1-Enable	--	1	Immediate Effect	Anytime Setting	General User
P08-05	AI1 Dead Zone	-32768~32767	0.1mv	100	Immediate Effect	Anytime Setting	General User
P08-06	AI1 Zero Drift	-32768~32767	0.1mv	0	Immediate Effect	Anytime Setting	General User
P08-07	AI2 Offset	-32768~32767	mv	0	Immediate Effect	Anytime Setting	General User
P08-08	AI2 Input Filter Time	0~65535	10us	200	Immediate Effect	Anytime Setting	General User
P08-09	Median Filter AI2 Input Enable	0-Disable 1-Enable	--	1	Immediate Effect	Anytime Setting	General User
P08-10	AI2 Dead Zone	-32768~32767	0.1mv	100	Immediate Effect	Anytime Setting	General User
P08-11	AI2 Zero Drift	-32768~32767	0.1mv	0	Immediate Effect	Anytime Setting	General User

9.9 P09 Communication Control Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P09-00	Axis address	1~247	--	1	Effective immediately	Set anytime	Ordinary users
P09-01	RS232 baud rate setting	0-2400 1-4800 2-9600 3-19200 4-38400 5-57600 6-115200	100bps	5	Stop and restart	Set anytime	Ordinary users
P09-02	Parity check settings	0- 8-None-1 1- 8-Even-1 2- 8-Odd-1 3- 8-None-2 4- 8-Even-2 5- 8-Odd-2 8- 9-None-1 9- 9-Even-1 10- 9-Odd-1 11- 9-None-2 12- 9-Even-2 13- 9-Odd-2	--	0	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P09-03	Modbus communication error code	0- No errors 1- command error, unsupported command code 2- Address error, accessed illegal address 3- Data value error, illegal data written 4- Slave equipment failure, slave data processing error 5- command received correctly, but command execution is incomplete 6- The device is busy and unable to respond to the current frame 8- Verification error, received data frame verification error from the slave station 10- No access permission, currently not authorized to access registers 11- Incorrect data length, incorrect access length 12 frame error, receiving frame error from the slave station 13- Other errors	--	0	read-only	read-only	Ordinary users
P09-04	EtherCAT Slave Name	0~65535	--	0	read-only	read-only	Ordinary users
P09-05	EtherCAT Slave Alias	0~65535	--	0	Effective immediately	Stop setting	Ordinary users
P09-06	AL status code	0~65535	--	0	read-only	read-only	Ordinary users
P09-08	FPGA synchronization mode selection	0-asynchronous 1-MCU calculation synchronous control 2-FPGA self synchronization	--	2	Effective immediately	Stop setting	Manufacturer mode
P09-09	EtherCAT synchronization point	0~65535	--	0	Stop and restart	Set anytime	Manufacturer mode

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P09-10	FPGA synchronous detection deviation threshold	100~4000	ns	3000	Effective immediately	Stop setting	Ordinary users
P09-11	XML version	0~65535	--	0	read-only	read-only	Ordinary users
P09-12	EtherCAT state machine	0~65535	--	0	read-only	read-only	Ordinary users
P09-13	SDO writing Eeprom switch	0-Prohibit SDO from writing parameters 1. Enable SDO to write user parameters object group 2000h 2- Prohibit SDO from writing object groups for 6000h 3- Allow SDO to write user parameters object group 2000h and 6000h	--	3	Effective immediately	Randomly set	Ordinary users
P09-14	Number of synchronization losses	0~65535	--	0	read-only	read-only	Ordinary users
P09-15	EtherCAT synchronization interrupt loss allowed amount	1~20	--	9	Effective immediately	Randomly set	Ordinary users
P09-16	Port 0 invalid/incorrect frame count	0- Port 0 Invalid Frame Count 1- Port 0 Error Frame Count	--	0	read-only	read-only	Ordinary users
P09-17	Port 1 invalid/incorrect frame count	0- Port 1 Invalid Frame Count 1- Port 1 Error Frame Count	--	0	read-only	read-only	Ordinary users
P09-18	Port forward error count	0-port 0 forward error count 1- Port 1 forward error count	--	0	read-only	read-only	Ordinary users
P09-19	Processing unit and PDI error count	0- processing unit error count 1 -PDI error count	--	0	read-only	read-only	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P09-20	Port loss count	0-Port 0 Loss Count 1- Port 1 loss count	--	0	read-only	read-only	Ordinary users
P09-21	EtherCAT Master Station Selection	0~3	--	2	Stop and restart	Stop setting	Ordinary users
P09-22	Location cache selection	0~1	--	0	Effective immediately	Stop setting	Ordinary users
P09-23	CSP position command increment too large threshold	1~7	--	3	Effective immediately	Set anytime	Ordinary users
P09-24	CSP position command increment too large times	0~65535	--	0	read-only	read-only	Ordinary users
P09-25	Whether to use VDI or not	0~1	--	0	Effective immediately	Stop setting	Ordinary users
P09-26	VDI default value after power on	0~65535	--	0	Stop and restart	Set anytime	Ordinary users
P09-27	Do you use VDO	0~1	--	0	Effective immediately	Stop setting	Ordinary users
P09-28	Default value when VDO function selection is 0	0~65535	--	0	Effective immediately	Stop setting	Ordinary users
P09-29	CAN baud rate setting	0- 20kHz 1- 50kHz 2- 100kHz 3- 125kHz 4- 250kHz 5- 500kHz 7- 1000kHz		5	Stop and restart	Set anytime	Ordinary users
P09-32	Effective method of 485 communication parameters	0-Restart after modifying 485 parameters to take effect 1. Effective immediately after modifying the 485 parameter		0	Stop and restart	Set anytime	Ordinary users

9.10 P0A Stop Control Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0A-00	Servo OFF Stop mode	0-Free Stop 1-Zero speed Stop 2-Zero speed Stop, maintain DB status after Stop 3-DB Stop, maintain DB status after Stop	--	0	Effective immediately	Stop setting	Ordinary users
P0A-01	Type 1 fault Stop method	0-Free Stop 1-DB Stop, free operation after Stop 2-DB Stop, maintain DB status after Stop	--	0	Effective immediately	Stop setting	Ordinary users
P0A-02	Type 2 fault Stop method	0-Free Stop 1-Zero speed Stop 2-Zero speed Stop, maintain DB status after Stop 3-DB Stop, maintain DB status after Stop 4-DB Stop, free operation after Stop	--	0	Effective immediately	Stop setting	Ordinary users
P0A-03	Over travel stop mode	0-Free Stop 1-Zero speed Stop 2-Zero speed Stop, free operation after Stop	--	1	Effective immediately	Stop setting	Ordinary users
P0A-04	Over travel Stop speed switch threshold	10~6000	rpm	6000	Effective immediately	Stop setting	Ordinary users
P0A-05	Enable zero speed Stop when power off	0~1	--	0	Effective immediately	Stop setting	Ordinary users
P0A-06	Stop zero speed threshold	10~6000	rpm	100	Effective immediately	Stop setting	Ordinary users
P0A-07	Servo on signal filtering time	0~64	ms	0	Effective immediately	Stop setting	Ordinary users
P0A-09	Delay in receiving brake opening command	40~500	ms	250	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0A-10	Brake closing time	1~1000	ms	150	Effective immediately	Set anytime	Ordinary users
P0A-11	Brake safety speed	0~3000	rpm	30	Effective immediately	Set anytime	Ordinary users
P0A-12	The longest waiting time for the brake to close after the servo is turned off	1~1000	ms	500	Effective immediately	Set anytime	Ordinary users
P0A-13	DB release completion time	20~2000	ms	60	Effective immediately	Randomly set	Ordinary users

9.11 P0B Fault and Protection Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0B-00	LED warning display selection	0-Warning Display 1- Warning not displayed	--	0	Effective immediately	Stop setting	Ordinary users
P0B-01	Enable fault record storage	0-Fault record storage enable 1- Fault record storage disabled	--	0	Effective immediately	Randomly set	Manufacturer mode
P0B-02	Selection of power input phase loss protection	0-Enable phase loss fault, prohibit phase loss warning 1. Enable phase loss fault, enable phase loss warning 2- Prohibit phase loss faults and phase loss warnings	--	0	Effective immediately	Stop setting	Ordinary users
P0B-03	Drive over temperature protection point	0~1000	0.1°C	900	Stop and restart	Stop setting	Manufacturer mode
P0B-04	IGBT over temperature threshold	0~2000	0.1°C	950	Effective immediately	Set anytime	Manufacturer mode

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0B-05	Overload alarm disabled	0-Enable overload alarm 1. Turn off the motor overload alarm 2- Turn off the driver overload alarm 3- Turn off motor overload and driver overload alarms	--	0	Effective immediately	Stop setting	Ordinary users
P0B-06	Motor overload level	0~400	%	0	Effective immediately	Stop setting	Ordinary users
P0B-07	Motor overload protection gain	50~300	%	100	Effective immediately	Stop setting	Ordinary users
P0B-08	Blockage alarm enabled	0~1	--	1	Effective immediately	Set anytime	Ordinary users
P0B-09	Duration of blockage detection	10~65535	ms	200	Effective immediately	Set anytime	Ordinary users
P0B-10	Car protection selection	0- no sudden speed alarm 1. Enable the sudden speed alarm	--	1	Effective immediately	Set anytime	Ordinary users
P0B-11	Maximum pulse input frequency for position	100~4000	KHz	4000	Effective immediately	Stop setting	Ordinary users
P0B-12	Excessive position deviation fault threshold	1~1073741824	ins	3145728	Effective immediately	Set anytime	Ordinary users
P0B-15	Software location restriction settings	0- Do not enable software location restrictions 1. Enable software location restrictions 2-Enable software position limit after origin regression	--	0	Effective immediately	Stop setting	Ordinary users
P0B-16	Over speed determination threshold	0~10000	rpm	0	Stop and restart	Set anytime	Ordinary users
P0B-17	Encoder multi loop overflow fault prohibited	0~1	--	0	Effective immediately	Stop setting	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0B-19	SIGN signal disturbance warning threshold	0~65535	ins	5	Effective immediately	Set anytime	Ordinary users
P0B-20	SIGN signal disturbance error threshold	0~65535	ins	100	Effective immediately	Set anytime	Ordinary users
P0B-27	Custom warning switch for motor	0- Customize motor does not alarm 1- Customize click alarm	--	1	Effective immediately	Set anytime	Ordinary users
P0B-28	Motor mismatch detection	0- Enable motor mismatch detection 1- Prohibition of motor mismatch detection	--	0	Effective immediately	Set anytime	Ordinary users
P0B-29	Can the alarm selection be cleared when the servo is turned on	0- Cannot clear alarm 1- Clearable alarms can be cleared when the servo is turned on	--	0	Effective immediately	Set anytime	Ordinary users
P0B-30	Main circuit charging time	0~30000 When the setting value is 30000, AL.073 alarm can be blocked	ms	0	Stop and restart	Set anytime	Ordinary users
P0B-31	Multiple position DI false triggering alarm shielding	0~1	--	0	Restart to take effect	Stop setting	Ordinary users

9.12 P0C multi-stage position control parameter group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0C-00	Multi position operation mode	0-End of single run Stop 1-Loop operation 2-DI switch operation 3- Sequential operation (without delay between segments)	--	1	Effective immediately	Stop setting	Ordinary users
P0C-01	Selection of displacement execution segments	1~16	--	2	Effective immediately	Stop setting	Ordinary users
P0C-02	Remaining processing method	0- Include in the next paragraph 1. Enter the next paragraph and ignore the remaining amount in this paragraph	--	0	Effective immediately	Stop setting	Ordinary users
P0C-03	Waiting time unit	0-milliseconds (ms) 1-second (s)	--	1	Effective immediately	Stop setting	Ordinary users
P0C-04	Selection of displacement command type	0-Relative displacement 1- Absolute displacement	--	0	Effective immediately	Stop setting	Ordinary users
P0C-05	Selection of starting segment for loop mode	0~16	--	0	Effective immediately	Stop setting	Ordinary users
P0C-10 ~ P0C-40	The displacement of the i-th (1-16) segment	-1073741825~1073741824	ins	0	Effective immediately	Set anytime	Ordinary users
P0C-42 ~ P0C-57	Moving speed of section i (1-16)	1~6000	rpm	200	Effective immediately	Set anytime	Ordinary users
P0C-58 ~ P0C-73	The acceleration and deceleration time of the i-th (1-16) segment movement	0~65535	ms	1	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0C-74 ~ P0C-89	Waiting time after the completion of the i-th (1-16) segment shift	0~10000	Ms or s (unit determined by P0C-03)	10	Effective immediately	Set anytime	Ordinary users

9.13 P0D multi segment speed control parameters

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0D-00	Multi segment speed command operation mode	0-Single run, Stop upon completion of run 1-Loop operation 2. switch operation interruption through external DI signal	--	1	Effective immediately	Stop setting	Ordinary users
P0D-01	Selection of End Segment Number for Speed Command	1~16	--	16	Effective immediately	Stop setting	Ordinary users
P0D-02	Selection of Running Time Unit	0-0.1s 1-0.1min	--	0	Effective immediately	Stop setting	Ordinary users
P0D-05	Acceleration time 1	0~65535	ms	10	Effective immediately	Stop setting	Ordinary users
P0D-06	Acceleration time 2	0~65535	ms	10	Effective immediately	Stop setting	Ordinary users
P0D-07	Acceleration time 3	0~65535	ms	50	Effective immediately	Stop setting	Ordinary users
P0D-08	Acceleration time 4	0~65535	ms	50	Effective immediately	Set anytime	Ordinary users
P0D-10	Deceleration time 1	0~65535	ms	100	Effective immediately	Set anytime	Ordinary users
P0D-11	Deceleration time 2	0~65535	ms	100	Effective immediately	Set anytime	Ordinary users
P0D-12	Deceleration time 3	0~65535	ms	150	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0D-13	Deceleration time 4	0~65535	ms	150	Effective immediately	Set anytime	Ordinary users
P0D-20	The first segment command	-6000~6000	rpm	0	Effective immediately	Set anytime	Ordinary users
P0D-21	The second segment command	-6000~6000	rpm	100	Effective immediately	Set anytime	Ordinary users
P0D-22	The third segment command	-6000~6000	rpm	300	Effective immediately	Set anytime	Ordinary users
P0D-23	The fourth segment command	-6000~6000	rpm	500	Effective immediately	Stop setting	Ordinary users
P0D-24	The 5th segment command	-6000~6000	rpm	700	Effective immediately	Stop setting	Ordinary users
P0D-25	The 6th segment command	-6000~6000	rpm	900	Effective immediately	Stop setting	Ordinary users
P0D-26	The 7th segment command	-6000~6000	rpm	600	Effective immediately	Stop setting	Ordinary users
P0D-27	The 8th segment command	-6000~6000	rpm	300	Effective immediately	Stop setting	Ordinary users
P0D-28	The 9th segment command	-6000~6000	rpm	100	Effective immediately	Stop setting	Ordinary users
P0D-29	The 10th segment command	-6000~6000	rpm	-100	Effective immediately	Stop setting	Ordinary users
P0D-30	The 11th segment command	-6000~6000	rpm	-300	Effective immediately	Stop setting	Ordinary users
P0D-31	The 12th segment command	-6000~6000	rpm	-500	Effective immediately	Stop setting	Ordinary users
P0D-32	The 13th segment command	-6000~6000	rpm	-700	Effective immediately	Stop setting	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0D-33	The 14th segment command	-6000~6000	rpm	-900	Effective immediately	Stop setting	Ordinary users
P0D-34	The 15th segment command	-6000~6000	rpm	-600	Effective immediately	Stop setting	Ordinary users
P0D-35	The 16th segment command	-6000~6000	rpm	-300	Effective immediately	Stop setting	Ordinary users
P0D-40~ P0D-55	The running time of the i-th (1-16) segment	0~65535	0.1s(min)	50	Effective immediately	Stop setting	Ordinary users
P0D-60 ~ P0D-75	Acceleration and deceleration time of segment i (1-16)	0- Zero acceleration and deceleration time 1- Acceleration and deceleration time 1 2- Acceleration and deceleration time 2 3- Acceleration and deceleration time 3 4- Acceleration and deceleration time 4	1	0	Effective immediately	Stop setting	Ordinary users

9.14 P0E adaptive adjustment parameter group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0E-00	Adaptive filter working mode	<p>0- No operation</p> <p>1. Enable an adaptive notch filter to automatically update filter parameters</p> <p>2- Enable two adaptive notch filters to automatically update filter parameters</p> <p>3- Only identify the resonance frequency without updating the notch filter</p> <p>4. Reset the parameters of the adaptive notch filter</p>	--	0	Effective immediately	Set anytime	Ordinary users
P0E-01	Frequency of notch filter 1	50~4000	Hz	4000	Effective immediately	Set anytime	Ordinary users
P0E-02	Bandwidth of notch filter 1	0~20	--	2	Effective immediately	Set anytime	Ordinary users
P0E-03	Attenuation level of notch filter 1	0~99	--	0	Effective immediately	Set anytime	Ordinary users
P0E-04	Frequency of notch filter 2	50~4000	Hz	4000	Effective immediately	Set anytime	Ordinary users
P0E-05	Notch filter 2 bandwidth	0~20	--	2	Effective immediately	Set anytime	Ordinary users
P0E-06	Attenuation level of notch filter 2	0~99	--	0	Effective immediately	Set anytime	Ordinary users
P0E-07	Adaptive notch filter 1 frequency	50~4000	Hz	4000	Effective immediately	Set anytime	Ordinary users
P0E-08	Adaptive notch filter 1 bandwidth	0~20	--	2	Effective immediately	Set anytime	Ordinary users
P0E-09	Adaptive notch filter 1 attenuation level	0~99	--	0	Effective immediately	Set anytime	Ordinary users
P0E-10	Adaptive notch filter 2 frequency	50~4000	Hz	4000	Effective immediately	Set anytime	Ordinary users
P0E-11	Adaptive notch filter 2 bandwidth	0~20	--	2	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0E-12	Adaptive notch filter 2 attenuation level	0~99	--	0	Effective immediately	Set anytime	Ordinary users
P0E-13	resonance frequency	0~4000	Hz	0	read-only	read-only	Ordinary users
P0E-20	Disturbance observer gain	-1000~1000	A/rpm	0	Effective immediately	Set anytime	Ordinary users
P0E-21	Disturbance observer filtering time	0~2500	0.01ms	50	Effective immediately	Set anytime	Ordinary users
P0E-22	Torque compensation value	-1000~1000	%	0	Effective immediately	Set anytime	Ordinary users
P0E-23	forward friction compensation	-1000~1000	%	0	Effective immediately	Set anytime	Ordinary users
P0E-24	Reverse friction compensation	-1000~1000	%	0	Effective immediately	Set anytime	Ordinary users
P0E-25	Low frequency vibration suppression mode	0-Manually set low-frequency suppression parameters 1. Automatic identification of low-frequency suppression parameters	--	0	Effective immediately	Set anytime	Ordinary users
P0E-26	Low frequency resonance frequency A	10~1000	0.1Hz	1000	Effective immediately	Stop setting	Ordinary users
P0E-27	Low frequency suppression width	0~10	--	2	Effective immediately	Stop setting	Ordinary users
P0E-28	Low frequency vibrate Ratio of denominator /numerator frequency	0~30	--	12	Effective immediately	Stop setting	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0E-29	Servo low-frequency vibration position deviation judgment threshold	0~1000	--	5	Effective immediately	Set anytime	Ordinary users
P0E-35	Self tuning response level	0-low response mode 1-Medium response mode 2-High response mode	--	1	Effective immediately	Set anytime	Ordinary users
P0E-36	Self tuning vibration determination threshold	0~1000	%	20	Effective immediately	Set anytime	Ordinary users
P0E-37	Self tuning external load operation mode	0-Disable self-tuning function 1- Trajectory mode 2-Positioning mode	--	1	Effective immediately	Set anytime	Ordinary users
P0E-38	Self setting operating distance	0~2147483647	ins	40000	Effective immediately	Set anytime	Ordinary users
P0E-40	Self setting operating speed	0~3000	rpm	400	Effective immediately	Set anytime	Ordinary users
P0E-41	Self setting acceleration and deceleration time	0~20000	ms	100	Effective immediately	Set anytime	Ordinary users
P0E-42	Self setting waiting time	0~20000	ms	500	Effective immediately	Set anytime	Ordinary users
P0E-45	Online inertia identification mode	0- Do not enable online inertia identification 1. Enable online inertia identification, with the load inertia remaining basically unchanged 2- Enable online inertia identification, with slow changes in load inertia 3- Enable online inertia identification, with fast changes in load inertia	--	0	Effective immediately	Set anytime	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P0E-46	Offline inertia identification mode	0-Triangular wave velocity mode 1- Free jog mode	--	0	Effective immediately	Stop setting	Ordinary users
P0E-47	Offline inertia identification speed amplitude	100~1000	rpm	500	Effective immediately	Stop setting	Ordinary users
P0E-48	Offline inertia identification acceleration and deceleration time	20~800	ms	125	Effective immediately	Stop setting	Ordinary users
P0E-49	Inertia identification waiting time	50~10000	ms	800	Effective immediately	Stop setting	Ordinary users
P0E-50	Offline inertia identification of travel cycles	0~65535	0.01 circle	0	Effective immediately	Set anytime	Ordinary users
P0E-60	Torque gravity compensation value	-1000~1000	%	0	Effective immediately	Set anytime	Ordinary users
P0E-61	Friction Compensation Time Coefficient	0~2000	--	0	Effective immediately	Stop setting	Ordinary users

9.15 P10 motor parameter group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P10-00	Motor model record	0- 40HK_A00330	--	0	Stop and restart	Set anytime	R&D personnel
		1- 60HK_A00630					
		2- 60HK_A01330					
		3- 60HK_A01930					
		4- 80HK_A02430					
		5- 80HK_A03230					
		6- 80HK_A03825					
		7- 130HK_A04830					
		8- 130HK_A07220					
		9- 130HK_A09620					
		10- 180HK_A19015					
		11- 180HK_A28015					
		12- 180HK_A35015					
		13- 180HK_A48015					
		100- 80ZK_A02430					
101- 80ZK_B02430							
102- 60ZK_A01330							
103- 60ZK_A01330_B							

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P10-01	Alternative motor models	1- 40HK_A00330 14- 60HK_A00630 15- 60HK_A01330 16- 60HK_A01930 17- 80HK_A02430 18- 80HK_A03230 19- 80HK_A03825 20- 130HK_A04830 21- 130HK_A07220 22- 130HK_A09620 23- 180HK_A19015 24- 180HK_A28015 25- 180HK_A35015 26- 180HK_A48015 104- 80ZK_A02430 105- 80ZK_B02430 106- 60ZK_A01330 107- 60ZK_A01330_B	--	0	Stop and restart	Set anytime	R&D personnel
P10-02	Encoder type	0-Tamagawa Linear Incremental Encoder 1- Tamagawa incremental encoder 16 -Tamagawa Absolute Encoder 32- Rotary Encoder 48- Grating encoder	--	16	Stop and restart	Stop setting	Manufacturer mode
P10-04	Single cycle pulse count of motor	1~1073741824	p	1	Stop and restart	Stop setting	Manufacturer mode
P10-06	Rated voltage	0-220V 1-380V	--	0	Stop and restart	Stop setting	Manufacturer mode
P10-07	Rated power	0~65535	10W	75	Stop and restart	Stop setting	Manufacturer mode
P10-08	Rated current	0~65535	0.01A	470	Stop and restart	Stop setting	Manufacturer mode

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P10-09	Rated torque	0~65535	0.01Nm	239	Stop and restart	Stop setting	Manufacturer mode
P10-10	Rated speed	0~65535	rpm	3000	Stop and restart	Stop setting	Manufacturer mode
P10-11	Maximum torque	0~65535	0.01Nm	seven hundred and sixteen	Stop and restart	Stop setting	Manufacturer mode
P10-12	Maximum speed	0~65535	rpm	6000	Stop and restart	Stop setting	Manufacturer mode
P10-13	Mechanical constant	0~65535	0.01ms	24	Stop and restart	Stop setting	Manufacturer mode
P10-14	Electrical constant	0~65535	0.01ms	654	Stop and restart	Stop setting	Manufacturer mode
P10-15	Torque coefficient	0~65535	0.01mV/Arms	51	Stop and restart	Stop setting	Manufacturer mode
P10-16	Moment of inertia	0~65535	kg.mm ²	130	Stop and restart	Stop setting	Manufacturer mode
P10-17	Extreme logarithm	0~65535	--	4	Stop and restart	Stop setting	Manufacturer mode
P10-18	Phase resistance	0~65535	mΩ	500	Stop and restart	Stop setting	Manufacturer mode
P10-19	Q-axis inductance	0~65535	mH	327	Stop and restart	Stop setting	Manufacturer mode
P10-20	D-axis inductance	0~65535	mH	387	Stop and restart	Stop setting	Manufacturer mode
P10-21	reverse electromotive force coefficient	0~65535	0.01mV/rpm	3330	Stop and restart	Stop setting	Manufacturer mode
P10-22	Z signal corresponds to electrical angle	0~3600	0.1°	1800	Stop and restart	Stop setting	Manufacturer mode
P10-24	positive direction of current	0-Flow into motor, flow out servo is positive 1- Flow out of the motor, flow into the servo is positive	--	0	Stop and restart	Stop setting	R&D personnel

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P10-25	Encoder forward direction	0- counterclockwise is positive 1- Clockwise is positive	--	0	Stop and restart	Stop setting	R&D personnel
P10-26	Vw exchange	0~1	--	0	Stop and restart	Set anytime	R&D personnel

9.16 P11 Driver Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P11-00	Driver model	3-S8P-400; 5-S8P-750; 3-S8P-400; 5-S8N-750	--	five	Stop and restart	Stop setting	R&D personnel
P11-02	Rated voltage	0~65535	V	220	read-only	read-only	Manufacturer mode
P11-03	Rated power	1~65535	10W	75	read-only	read-only	Manufacturer mode
P11-04	Rated current	1~65535	0.01A	550	read-only	read-only	Manufacturer mode
P11-05	Maximum current	1~65535	0.01A	1690	read-only	read-only	Manufacturer mode
P11-06	Bus under voltage threshold	0~900	V	200	Stop and restart	Stop setting	Manufacturer mode
P11-07	Bus over voltage voltage threshold	0~900	V	395	Stop and restart	Stop setting	Manufacturer mode
P11-08	Bus voltage discharge threshold	0~900	V	375	Stop and restart	Stop setting	Manufacturer mode
P11-09	Dead Time	1~2000	0.01us	200	Stop and restart	Stop setting	Manufacturer mode
P11-10	Dead zone compensation amount	0~2000	0.01us	200	Stop and restart	Set anytime	Manufacturer mode
P11-11	Dead zone compensation inflection point	0~2000	0.01A	20	Stop and restart	Set anytime	Manufacturer mode

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P11-12	Minimum duration of zero vector	0~6250	0.01us	960	Stop and restart	Set anytime	R&D personnel
P11-13	Enable local mode	0~1	--	0	Effective immediately	Stop setting	Ordinary users
P11-14	Current loop D-axis gain Kp	0~65535	--	2000	Effective immediately	Set anytime	Manufacturer mode
P11-15	Integral coefficient Ki of current loop D-axis	0~65535	Q7	256	Effective immediately	Set anytime	Manufacturer mode
P11-16	Current loop Q-axis gain Kp	0~65535	--	2000	Effective immediately	Set anytime	Manufacturer mode
P11-17	Current loop Q-axis integral coefficient Ki	0~65535	Q7	128	Effective immediately	Set anytime	Manufacturer mode
P11-18	Current loop D-axis gain Kp2	0~65535	--	1000	Effective immediately	Set anytime	Manufacturer mode
P11-19	Integration coefficient Ki2 of current loop D-axis	0~65535	Q7	200	Effective immediately	Set anytime	Manufacturer mode
P11-20	Current loop Q-axis gain Kp2	0~65535	--	1000	Effective immediately	Set anytime	Manufacturer mode
P11-21	Current loop Q-axis integral coefficient Ki2	0~65535	Q7	100	Effective immediately	Set anytime	Manufacturer mode
P11-22	Current loop gain coefficient Kp2Cef	0~10000	Q10	1024	Effective immediately	Set anytime	Manufacturer mode
P11-23	Current loop gain coefficient Kp3Coef	0~10000	Q10	1024	Effective immediately	Set anytime	Manufacturer mode
P11-24	Current loop gain switch point 1 current	0~3000	%	10	Effective immediately	Set anytime	Manufacturer mode
P11-25	Current loop gain switch point 2 current	0~3000	%	20	Effective immediately	Set anytime	Manufacturer mode

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P11-26	Current loop gain switch point 3 current	0~3000	%	1000	Effective immediately	Set anytime	Manufacturer mode
P11-27	Current loop gain switch point 4 current	0~3000	%	2000	Effective immediately	Set anytime	Manufacturer mode
P11-28	D-axis back electromotive force compensation coefficient	0~65535	0.1%	600	Effective immediately	Set anytime	Manufacturer mode
P11-29	Q-axis back electromotive force compensation coefficient	0~65535	0.1%	1000	Effective immediately	Set anytime	Manufacturer mode
P11-30	Voltage decoupling resistance effect failure	0-Enable 1- Disability	--	0	Stop and restart	Set anytime	Manufacturer mode
P11-31	Voltage decoupling inductance effect failure	0-Enable 1- Disability	--	0	Stop and restart	Set anytime	Manufacturer mode
P11-32	Voltage decoupling back electromotive force effect incapacitation	0-Enable 1- Disability	--	0	Stop and restart	Set anytime	Manufacturer mode
P11-33	Voltage decoupling disabling control	0-Enable 1- Disability	--	0	Stop and restart	Set anytime	Manufacturer mode
P11-34	Maximum sampling current	1~65535	0.01A	1200	Stop and restart	Set anytime	R&D personnel
P11-35	Phase overcurrent detection threshold	0~10000	0.01A	1800	Stop and restart	Set anytime	Manufacturer mode
P11-36	UVW over current detection filtering time	0~60000	0.1us	96	Stop and restart	Set anytime	Manufacturer mode
P11-37	Power failure detection mode	0-Bus phase loss detection 1. Control voltage detection	--	0	Effective immediately	Set anytime	R&D personnel

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P11-38	Single phase electrical input allowed	0- Prohibited 1- Allow	--	0	Stop and restart	Set anytime	R&D personnel
P11-39	FOC calculation time	100~10000	0.01us	260	Stop and restart	Set anytime	R&D personnel
P11-40	MCU current command processing time	0~6000	0.01us	5500	Stop and restart	Set anytime	R&D personnel
P11-41	Bus encoder data transmission compensation time	0~1000	0.01us	0	Stop and restart	Set anytime	R&D personnel
P11-42	Absolute encoder command transmission interval	0~65535	--	3120	Stop and restart	Set anytime	R&D personnel
P11-47	Minimum allowable energy consumption resistance of the driver	1~1000	Ω	40	Stop and restart	Set anytime	R&D personnel
P11-48	Built in energy consumption resistor, power capacity	1~65535	W	40	Stop and restart	Set anytime	R&D personnel
P11-49	Built in energy consumption resistor resistance value	1~1000	Ω	50	Stop and restart	Set anytime	R&D personnel
P11-50	Resistance heat dissipation coefficient	10~100	--	30	Stop and restart	Stop setting	Manufacturer mode
P11-51	Maximum regeneration time	0~30000	ms	3000	Stop and restart	Set anytime	Manufacturer mode
P11-52	carrier frequency	4000~20000	Hz	8000	Stop and restart	Set anytime	R&D personnel

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P11-53	Current sampling mode	0-Trigger Sampling 1- Continuous sampling	--	0	Stop and restart	Set anytime	R&D personnel
P11-54	PWM immediate update enable	0- Not enabled, updated twice per carrier wave period 1- Enable, update immediately	--	1	Stop and restart	Set anytime	R&D personnel
P11-55	Frequency selection for current loop modulation	0~1	--	0	Stop and restart	Set anytime	R&D personnel
P11-56	Speed loop scheduling frequency division coefficient	0-The current loop and carrier frequency are consistent 1-The current loop frequency is twice the carrier frequency	--	1	Stop and restart	Set anytime	R&D personnel
P11-57	Frequency division coefficient for position loop scheduling	2~128	--	4	Stop and restart	Set anytime	R&D personnel
P11-58	Maximum allowable duration of et1100 NWAIT signal	0~204	0.1us	12	Stop and restart	Set anytime	R&D personnel
P11-59	Driver load rate filtering time constant	0~10000	0.1s	300	Stop and restart	Set anytime	R&D personnel
P11-76	Enable bus voltage filtering	0		0	Effective immediately	Set anytime	R&D personnel
P11-77	Number of bus voltage filtering cycles	1~20	125us	1	Restart to take effect	Stop setting	R&D personnel

9.17 P12 Auxiliary Function Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P12-00	Servo restart	0- No operation 1. Servo restart 2. User parameter reset to factory settings	--	0	Effective immediately	Stop setting	Ordinary users
P12-01	Alarm clearing	0- No operation 1. Clear the current alarm (this operation cannot be operated when the internal enable or son input is ON) 2- Clear alarm records	--	0	Effective immediately	Stop setting	Ordinary users
P12-02	JOG enable	0~6000	rpm	0	Effective immediately	Set anytime	Ordinary users
P12-03	Inertia identification	0~65	--	0	Effective immediately	Set anytime	Ordinary users
P12-04	Absolute encoder reset operation	0- No operation 1-Absolute encoder alarm reset 2-Absolute encoder reset 3- Single circle data reset	--	0	Effective immediately	Stop setting	Ordinary users

9.18 P13 Monitoring Parameter Group

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P13-00	Servo operation status	0-Servo not ready 1- Servo ready 2- Servo operation 3- Servo malfunction	--	0	read-only	read-only	Ordinary users
P13-01	Alarm ID	0~65535	--	0	read-only	read-only	Ordinary users
P13-02	motor speed	-32767~32767	rpm	0	read-only	read-only	Ordinary users
P13-03	Speed command	-32767~32767	rpm	0	read-only	read-only	Ordinary users
P13-04	Torque command	-32767~32767	%	0	read-only	read-only	Ordinary users
P13-05	Torque feedback	-32767~32767	%	0	read-only	read-only	Ordinary users
P13-10	Command pulse counting	-2147483648~2147483647	ins	0	read-only	read-only	Ordinary users
P13-12	Input pulse count	-2147483648~2147483647	ins	0	read-only	read-only	Ordinary users
P13-14	Feedback pulse counting	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-16	Position deviation (command unit)	-2147483648~2147483647	ins	0	read-only	read-only	Ordinary users
P13-18	Position deviation (encoder unit)	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-20	Command pulse speed	-32767~32767	rpm	0	read-only	read-only	Ordinary users
P13-21	Bus voltage	-32767~32767	0.1V	0	read-only	read-only	Ordinary users
P13-22	Control the bus voltage	0~65535	0.1V	0	read-only	read-only	Ordinary users
P13-23	Phase current	0~65535	0.01A	0	read-only	read-only	Ordinary users
P13-24	Effective value of driver output line voltage	0~65535	0.1V	0	read-only	read-only	Ordinary users
P13-25	Driver temperature	0~65535	0.1°C	0	read-only	read-only	Ordinary users
P13-26	IGBT temperature	0~2000	0.1°C	0	read-only	read-only	Ordinary users
P13-27	Driver load rate	0~10000	%	0	read-only	read-only	Ordinary users
P13-28	Motor load rate	0~8000	%	0	read-only	read-only	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P13-29	Input signal monitoring DI	0~65535	--	0	read-only	read-only	Ordinary users
P13-30	Output signal monitoring DO	0~65535	--	0	read-only	read-only	Ordinary users
P13-31	Electrical angle	0~3600	0.1°	0	read-only	read-only	Ordinary users
P13-32	Encoder single turn position	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-34	Encoder multi turn position	0~65535	circle	0	read-only	read-only	Ordinary users
P13-36	Mechanical absolute position counting (command unit)	-2147483648~2147483647	ins	0	read-only	read-only	Ordinary users
P13-38	Mechanical absolute position is low 32 bits (encoder unit)	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-40	Mechanical absolute position is high 32 bits (encoder unit)	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-42	Rotating load single turn position (command unit)	0~2147483647	ins	0	read-only	read-only	Ordinary users
P13-44	Rotating load single turn position is low 32 bits (encoder unit)	0~2147483647	p	0	read-only	read-only	Ordinary users
P13-46	Rotating load single turn position is high 32 bits (encoder unit)	0~2147483647	p	0	read-only	read-only	Ordinary users
P13-48	Encoder position is low by 32 bits	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-50	Encoder position is high 32 bits	-2147483648~2147483647	p	0	read-only	read-only	Ordinary users
P13-52	AI1 sampling voltage	-32767~32767	mV	0	read-only	read-only	Ordinary users
P13-53	AI2 sampling voltage	-32767~32767	mV	0	read-only	read-only	Ordinary users
P13-54	AI3 sampling voltage	-32767~32767	mV	0	read-only	read-only	Ordinary users
P13-55	Load inertia ratio	0~65535	%	0	read-only	read-only	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P13-56	External load torque	-1000~1000	%	0	read-only	read-only	Ordinary users
P13-57	Fault record index	0~9	--	0	read-only	read-only	Ordinary users
P13-58	Fault code	0~65535	--	0	read-only	read-only	Ordinary users
P13-60	Selected fault timestamp low bit	0~2147483647	0.1s	0	read-only	read-only	Ordinary users
P13-62	Speed at selected fault	-32767~32767	rpm	0	read-only	read-only	Ordinary users
P13-63	U-phase current during selected fault	-32767~32767	0.01A	0	read-only	read-only	Ordinary users
P13-64	V-phase current during selected fault	-32767~32767	0.01A	0	read-only	read-only	Ordinary users
P13-65	Bus voltage at selected fault	0~65535	0.1V	0	read-only	read-only	Ordinary users
P13-66	Input terminal status when selecting faults	0~65535	--	0	read-only	read-only	Ordinary users
P13-67	Output terminal status at selected fault	0~65535	--	0	read-only	read-only	Ordinary users
P13-68	Command speed at selected fault	-30000~30000	rpm	0	read-only	read-only	Ordinary users
P13-69	Command torque for selected faults	-30000~30000	%	0	read-only	read-only	Ordinary users
P13-70	Feedback torque for selected faults	-30000~30000	%	0	read-only	read-only	Ordinary users
P13-71	Position command for selected fault	-32767~32767	p	0	read-only	read-only	Ordinary users
P13-72	Position deviation during selected fault	-32767~32767	p	0	read-only	read-only	Ordinary users
P13-73	Control word for selected fault	0~65535	--	0	read-only	read-only	Ordinary users
P13-74	Status word for selected fault	0~65535	--	0	read-only	read-only	Ordinary users
P13-77	Number of effective faults	0~65535	--	0	read-only	read-only	Ordinary users

Code	Name	Set range	unit	value	Effective mode	Set method	Set mode
P13-78	Function code group number with abnormal parameters	0~65535	--	0	read-only	read-only	Ordinary users
P13-79	Function code group offset with abnormal parameters	0~65535	--	0	read-only	read-only	Ordinary users
P13-80	Total running time	0~2147483647	0.1s	0	read-only	read-only	Ordinary users
P13-91	Maximum scheduling time for the main loop within 4 seconds	0~65535	us	0	read-only	read-only	R&D personnel
P13-92	Maximum running time of the main loop within 4 seconds	0~65535	us	0	read-only	read-only	R&D personnel
P13-93	Maximum interruption running time of current loop within 4 seconds	0~65535	us	0	read-only	read-only	R&D personnel
P13-94	Maximum interruption running time of the position loop within 4 seconds	0~65535	us	0	read-only	read-only	R&D personnel

9.19 P15 Virtual IO Parameter Group

Code	Name	Set range	Unit	Value	Effective mode	Set method	Set mode
P15-00	VDI1 terminal function selection	0- No allocation	--	0	Effective	Set	Ordinary
		1-Servo Enable			immediately	anytime	users
	2- Fault reset						
	3-Gain switch						
	4-command switch						
	5-command direction switch						
	6- Internal command switch0						
	7-Internal command switch 1						
	8-Internal command switch 2						
	9-Internal command switch 3						
	10 Operation mode switch 0						
	11- Operation mode switch 1						
	12 Zero Clamp						
	13- Pulse prohibition						
	14- Prohibition of forward rotation						
	15- Do not reverse						
	16- switch of external torque limit for forward rotation						
	17- switch of external torque limit for Reverse rotation						
	18-jog forward						
	19- Jog reversal						
	20- Reserved, 21- Reserved, 22- Reserved, 23- Reserved						
	24- Electronic gear switch						
	25- Direction of torque command						
	26- Speed command direction						
	27- Position Command Direction						
	28- Enable multi position operation						
	29- Cancel interrupt fixed length action						
	30- Reserved						
	31- Origin signal						

		32- Origin regression trigger signal						
		33- Interruption fixed length prohibition						
		34- Emergency stop						
		35- Clearance of Position Deviation						
		36- Speed limit selection						
		37 Pulse command prohibited						
		38 Probe 1						
		39 Probe 2						
P15-01	VDI2 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-02	VDI3 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-03	VDI4 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-04	VDI5 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-05	VDI6 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-06	VDI7 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-07	VDI8 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-08	VDI9 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-09	VDI10 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-10	VDI11 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-11	VDI12 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-12	VDI13 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-13	VDI14 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users	
P15-14	VDI15 terminal	Same parameter P15-00	--	0	Effective	Set	Ordinary	

	function selection				immediately	anytime	users
P15-15	VDI16 terminal function selection	Same parameter P15-00	--	0	Effective immediately	Set anytime	Ordinary users
P15-16	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-17	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-18	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-19	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-20	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-21	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-22	VDI1 terminal logic selection	0-VDI1 Write 1 is valid The write value of 1-VDI1 changes from 0 to 1, which is valid	--	0	Effective immediately	Set anytime	Ordinary users
P15-23	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-24	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-25	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-26	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-27	VDI1 terminal logic	0-VDI1 Write 1 is valid	--	0	Effective	Set	Ordinary

	selection	1-VDI1 valid when transfer from 0 to 1			immediately	anytime	users
P15-28	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-29	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-30	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-31	VDI1 terminal logic selection	0-VDI1 Write 1 is valid 1-VDI1 valid when transfer from 0 to 1	--	0	Effective immediately	Set anytime	Ordinary users
P15-32	VDO virtual level	0~65535	--	0	read-only	read-only	Ordinary users
P15-33	VDO1 terminal function selection	0- Undefined 1- Servo ready signal 2- Rotation signal 3-Zero speed signal 4- Torque arrival 5-speed reaching signal 6-Position arrival signal 7-Position proximity signal 8-Torque limit 9-Speed limit 10- Brake 11- Warning 12- Alarm 13- Reserved 14- Reserved 15- Reserved 16- Interrupt fixed length completion 17- Origin regression completed 18- Electrical origin regression completed	--	0	Effective immediately	Set anytime	Ordinary users

P15-34	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-35	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-36	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-37	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-38	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-39	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-40	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-41	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-42	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-43	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-44	VDO1 terminal function selection	Same parameter P15-33	--	0	Effective immediately	Set anytime	Ordinary users
P15-45	VDO1 terminal function selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-46	VDO1 terminal function selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-47	VDO1 terminal function selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-48	VDO1 terminal function selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-49	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-50	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-51	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-52	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users

P15-53	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-54	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-55	VDO1 terminal logic level selection	Same parameter P15-16	--	0	Effective immediately	Set anytime	Ordinary users
P15-56	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-57	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-58	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-59	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-60	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-61	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-62	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-63	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users
P15-64	VDO1 terminal logic level selection		--	0	Effective immediately	Set anytime	Ordinary users

9.20 P16 Version Information Parameter Group

Function code	Parameter Name	Set Range	Company	Factory value	Effective method	Setting method	Set mode
P16-00	MCU firmware version	0~65535	--	0	read-only	read-only	Ordinary users
P16-01	FPGA firmware version	0~65535	--	0	read-only	read-only	Ordinary users
P16-02	Ethercat version	0~65535	--	0	read-only	read-only	Ordinary users
P16-03	User parameter version	0~65535	--	0	read-only	read-only	Ordinary users

10 User Dictionary Description

10.1 Process Data

EtherCAT real-time data transmission is realized through Process Data Objects (PDO). According to the data transmission direction, PDO can be divided into RPDO (Reception PDO) and TPDO (Transmission PDO). RPDO transmits data from the master station to the slave stations, while TPDO feeds back data from the slave stations to the master station.

The S8 series servo drives support users to autonomously allocate the PDO list and customize PDO mapping objects.

PDO Mapping

PDO mapping is used to establish the mapping relationship between the object dictionary and PDO. Indices 1600h to 17FFh correspond to RPDO, and indices 1A00h to 1BFFh correspond to TPDO. In the S8 series servo drives, there are 4 RPDOs and 4 TPDOs available for selection.

PDO Name	Index	Maximum Number of Mappings	Maximum Byte Length
RXPDO	1600h	10	40
TXPDO	1A00h	10	40

PDO Configuration

PDO mapping parameters refer to the pointers to the process data corresponding to the PDO that needs to be sent or received, including the index, sub-index, and the length of the mapped object. Sub-index 0 records the number of objects specifically mapped by this PDO. The data length of each PDO can be up to 4*N bytes, and one or more objects can be mapped simultaneously. Sub-indices 1 to N represent the mapping content. The content of the mapping parameters is defined as follows:

Bit	31	16	15	8	7	0
Value	-	-	-	-	-	-	-	-	-

Meaning	Index	Subindex	Object Length
-	-	-	-

The index and subindex jointly determine the position of an object in the object dictionary. The object length indicates the specific bit length of the object, expressed in hexadecimal, as shown below:

Object Length (Hex)	Bit Length
08h	8 bits
10h	16 bits
20h	32 bits

Example: The mapping parameter representing the 16-bit control word (6040h-00) is **60400010h**.

The PDO configuration process of the S8 series servo follows the steps below:

- Configure the PDO mapping group. Write **0** to Subindex 00h of 1C12h (or 1C13h):
 - Clear the original mapping group: Write "0" to Subindex 00h of 1C12h (or 1C13h) to clear the PDO configuration group.
 - Write the PDO mapping group: Write the mapping configuration groups 1600h and 1A00h according to scenario requirements.
 - Write the total number of the PDO mapping group: Write the total number to Subindex 00h of the object 1C12h (or 0x1C13h).
- Configure the PDO mapping object. Write **0** to Subindex 00h of 1600h (or 1A00h):

- a) Clear the original mapping object: Write "0" to Subindex 00h of 1600h (or 1A00h) to clear the PDO mapping configuration.
- b) Write the PDO mapping content: Write the content to mapping parameter Subindexes 1~10 respectively according to the object parameter definition in the XML file; only objects that support mapping can be configured as PDO mapping content.
- c) Write the total number of PDO mapping objects: Write the number of mapped objects in Step b to Subindex 0.

● **Notes**

1. PDO configuration can only be set when the EtherCAT communication state machine is in **Pro-Operation** (displayed as 2 on the panel), otherwise an error will be reported.
2. PDO configuration parameters cannot be stored in the EEPROM. Therefore, **reconfigure the mapping objects after each power-on**; otherwise, the mapping objects will use the default parameters of the servo driver.

10.2 Mailbox Data

The EtherCAT mailbox data Service Data Object (SDO) is used to transmit aperiodic data, such as the configuration of communication parameters and servo driver operation parameters. The S8 series servo driver currently supports SDO requests and SDO responses.

Parameter Address Structure

The CiA402 protocol imposes the following constraints on parameter addresses:

Index (Hex)	Description
0000-0FFF	Data type description
1000-1FFF	CoE communication objects
2000-5FFF	Manufacturer-defined objects
6000-9FFF	Sub-protocol objects
A000-FFFF	Reserved

Among them, the custom manufacturer parameter group of the S8 series servo driver is the **0x2000-0x2020** parameter group.

Parameter access address: Index + Subindex

- The index address is **0x2000 + the first two digits of the parameter**
- The subindex address is **(the last two digits of the parameter converted from decimal to hexadecimal) + 1**

Example: To read the bus voltage parameter value of **P13-21**:

The index is 0x2013; the decimal number 21 is converted to hexadecimal 0x15, plus 1 to get 0x16. Access **0x2013:16** to read the value of the P13-21 parameter.

Other examples:

- Parameter P05-18 (Pulse signal filter time): Corresponding address is **0x2005:13**
- Parameter P09-00 (Drive axis address/Station number): Corresponding address is **0x2009:01**
- Parameter P0B-12 (Excessive position deviation fault threshold): Corresponding address is **0x200B:0D**

10.3 Appendix: Common Parameter List of Object Dictionary

6000h Group

Index	Subindex	Type	Name	Data Type	Access Type	Mapping Type	Unit
603Fh	-	VAR	Error code	UINT	ro	T	-
6040h	-	VAR	Control word	UINT	rw	R	-
6041h	-	VAR	Status word	UINT	ro	T	-
605Ah	-	VAR	Quick stop mode selection	INT	rw	R	-
605Dh	-	VAR	Pause mode selection	INT	rw	R	-
6060h	-	VAR	Control mode	SINT	rw	R	-
6061h	-	VAR	Control mode display	SINT	ro	T	-
6062h	-	VAR	User position command	DINT	ro	T	User command unit
6063h	-	VAR	Motor position feedback	DINT	ro	T	Encoder unit
6064h	-	VAR	User position feedback	DINT	ro	T	User command unit
6065h	-	VAR	Excessive user position deviation threshold	UDINT	rw	R	User command unit
6066h	-	VAR	Position deviation time window	UINT	rw	R	ms
6067h	-	VAR	Position arrival threshold	UDINT	rw	R	User command unit
6068h	-	VAR	Position arrival time window	UINT	rw	R	ms
606Ch	-	VAR	Actual user speed feedback	DINT	ro	T	User command unit/s
606Dh	-	VAR	Speed arrival threshold	UINT	rw	R	rpm
606Eh	-	VAR	Speed arrival time window	UINT	rw	R	ms
606Fh	-	VAR	Zero speed threshold	UINT	rw	R	rpm
6071h	-	VAR	Torque target value	INT	rw	R	0.1%
6072h	-	VAR	Maximum torque	UINT	rw	R	0.1%
6074h	-	VAR	User given torque value	INT	ro	T	0.1%
6077h	-	VAR	Actual torque feedback	INT	ro	T	0.1%
6078h	-	VAR	Actual current value	INT	ro	T	0.1%
6079h	-	VAR	DC bus voltage value	UDINT	ro	T	0.001V
607Ah	-	VAR	Target position value	DINT	rw	R	User command unit
607Ch	-	VAR	Home offset	DINT	rw	R	User command unit
607Dh	0	ARRAY	Soft limit: Maximum number of subindexes	UINT	ro	N	-
607Dh	1	ARRAY	Soft limit: Minimum position limit	DINT	rw	R	User command unit
607Dh	2	ARRAY	Soft limit: Maximum position limit	DINT	rw	R	User command unit
607Eh	-	VAR	Command polarity	USINT	rw	R	-

607Fh	-	VAR	Maximum profile speed	UDINT	rw	T	User command unit/s
6080h	-	VAR	Maximum motor speed	UDINT	rw	T	rpm
6081h	-	VAR	Profile speed	UDINT	rw	R	Command unit/s
6083h	-	VAR	Profile acceleration	UDINT	rw	R	User command unit/s ²
6084h	-	VAR	Profile deceleration	UDINT	rw	R	User command unit/s ²
6085h	-	VAR	Quick stop deceleration	UDINT	rw	R	User command unit/s ²
6087h	-	VAR	Torque ramp	UDINT	rw	R	100.0%/ms
608Fh	0	ARRAY	Position encoder resolution: Max subindexes	USINT	ro	N	-
608Fh	1	ARRAY	Motor encoder resolution per revolution	UDINT	ro	T	Encoder unit
608Fh	2	ARRAY	Motor revolution count	UDINT	ro	T	Revolutions
6091h	0	ARRAY	Electronic gear ratio: Max subindexes	UINT	ro	R	-
6091h	1	ARRAY	Electronic gear ratio: Numerator	UDINT	rw	R	-
6091h	2	ARRAY	Electronic gear ratio: Denominator	UDINT	rw	R	-
6092h	0	ARRAY	Feed constant: Max subindexes	UINT	ro	R	-
6092h	1	ARRAY	Feed constant: Numerator	UDINT	rw	R	-
6092h	2	ARRAY	Feed constant: Denominator	UDINT	rw	R	-
6093h	0	ARRAY	Position factor: Max subindexes	UINT	ro	N	-
6093h	1	ARRAY	Position factor: Numerator	UDINT	rw	R	-
6093h	2	ARRAY	Position factor: Feed constant	UDINT	rw	R	-
6094h	0	ARRAY	Speed encoder factor: Max subindexes	UINT	ro	N	-
6094h	1	ARRAY	Speed encoder factor: Numerator	UDINT	rw	R	-
6094h	2	ARRAY	Speed encoder factor: Denominator	UDINT	rw	R	-
6095h	0	ARRAY	Speed factor: Max subindexes	UINT	ro	N	-
6095h	1	ARRAY	Speed factor 1: Numerator	UDINT	rw	R	-
6095h	2	ARRAY	Speed factor 1: Denominator	UDINT	rw	R	-
6097h	0	ARRAY	Acceleration factor: Max subindexes	UINT	ro	N	-
6097h	1	ARRAY	Acceleration factor: Numerator	UDINT	rw	R	-
6097h	2	ARRAY	Acceleration factor: Denominator	UDINT	rw	R	-
6098h	-	VAR	Homing mode	UINT	rw	R	-
6099h	0	ARRAY	Homing speed: Max subindexes	UINT	ro	N	-
6099h	1	ARRAY	Homing speed: Search deceleration point	UDINT	rw	R	User command unit/s
6099h	2	ARRAY	Homing speed: Search home switch	UDINT	rw	R	User command unit/s
609Ah	-	VAR	Homing acceleration	UDINT	rw	R	User command unit/s ²

60B0h	-	VAR	Position offset	DINT	rw	R	User command unit
60B1h	-	VAR	Speed offset	DINT	rw	R	User command unit/s
60B2h	-	VAR	Torque offset	INT	rw	R	0.1%
60B8h	-	VAR	Probe function	UINT	rw	R	-
60B9h	-	VAR	Probe status word	UINT	ro	T	-
60BAh	-	VAR	Probe 1 rising edge position feedback	DINT	ro	T	User command unit
60BBh	-	VAR	Probe 1 falling edge position feedback	DINT	ro	T	User command unit
60BCh	-	VAR	Probe 2 rising edge position feedback	DINT	ro	T	User command unit
60BDh	-	VAR	Probe 2 falling edge position feedback	DINT	ro	T	User command unit
60C0h	-	VAR	Interpolation submode selection	INT	rw	R	-
60C1h	0	ARRAY	Interpolation data record: Max subindexes	UINT	ro	N	-
60C1h	1	ARRAY	Interpolation displacement	UDINT	rw	R	-
60C2h	0	ARRAY	Interpolation time period: Max subindexes	UINT	ro	N	-
60C2h	1	ARRAY	Interpolation time unit	USINT	rw	R	-
60C2h	2	ARRAY	Interpolation time index	SINT	rw	R	-
60C5h	-	VAR	Maximum profile acceleration	UDINT	rw	R	User command unit/s ²
60C6h	-	VAR	Maximum profile deceleration	UDINT	rw	R	User command unit/s ²
60E0h	-	VAR	Positive maximum torque limit	UINT	rw	R	0.1%
60E1h	-	VAR	Negative maximum torque limit	UINT	rw	R	0.1%
60F2h	-	VAR	Positioning option code	UINT	rw	R	-
60F4h	-	VAR	User position deviation	DINT	ro	T	User command unit
60F8h	-	VAR	Maximum slip	DINT	rw	R	-
60FCh	-	VAR	Motor position command feedback	DINT	ro	T	User command unit
60FDh	-	VAR	DI input status	UDINT	ro	T	-
60FEh	0	ARRAY	DO output: Max subindexes	UINT	ro	N	-
60FEh	1	ARRAY	DO output status	UDINT	rw	R	-
60FEh	2	ARRAY	Bit mask	UDINT	rw	R	-
60FFh	-	VAR	Target speed	UDINT	rw	R	User command unit/s
6502h	-	VAR	Supported servo operation mode	UDINT	ro	T	-

Remarks

1. The parameter 60FDh describes the DI input status and requires numerical conversion. The value of 60FDh is a 32-bit integer:

- a) When DI1 has a signal input, the 16th bit of the parameter changes from 0 to 1.
 - b) When DI2 has a signal input, the 17th bit of the parameter changes from 0 to 1, and so on.
- The reading rule of the DO output status parameter 60FEh is the same as that of 60FDh.